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R1978-042 Other #. Box # 6937B KENYA - Kenya 3 Tana River Basin / Kenya 29 Water Master Plan -Correspondence



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Comprehensive Water Resources Planning

in Kenya

Report of a Mission organised in June, 1971, to study and recommend on a National Water Planning Project

Dr. George B. Maxey Mr. Runo E. Savisaari CONSULTANTS

9 July, 1971

UNDP

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#### Summary

This report gives, with supplementary reports included in the references, an up-to-date summary of the water resources simulation in Kenya; a description of a general framework for water resources comprehensive planning, and offers recommendations for more adequate administrative and executive action in regard to water resources development and management.

The need for institutional reform is stressed, particularly in the field of high-level governmental concern for the resource and in the need to strengthen governmental action and control.

Training of personnel drawn from the population of Kenya is discussed with the idea that Kenyans must, within a reasonable time, take-over the management and development of Kenyan water resources.

Mechanics of implementation, financing, and management of the planning process are discussed largely in the light of impending Kenyandominated, as opposed to external expert controlled, management and control.

#### I. Introduction

1. In February 1971 the Government of Kenya submitted an official request to UNDP for a mission to study a National Master Plan for Water Development in Kenya (Appendix I). On the basis of this request a two-man mission composed of Mr. Runo E. Savisaari and Dr. George B. Maxey, both with experience in water resources planning, were asked to visit Kenya and advise both the Kenyan Government and the UNDP on the advisability of adoption of a comprehensive water resources plan and upon the terms of reference that this plan might have. In June 1971 the mission was organised and on June 23 first met in Nairobi, Kenya. On June 24 the mission met with Mr. Bruce Stedman, Resident Representative of the UNDP in Kenya, and with representatives of the WHO and of the Kenyan Government at which time it was made plain that:

- a) A National Water Plan for Water Development in Kenya did not exist, at least in any documents or in any way that the mission could realistically deal with the situation at hand.
- b) That the mission would do its best to develop basic considerations of a comprehensive water resources plan and, in the limited time available (two to three weeks), present this plan to the Kenyan Government and all other interested parties.
- c) That after two to three months the mission and representatives of the Government would meet again with the aim of developing terms of reference and a proposal to initiate comprehensive water resources planning in Kenya.

With these qualifications the objectives of the mission are clearly set forth in the terms of reference shown in Appendix A. of this report.

2. It should be clearly understood that Kenya has been considering comprehensive planning of water resources for many years. In 1963, as the result of a WHO/FAO joint report (Reference 12) it was recommended that a National Water Authority be established. This necessarily implied

that national water planning in some form was needed. This recommendation did not come out of the "clear blue" but was prompted by careful consideration by the Chief Hydraulic Engineer, Hydraulic Branch, PWD, of the Ministry of Works in February 1961 and by other comments by other Kenyan authorities (Reference 13). Following this report unmerous comments by many staff members and organizations indicated the necessity for specifically planning for water supply and sewerage and generally for overall water planning.

Many other comments and studies, too numerous to be commented upon by this mission, show clearly that water resources, as a sector of the national situation, needs clear and specific attention. For background material the best references presently available to the mission are the WHO/FAO studies in 1963 (Reference 12) and the WHO 1967-1968 report (Reference 13) cited above.

For many years the Hydraulic Branch of PWD (Ministry of Works) dealt with urban water supply while the African Land Development Board of the Ministry of Agriculture dealt with all water development in the African rural areas. Later they were combined to form the Water Development Department of the Ministry of Natural Resources. In 1967 the Department became the Water Development Division of the Ministry of Agriculture and continues to be the primary agency responsible for water resources development and management in Kenya. This agency, wherever its house in the administrative structure, has responsibly carried out its commission within the limits of Government support to manage and develop the water resources of Kenya. But it has never received the Governmental and popular support necessary to efficiently and properly deal with the overall water resources of the nation. In comparison with other sectors of national development the Division cannot, and has not been able, to compete on either a status or salary level in the

professional market. In part this is porbably due to the fact that the Division has concentrated its efforts mainly in water supply for domestic and livestock use and has not assumed active responsibility in other sectors mentioned or implied by the Water Act or by later Ordinances passed by the Parliament. Development management and ultimate optional use of the resource reach into most sectors of Kenyan development and ranges in importance from being almost an absolute control of development in the northern, southwestern and eastern parts of the nation to being the key to environmental management, industrial development, and municipal and domestic well-being in other parts of the country. Thus, water resources planning, development and management deserve increased recognition by the Government and the public. Such recognition should take the form of increased status in the Governmental structure, increased compensation to professional and technical civil servants and further encouragement to career-minded Kenyans to select water resources work as their profession.

Within the time limitations, the mission hopes that a viable proposition has been generated and that the responsibilities and effort needed by all parties concerned have been clearly stated. It may well be that terms of reference for a proposal for support of National Water Resources Planning exist within this report. However, the mission respectfully suggests that it and the Government may well wish to meet and to frame a proposal after a reasonable period of study and consideration. We suggest the period September 15 to October 15 as appropriate for such a meeting.

Kenya may well be the first and most appropriate African nation to adopt comprehensive national planning for water resources. With this in mind the mission recommends the consideration of a planning project provided the Government of Kenya indicates a strong desire and demonstrates the interest and capability for national water resources planning as suggested in this report.

Acknowledgement should be made of the gracious and considerate cooperation received from all parties, Government and external, that the mission contacted while in Kenya. A list of persons and organizations interviewed is appended.

#### II. THE WATER RESOURCES SITUATION IN KENYA - A SUMMARY

#### 1. General Facts - present supply and demand

The mean annual precipitation in Kenya is 20 inches and the total quantity of water falling on the land area in an average years is 235 mill. acre feet (one acre foot equals 271,000 Imperial gallons).

6.

Stream run-off data obtained from 361 gauging stations in the five principal drainage basins give a mean annual discharge of all streams as 12 mill. acrefeet, which is only a little over 5 per cent of average yearly precipitation and varies in the five principal drainage areas from 12.3 per cent in Lake Victoria basin to 1.2 per cent in the Rift Valley.

Water requirements for domestic use of the present population of 10.9 million, using an average per capita per day figure of 10 imperial gallons, amounts to 1.5acrefeet per year, which is less than 0.06% of the total precipitation and only a little over 1% of average annual run-off. If the population grows 3% annually to the end of the century, Kenya at that time will have 27 million people, and if the average water consumption has increased to 14 gallons per day, the total annual demand would be 1,460,000 acrefeet. This is equal to about 0.6% of the precipitation at 12% of the run-off. The above figures show, that the water resources in Kenya as a whole are sufficient during the present century for domestic use.

The ground-water resources are an important factor in the overall water supply. On the average the surface of the ground waterlies 80 metres below the surface, i.e. considerably deeper than in other parts of Africa. Ground water resources, both location and amount, are poorly known in Kenya.

## 2. Availability of data

Hydrological data are to be found in Kenya for 20 to 30 years time. In 1969 the observation net consisted of the following observation stations :

Type		N:0 of
River gauging stations		361
Water level records		42
Standard rain gauges	· ·	828
Autographic rain gauges		54
Storage rain gauges		42
Evaporation pans		81
Full Hydro-Meteorological	Stations	20

The observation net is mainly concentrated on the Highlands, where the main part of the population is to be found. The rainfall and weather data are regularly published by the East African Meteorological Department. The stream-flow records from 70 river gauging stations are published twice a year. This publication gives information on the mean and the extreme flows recorded during the month.

Accurate data concerning the population in Kenya is to be found in the publication "Kenya Population Census 1969". According to this publication, the population in Kenya was in August 1969 totally 10,942,705, of which 5,482,381 are men and 5,460,324 women. This means an average frequency of 19 people per square kilometre.

The accuracy of theæstatistics is sufficient for all kinds of planning operations. As for each province the population is divided as follows :

Central Province	1,676,000
Coast Province	944,000
Eastern Province	1,907,000
North Eastern Province	246,000
Nyanza Province	2,122,000
Rift Valley Province	2,210,000
Nairobi	509,000

8.

Excellent maps, fully satisfactory for planning purposes, are available in Kenya. There are maps in the scale of 1:250,000 covering the whole country with contours at an interval of 200 feet, and there are also maps in the scale 1:50,000 covering the southern part of the country with contours at an interval of 50 feet. A series of 1:100,000 scale maps cover the northern part of the country, some with contours at an interval of 200 feet. Since all of these maps are developed photogrammetrically, areal photos are also available. Additionally there is the National Atlas of Kenya, published in 1970, the maps being at a scale 1:3,000,000. In the atlas is included maps and short texts describing the lakes, rivers, water falls, precipitation, temperatures per month, geology, soil, distribution of population, water supply.and industry.

#### 3. Completed and ongoing water projects

- a. Sectorial Study and National Programming for Community and Rural Water Supply, Sewage and Water Pollution Control (Ref. 20). This study is being carried out by the WHO. The contract was sign d on behalf of the Kenya Government in January 1971. The last report will be given 20 months after the commencement of the field operations.
- b. Survey of the irrigation potential of the Lower Tana River Basin, FAO (KEN 3).

c. The National Power Development Plan 1966-1986.

- d. Surveys and Pilot Demonstration Schemes leading to the reclamation of the Yala Swamp -(FAO (KEN 6).
- e. Range Management Division of the Ministry of Agriculture and Animal Husbandry - FAO (KEN 11).
- f. Irrigation Research Station, Ahero FAO (KEN 16).
- g. Sewage and Ground Water Survey, Nairobi WHO (KEN 23).
- h. A study of the Upper Tana River Basin by LARCO consultants (Reference 30).

### 4. Legal considerations

The Water Ordinance of 1952 and subsequent amendments define the ownership and control of water and the powers of the Minister responsible for water resources. It establishes the Water Resources Authority and the Water Apportionment Board. The Water Resources Authority has no executive or financial powers, but has wide advisory functions in relation to the policy of water development while the control and apportionment of water is vested in the Water Apportionment Board. The Water Resources Authority is charged with the duty to guide the investigation of water resources and to advise and make recommendations to the Minister in regard to the improvement, preservation, conservation and utilization of such resources. In all of these activities the Director of Water Development is the Technical Adviser and the Water Development Division is the chief technical arm.

The abstraction of water from surface and underground sources, the construction of dams and channels, etc. may only be carried out if a permit is issued by the Water Apportionment Board. The Board consists of eight members appointed by the Ministry, of whom four members must not be public officers and who are selected from a panel of names submitted by the Regional Water Boards.

The Regional Water Boards' main function is to make recommendations to the Water Resources Authority on water development and conservation policy within their drainage areas and to the Water Apportionment Board in regard to the apportionment of water. For the purpose of the distribution of water supplies in any area the Minister appoints undertakers, who shall be responsible for provision of an adequate supply of water for the area within their limits of supply. The Agricultural Ordinance of 1955 gives the Ministry of Agriculture the power to make rules concerning the maintenance of a body of water and other water matters, when this is deemed necessary for the preservation of the soil and its fertility.

According to the Public Health Ordinance, local authorities are obliged to take measures for preventing any pollution, dangerous to health or to a supply of water, which the public within its district has a right to use and does use for drinking and domestic purposes, and for purifying such supply which has become polluted.

#### 5. Organizations

While the main responsibility for water resources belongs to the Ministry of Agriculture, under which Ministry the Water Development Division has operated since 1967, other ministries, e.g. the Ministry of Works, the Ministry of Health, the Ministry of Local Government and the Ministry of Social Services also initiate and finance small water supplies.

The function of the Water Development Division is to implement the development and management of water throughout Kenya. The principal duties are as follows :

- to advise the Water Resources Authority and the Minister on the water resources of Kenya within a carefully planned programme designed to enhance the economic and social welfare of the country,
- to advise the Water Resources Authority on the development of water resources to serve the needs of the human and animal population, agriculture, including irrigation and ranches, manufacturing, hodro-electric power generation, etc., and to place as much water development as possible on a sound commercial basis,
- to advise the Water Apportionment Board on the conservation of the country's water resources by the control of and the apportionment of such resources, including river regulation, and the promotion of the measures designed to prevent waste and pollution,
- to assist in the preservation of forest reserves, which covers some of the principal water catchment areas in collaboration with the Chief Conservator of Forests,
- to make a continuing assessment of the surface and ground water resources of the country by a co-ordinated and systematic programme for the measuring and recording of data, such as rainfall, evaporation, river discharge, etc.,
- to operate and maintain public and government institutional water suplies, for which the Director of the Water Development Division is the gazetted water undertaker, including the installations of the Mombasa Pipeline Board, and to plan, design and construct new supplies and the augmentation of existing supplies,

- to advise other Government Departments, including carrying out the design and construction of civil engineering works in connection with irrigation, flood protection, sewerage, sewerage disposal, etc. (Reference 31)

The Water Development Division is divided into

Planning and Operations Technical Services Development Water Resources and Conservation Administration

Subordinated to the Ministry of Agriculture are various parastatal agencies such as the National Irrigation Board and the Mombasa Pipeline Board

The power supply in Kenya is controlled by the following firms under the regulation of the Ministry of Power and Communications :

- 1. East African Power and Lighting Company
- 2. Kenya Power Company Ltd.
- 3. Tana River Development Company Limited.

Certain municipalities and most local authorities administer their own water supplies.

External assistance in water resources is supplied by the World Health Organization (WHO), the United Nations Development Programme (UNDP), the Food and Agriculture Organization (FAO), SIDA (the Swedish International Development Authority), USAID, and volunteer groups.

6. Training arrangements

Technical education, which is the basis of developments concerning water supply, is given in Kenya as follows :

- The University of Nairobi have 3-year courses for Civil and Mechanical Engineers, but in the near future the courses will last for 4 years. Due to lack of personnel and laboratory accommodations it is not possible to educate a satisfactory number of engineers,
- Egerton Agricultural College educates Agriculture Technicians,
- Kenya Polytechnic in Nairobi educates subprofessional engineers. The courses last for 3 years,
- The Mombasa Technical Institute is a bridge between the technical institutes and the technical colleges. They educate technicians in the electrical and the mechanical fields.
- The Water Development Division Training School has been operating courses for foremen/inspectors (operation and maintenance), and construction foremen and operators.

The foreman/inspector courses aim at a training of staff for the foreman/inspector cadre, which is in charge of the construction, operation, and maint nance of water supplies. The trainees spend at the present 6 months in the class room and thereafter 2.5 years training on the job.

The first construction foremen course was commenced in January 1971. This course will last for 6 months and will be followed by 2 years of training on the job. It is envisaged that the training will be supplemented by another period of 6 months in the class room.

The courses for water operators so far completed have included 6 weeks of training in class room and workshop. About 150 operators have been trained during ten such courses. 7. Source of funds for present studies and implementation

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 a) <u>Kenyan Government</u> - The Government includes in its budget funds appropriated for the 5-year Development Plan (Reference 1) in the total amount of \$44.85 million. These expenditures are shown in Table I according to recipients of the funds.

		*		Table I	(in US\$	million)	
		1969/ 1970	1970/ 1971	1971/ 1972	1972/ 1973	1973/ 1974	TOTAL
1.	Central Govern- ment	2.61	3.77	4.56	5.40	6.65	22.99
2.	Munici- pality	2.27	3.42	5.38	5.52	4.54	21.13
3.	Other local autho- rities	0.09	0.13	0.14	0.17	0.20	0.73
4.	TOTAL	4.07	7.32	10.08	11.09	11.39	44.85

A breakdown of the Central Government expenditures as shown in the 5-year Development Plan (Reference 1) is given in Table II.

# Table II (in US\$ million)

		1969/ 1970	1970/ 1971	1971/ 1972	1972/ 1973	1973/ 1974	TOTAL
1.	Water Deve- bpment Division						
a)	Urban Supplies	5 0.48	0.59	0.70	0.84	1.01	3.62
b)	Rural Supplies range water	5 1.47	2.52	3.30	4.12	5 26	16.67
2.	Hg. Housing, other 1	0.44	0.48	0.42	0.35	0.31	2.00
3.	Other Minis- tries Rural Water						
	supplies 2/	0.22	0.18	0.14	0.09	0.07	0.70
1.	Total	2.61	3.77	4.56	5.40	6.65	22.99
4	See next page					andretagan 🌶	

 Includes dam and borehole subsidies, small irrigation schemes, water resources surveys and misc. all mainly performed by the WDD.
 Includes Ministry of Health with WHO/UNICEF contributions and local contribution through self-help labour, materials, and cash.

> These tables clearly show the increase in emphasis being placed by the Government on rural water supply and the lack of emphasis on water resources studies other than water supply. However, in addition to these funds about K£2.5 million have been allocated to develop and support irrigation schemes (through the National Irrigation Board, Reference 8). This amount is broken down into K£535,000 for 1969/70, 696,000 for 1970/71, 476,000 for 1971/72, 509,000 for 1972/73 and 310,000 for 1973/74. Also about K£40,000 have been allocated by the Ministry of Economic Planning and Development for surveys relating to land reclamation schemes in underdeveloped areas, and an unknown (to this Mission) amount of government money, but probably quite small, has been or will be expended in the near future in hydropower and geothermal power studies.

> Probably other sectors such as forestry, recreation and wildlife, sewerage and pollution are allotted small sums of government money to be spent on water resources but these allocations were not determined by the mission.

# b) United Nations family projects

Considerable support has been contributed annually to water resource development in Kenya through WHO, UNICEF, FAO operations and projects, most of which are enumerated in the section on Organization (II.5) of this report.

# c) Other multilateral and bilateral assistance

Financial and other support have come to Kenya from several national aid plans including SIDA and USAID and volunteer corps from Great Britain, Sweden, Denmark and the United States among others III. Planning for long-term development and management of water and related land resources in Kenya

 An ideal long-term comprehensive water plan should contain several elements as follows:

- a. It should be guided by carefully chosen and realistic objectives which demand coordination with other national planning and which allows flexibility for implementation of both short and longrange projects. These objectives should include careful consideration of all ongoing and previous project work.
- b. It should take into account the development of other sectors in the national economy and should be adjusted to contribute to the betterment of the total economic and sociological conditions in the country.
- c. It should consider all uses of water as well as the need to reserve water for recreational, environmental and dilution purposes.
- d. It should be phased in a manner that satisifies both 1) the
  limitations of the Government to initiate and maintain it and
  2) the availability of data, methodology and technology.

2. Present water resources planning in Kenya has been primarily concerned with single short-term project development. Thus, the National Five Year programme for 1970 to 1974 (Reference 1) considers only a Master Water Plan for development and management of rural and urban domestic water supplies, implementation and management of a few irrigation schemes and power development in one drainage basin. Little or no mention is made of comprehensive water resource planning and only the forementioned projects are budgeted. Further, it is estimated that the total Government budget allocated for water development plus certain implementation projects such as that supported by SIDA and local "selfhelp" projects will barely meet the requirements of the population increase thus leaving essentially the same percentage (85 per cent) of the rural population without water supplies that are reasonably healthful and accessible. Rough estimates by Government officials (Water Development Division) indicate that the present effort should be increased by a factor of 10 to 15, starting next year, if this large segment of Kenya's population is to have healthful and readily accessible domestic supplies by the year 2000. The ongoing sectorial study now being conducted by WHO will yield more accurate information on this **su**bject.

Budget allocations are similarly small in other sectors of the water resource field and no small factor in this lack of support is the fact that needs and available resources have not been systematically studied, priorities based on modern technical methods have not been set, and applications for significant budget increases to develop even study projects have not been made. In large part, this may well be the result of not only inadequate financing, but lack of availability of well-trained and experienced personnel. Perhaps evidence of this lies in the fact that there are numerous authorised but empty posts in the present organization and the budget for water was not fully expended last year.

3. Initiation of comprehensive long-range water resource planning would bring international, national and Governmental attention to water resources problems and would provide a vehicle to study and define these problems, to set rational priorities, and to develop support, both from national and international sources. Further, proper elucidation of the public in these matters might well result in attracting more people to select the water resources field as a career and thus eventually help to relieve the shortage of trained personnel.

4. This mission did not have time to develop and prepare detailed terms of reference for a comprehensive water plan project in cooperation with Kenyan Government officials. Further, the Kenyan Government agencies had no plan and could not prepare one in the alloted time for the mission. However, it was agreed by all parties concerned that the mission **s**could develop a skeletal plan accompanied by a list of suggested

considerations and actions that the Government might take in the next two or three months. Meanwhile the mission and the Government would further study the substantive material involved and revise, enlarge or otherwise modify the skeletal plan. After this period of study and preparation the responsible Government staff and the mission would meet and develop detailed terms of reference for a comprehensive water plan project to be submitted to prospective sponsors. The skeletal plan is described in the following paragraphs.

> 1) Objectives - The Kenyan Government should define both long and short-term objectives of the Comprehensive Plan, taking into account the present development and management programmes and aims that they wish to set for periods of 3, 10, 30 and possibly 50 years. The 3 and 10 year periods may be regarded as short-term and the 30 and 50 year periods are long-term. Probably most of the effort expended in development and management in the first 10 years of the plan, that is, until 1981, would include presently ongoing and proposed projects, the implementation of which may extend even beyond this date, depending primarily upon availability of staff, available financing, required pre-investment and technical studies, and demand for power, irrigation, water supply, pollution control and conservation.

Long-term considerations through the first ten years should be made concurrently and should be carefully defined by clearly stated and understood realistic objectives. These objectives should be defined keeping in mind the unique Kenyan situation including the legal constraints; the estimated physical limits of the resources and of dependent or accessory resources such as land; sociological factors such as the educational level of potential users and constraints of the tribal systems and traditions; economic constraints including the wherewithal to finance studies, construction, management and the likelihood of industrial development; environmental constraints especially involving the preservation of the vegetative cover of the natural habitats of game animals, fish and birds, and the quality of the marine, surface, and ground waters; capacity for irrigation and stock-raising developments; development of new technology; and population growth, distribution and mobility. As far as possible the objectives, although clearly defined, should allow some flexibility which in turn will allow adaption to the dynamic, changing and largely unforeseeable future.

It should be constantly kept in mind that one of the most valuable features of a dynamic comprehensive plan is not that it allows the nation to foresee everything that will happen between 1971 and 2020, but does allow it to anticipate and ready itself for developments with enough lead time and a store of substantive material, methodology and staff to efficiently cope with such developments.

- 2) The Government should develop a list of <u>principles and</u> <u>assumptions</u> that will effectively constitute the "ground rules" upon which the planning is based. Apart from general **assumptions** such as that there will be no general war or other catastrophe or that the government will remain stable and effective, most planning schemes in the western world include the following:
  - a) That consumptive use requirements in the various sectors will either 1- increase at an agreed upon estimated rate, 2- increase for some period and then stabilize, or 3- will remain stable during the planning period;

- b) That adequate power and fuel will be available to the population throughout the planning period;
- c) That large transbasin or international exports or imports of water will not or will take place;
- d) Various assumptions based upon overall national planning unique to a given country.

3) Phases of the plan should include the following:

a) An inventory phase which allows for the collection, compilation, proper storage and provisions for ready retrieval of all relevant substantive data. Storage and retrieval should probably be accomplished by computer methods since this would allow for orderly and high capacity input and for rapid output in a wide variety of methods or programmes. The inventory will cover all of the sectors discussed in a following section of this report (see III-3-4) and general comments in regard to the completeness and availability of the relevant data are made in that section. This phase might be regarded in two parts, 1) the organisation of the backlog data already on file in some form somewhere and 2) the collection and proper storage of needed information not presently available. This data collection probably should not be done by the planners but should be collected for the planners by the appropriate agency for the various sectors.

Timing for accomplishment of the inventory is, of course, flexible and dependent upon availability of staff and other support. Greatest emphasis should be placed on this phase in the initial stages of the plan and probably part 1, the backlog, should be completed in two to four years. Part 2, of course, is continuing and will continue throughout the life of the plan. It is necessary that the Inventory phase yield enough information to accurately define the extent of the resources, the present use and abuse of it, clearly delineate the nature and extent of present problem areas and sectors where data is lacking. The continuing collection of data should be directed at filling holes in our knowledge and thus allowing the planners to more and more accurately define the water resources situation.

- b) A Water Needs phase which involves the determination of water requirements by prediction and projection for specific time horizons. It is suggested that these time horizons be set at 3 years (1974), 10 years (1981), 30 years (circa 2000) and 50 years (circa 2020). Obviously accuracy of projection for requirements in 1974 and 1981 will be far more realistic and well-defined than for longer periods. However, production of longer projections furnishes a general picture that can be progressively brought up to date as more data are produced and as development for the shorter periods is consummated. The short-term development should furnish valuable information to long-term national planning in all areas as they are consummated. Comparison of estimates of water requirements with results of the Inventory phase allows a sound scientific and technical determination of projects needed for development.
- c) <u>Development of individual project plans and assignment</u> of priorities naturally follow the above two phases. Once the limitations of the resource and the areas of need are determined individual projects can be defined, compared and assigned priorities. This phase of the planning is of great importance because it is an interface with all other development and planning. Project

priorities must be judged, not only for their own merit and in regard to the water resources sector alone, but also in regard to all other sectors in the local and national picture.

d) An implementation and construction phase which obviously is the objective of the whole process.

Phasing of the plan in this manner does not in any way imply that Phase I must be completed before Phase II is started and so on. Actually parts of all the phases from the very beginning of planning will be taking place, for presently ongoing and planned water resources projects will be incorporated into and become an integral part of the plan. Further, work in the various phases of the plan may well progress far more rapidly in certain areas or drainage basins than in others where the demand or the need is less. Inherent in the plan is the concept that study, development, and management should be approached on the basis of geographic subdivisions, most likely drainage basins, although in some instances political or other subdivisions will also have to be considered.

4) General sectors of the water resources field to be considered include:

a) <u>Water supply for domestic use</u> - This sector has been concentrated on by the Water Development Division for several years and much information and substantive data is available. In more recent years not only the WDD, but SIDA, the World Health Organization in concert with the Ministry of Health, UNESCO and the Kenyan Community Development Department have and are supporting an increased effort. The recently initiated WHO-sponsored sectorial study (Reference 20) is strong evidence of increasing attention to this sector and this study should do much to produce data and information for planning purposes.

In general, it is believed that adequate hydrologic data for planning purposes is being produced by the WDD and other data collection agencies but published hydrogeologic information, especially on ground-water occurrence, availability and utilisation is woefully lacking. This is also true in the field of waste disposal and pollution. In both cases a start will have been made to correct this deficiency in the WHO sectorial study (Reference 20) but much further work will remain to be done before both fields are adequately inventoried.

Information on water utilisation in the water supply sector is probably available in sufficient accuracy for national planning and, again, evaluation and organisation of this data should result from the sectorial study (Reference 20).

The chief responsible Government agency in this area is the Water Development Division, Ministry of Agriculture, with accessory responsibilities lying in the Ministry of Health and the Community Development Department.

Recommendations regarding critical needs in <u>all sectors</u> are included in the last section of this report.

b) <u>Irrigation</u> - Although numerous single projects have been developed and are planned for this sector of water resources, a national inventory of irrigable lands and of the projects necessary for their reclamation and use does not seem to exist. Estimates suggest that about 160,000 hectares of land with a high irrigation potential exist and that of this about 6,000 hectares are irrigated (Reference 8). Since irrigation may become one of the largest, if not the largest corsumptive use of water in Kenya and therefore possibly the chief use conflicting with use of water in other sectors, it is necessary that such an inventory be developed as soon as possible.

Experience with several small irrigation projects has indicated reasonable success in betterment of economic and social conditions. Examples include the Mwea, Ahero, Bunyala, Tana and Perkersa schemes. The total annual gross value of production from these schemes exceeded K£780,000 in 1969/70 and more than 3,700 plot-holders profited from more than 5,700 hectares. Since a plot-holder supports an estimated 11 people it can be supposed that about 40,000 people were settled and profited from these schemes (Reference 8).

Although the above figures represent a very small fraction of the total national economy they indicate the tremendous importance that properly managed and developed irrigation projects might assume in the national picture and, therefore, the importance of national planning in this sector.

Responsibility in this sector resides primarily in the National Irrigation Board, but some action on small irrigation projects is also taken by the Water Development Division, Ministry of Agriculture.

c) <u>Hydropower</u> - Rather complete knowledge of this sector is available from only one drainage basin in Kenya and less complete data is available for the rest of the country. The 20-year development scheme cited in the bibliography (Reference 10) probably forms a good nucleus for power information needed for planning purposes at this time.

Chief responsibility for hydropower lies in the Ministry of Power and Communications and the East African Power and Lighting Co. and its associated companies under the general regulation of the Ministry of Power and Communications.

- d) Water for industrial use Little if any information is available on this subject and projected needs for the future are apparently non-existant.
- e) Water reserves for recreation and wildlife including environmental and ecological considerations - It is not known whether knowledge of this area exists at this time. Inquiry by the mission established that no national plan presently exists.

f) <u>Thermal power generation</u> - The only studies available to the mission are described in the 20-year development scheme (Reference 10).

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- g) <u>Navigation and transport</u> No information on this subject was discovered by the mission.
- h) <u>Flood Control</u> Flood control has not assumed large proportions as a problem in Kenya except locally, for the most part, in the western provinces. However, with continuing development, especially along rivers, it can be expected to become a concern if measures are not taken to forestall building and other development in vulnerable areas. Planning that will result in avoidance and prevention of flood damage should be underway on a national basis. Primary responsibility for flood control is in the Water Development Division.
- i) <u>Livestock water</u> Several elaborate schemes for range management have been and are now being conducted in Kenya and data and knowledge of livestock needs for water is probably better understood than in any other sector. Since the quantities necessary for stock needs are very small, it is unlikely that major conflicts of other uses with this use will develop. However, the importance of this supply and strategic location of water points is of critical importance to the nation, especially in northern and north-eastern an in parts of the southern provinces. Primary responsibility for livestock water resides in the Ministry of Agriculture.
- j) <u>Waste disposal and pollution</u> Very few measures to control waste disposal and pollution are presently practiced in Kenya. Definition of plution is not available and

no Government criteria or standards are available. In the one document available to the mission on this subject (Reference 25) a good case is made regarding national needs in this sector and suggestions for implementing Government controls are made. Further, the objectives of the sectorial study (Reference 20) include allowances for study of this problem.

A national inventory of pollution and related problems is needed in order to define and implement a programme in this field. +) Further, a study is needed to determine how much reclamation and reuse of water occurs presently and under what conditions and what the future demand may be for reused water. Obviously this could be a significant source of water supply. It is doubtful that the greater part of the reused water today is properly treated or managed in any way. Undoubtedly some information and recommendations will be forthcoming from the sectorial study (Reference 20) and from ongoing work by Mr. Christiansen in the WDD (Reference 25) but a concerted effort with adequate support is needed to indicate proper institutional arrangements, necessary legislation, establishment of criteria and standards, regional requirements and a proper regulatory procedure. Lack of such action may well result in one of two developments (a) widespread pollution of water sources or (b) rigid poorly informed,

<sup>+)</sup> At the time of this writing a report entitled "National Report on the Human Environment in Kenya" was being prepared by a special Secretariat on the Human Environment in Kenya.

restrictive action which may critically impede industrial and other development in the country, or both. Presently, responsibility for p2lution has been assumed by the Water Development Division with accessory interest being shown by the Ministry of Health (principally health considerations) and the Ministry of Works (construction of some treatment plants).

It is readily apparent, even from these brief summaries, that there is much to be accomplished in the Inventory Phase of the plan. One major chore is the collection and compilation of all the substantive data in a Water Resources Data Bank. This Data Bank should be in the form of a storage and retrieval system which will allow rapid and efficient use of the information in a variety of programs for analysis and interpretation, and especially for simulation theory (systems analysis) studies of drainage basins described in the following section (III.3.5).

In order to handle the "backlog" part of the Inventory and Needs phases, a number of studies, varying in length and complexity, must be undertaken, or if already undertaken, should be completed and, in some instances, enlarged. Among the most important of these are a national ground-water study which should take the form of an intensive reconnaissance by drainage basin or other appropriate subdivision; a land classification study to determine all classes and locations of irrigable lands in the country; an industrial water use study; a study of needs for recreation and wildlife including consideration of environmental and ecological consideration; an evaluation of present and future needs for flood control; a critical, comprehensive investigation of all aspects of water pollution, reclamation and reuse of water. As has been mentioned previously, a start on some of these studies has been made in the Sectorial Study of WHO (Reference 20).

### 5. Mechanics of analysis - The Drainage Basin approach

In order to reduce the problem of determining national water requirements to a tractable level and to assist in determining project priorities, a drainage basin model approach should be undertaken. Thus, all of the substantive data for all of the sectors in given basin can be introduced into a programme based on simulation or related theory and analysed for applicability and degree of relative accuracy. If the programme model turns out to be acceptably accurate, numerous analytical exercises can be performed and several alternative solutions can be developed.

This approach requires the use of modern computers and obviously is directly based upon the storage and retrieval system of the Water Resources Data Bank. It allows for sophisticated use of all the pertinent data and for development of many alternatives, results that cannot be attained by manual or conventional calculation in reasonable periods of time.

As previously pointed out, the Comprehensive Plan allows for all phases to be worked upon at the same time if required. Thus, in a drainage basin where adequate data is inventoried, the Water Requirements Phase can be embarked upon immediately and so on. It would appear that in Kenya much of the substantive data has been collected for the Tana River Basin, and therefore a relatively short basin study, utilizing all the previous studies and with a minimum of further data collection could result in development of a basin model to determine water requirements and project priority. Such a study could serve as a pilot and training project in the Comprehensive Plan and would demonstrate how effectively comprehensive water resources planning may be utilized in Kenya.

6. Projects of immediate concern to Comprehensive later Resources Planning

Implementation of a Comprehensive Water Plan has a high priority in the Kenyan Government. All of the Government staff who were interviewed

by the Mission indicated the desirability and need for such a plan. The Mission agrees in principle that Comprehensive Water Resource Planning should become a part of the policy and operations of the Kenyan Government and therefore recommends that the project of earliest concern in water resources in Kenya should be development of a proposal with terms of reference to implement a Comprehensive Water Resources Plan project to be supported by the Government and by one or any combination of supporting organizations.

If a Water Planning Project is implemented, a number of on-going or proposed studies could immediately become integral parts of it or would at least be highly important contributors to it. These studies and their possible relationship to the Planning project include:

- a) On-going projects
  - The sectorial study by WHO (Reference 20) will contribute much information and guidance especially in the water supply, water utilization, and water pollution areas. It should be closely correlated to and co-ordinated with the proposed Planning Project.
  - 2) Training of scientists, engineers and technicians. The present Government programme of training is considered by all concerned inadequate to develop a cadre of Kenyan citizens capable of developing, operating and maintaining the water resources of the country. In any case, this training programme should be enhanced and, if a Water Planning Project is adopted, should carry provisions to add materially to training at all levels from field technicians to professional engineers and scientists. All principals in the proposed Project staff should have Kenyan counterparts capable of profiting from on-the-job training as well as from special training courses.

#### b) Proposed projects

- If a Water Planning Project is adopted, the proposed Tana River Basin Study should be expanded and used as a pilot project in river basin analysis for planning as well as for a pre-investment study for justification of financing the proposed construction.
- 2) Several municipalities in Kenya are proposing enhancement and enlargement of present water supply and sewerage facilities. The Water Planning Project should be aware of these developments participate in their planning and assure their co-ordination with other sectors of water resources. Among these municipalities which are conducting or are proposing to conduct pre-investment studies are Nairobi, Mombasa, Nakuru, Kisumu and Eldoret in addition to the three large towns of Kakamega, Nyeri and Embu. Probably, all of these areas have inadequate sewerage treatment facilities and water supply shortages at least at times or in some places. All will be water-short within a few years (as early as 1974), if expansion of facilities is not accomplished and most are in areas of expected rapid future growth.
- 3) For many years, communities who are willing to shoulder most of the cost of water supply and sewerage facilities have asked the Government for minor assistance mostly consisting of technical supervision, design, and skilled labour. The Water Development Division has tried to furnish such assistance, but has been able to do so in all too few cases. Thus, community leaders who show great initiative become discouraged and this attempt to progress on the part of Kenyan citizens is thwarted. It is suggested that a plan be devised on the basis of a comprehensive study to correct this default and find adequate support for communities who are willing and able to carry most of the burden of development. Such a plan could be worked out under the aegis of the Water Planning Project.

7. Mechanics and implementation of the Comprehensive Plan Project

a) The project should be under the control of an organization at a high level in Government, preferably above ministerial level so that interministerial co-ordination can be firmly achieved. For several years establishment of a National Water Authority has been considered and studied by the Government (References 12 and 13), but the Authority has never been established. Such an Authority would be the ideal administrating agency for the planning project, assuming that the Authority would be an umbrella agency dealing with all water resources policy and presumably would be parastatal comparable, for example, to the National Irrigation Board in terms of administrative responsibilities, freedom of operation, and management of funds. It is assumed that the Water Planning Project staff would act as an executing group for the National Water Authority.

Lacking such an organization at this time, the Comprehensive Plan Project might be placed under administrative control of an inter-ministerial committee such as the one that already exists for co-ordination of water resources development and management activities. The principal advantages for this are obvious, since the committee is supra-ministerial and would allow for co-ordination of ministerial activities in the water resources Disadvantages of such a committee include, (1) that the committee field. may not function effectively because all of the members are preoccupied with other duties fully as pressing and as critical as the committee duties and (2) such committees seldom have staff to take action and prepare background material in a form that is fully informative of the issues under consideration. It is suggested that the Plan Project Manager or Co-Manager act as secretary of the inter-ministerial committee and that their staff act as an executive arm of the committee thus forestalling in part the disadvantages voiced above.

An alternative to the above suggestions would be that the Planning Project be centered in the Planning Division of the Ministry of Finance and Economic Planning. This action would probably assure co-ordination of Water Resources Planning with other planning sectors, but might place
control of the planning in the hands of staff not well acquainted with water resources problems.

The Mission recommends that the Government carefully consider each of these alternatives and any others that may be brought forward and select a course of action very soon so that terms of reference and a proposal for a Planning Project can be prepared. The mission considers that of the three alternatives, administration of the Plan by a National Water Authority holds highest priority and that administration by the Ministry of Finance and Economic Planning or by an inter-ministerial committee is less desirable.

b) Once the administering organization is selected, terms of reference and a proposal for the Planning Project can be developed. The mission suggests that these take into account essentially the material discussed in this section (Section III) of this report and in the section on recommendations (Section IV).

In regard to timing and financing of the Plan Project, considerable flexibility exists. A Plan can be produced in a relatively short time, say two to three years if support, personnel and facilities are readily available. On the other hand, none of these items are known to be readily available and it seems likely that completion of the "backlog" part of Phase I, Inventory, and Phase II, Water requirements, might more likely be accomplished in four to seven years. This is to say that by the end of the period, the planners would be in a position to consider for priority assignment for implementation all proposed projects on a nationwide basis. Previous to this time implementation would be reserved for presently ongoing and some presently proposed projects. The mission believes that the Planning Project should be initially framed for the completion of the "backlog" parts of Phase I and Phase II in five years.

The following personnel might be needed:

1) External experts

a) Project Director - an experienced water resources planner preferably with either an engineering or economics background.

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- b) Water Resources Engineer or Hydrologist with experience in application of computers to hydrologic problems and in simulation or related theory. Minimum period of employment 3 to 5 years.
- c) Sanitary Engineer with broad experience in sewerage treatment and pollution problems, and preferably experience also in planning. Minimum period of employment 3 to 5 years.
- d) Hydrogeologist with experience in ground-water resource evaluation and reconnaissance exploration. Minimum period of employment 2 years.
- e) Land Classification Expert. Minimum period of employment 2 years.
- f) Economist with experience in water resources planning. Minimum period of employment 2 years.
- 2) Government professional staff
  - a) Water Resources Engineer, Hydrologist or Water Resources Planner; co-project director and counterpart.
  - b) Counterpart for Water resources engineer or hydrologist.
  - c) Counterpart for Sanitary Engineer.
  - d) Counterpart for Hydrogeologist.
  - e) Counterpart for Land Classification Expert.
  - f) Three Junior Engineers or Engineers in training.
  - g) One Junior Economist.
  - h) Three to five part-time or full-time students (preferably engineers, economists, geologists) for on-the-job training.
- 3) Government technicians and labourers
- 4) Short-term consultants as needed

The mission recognises the need for consideration of relevant subjects such as demography, ecology, water resources management and training among others and suggests that the Project Director call upon consultants in these fields. A staff esentially comparable to the above should be able to accomplish the 5-year task and, in addition, direct one pilot basin model project and recruit and train a sizable Kenyan professional group.

c) On the basis of the above assumptions the budget for the 5-year Planning Project to be supplied by external agencies might be on the order of \$1.0 million or approximately \$200,000 per year. Costs to the Kenyan Government for counterpart and trainee staff might total to between one-half and three-fourths of this amount. It is assumed that the computer competence of the Kenyan Government is adequate and available for this job, and that no special expensive equipment will be required beyond ordinary office, engineering and geological requirements.

35.

IV <u>Recommendations</u> The mission respectfully acknowledges that three weeks in a country allows little time for deep consideration of that country's problems. At the same time many of the problems we have encountered in Kenya exist in the world at large and not only "developing" nations but so-called "developed" nations must also deal with them. With this in mind we humbly submit the following recommendations.

pp 2; 3; 4

PP 32,

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1. Kenya can profit immeasurably from a well-prepared national water and related land resources plan.

 Kenya must accept several responsibilities if such a plan is adopted. These include:

- a) The development of a responsible organization, such as a <u>national</u> <u>water authority</u> of <u>supra-ministerial and parastatal</u> level within the Government to administer the plan, or delegate the administration of the plan to an <u>inter-ministerial committee</u> that will <u>accept the</u> <u>commission</u> or delegate the administration of the plan to the Ministry of Finance and Planning which again must accept the responsibility of seeing that the Water Plan Project is carried out. In any of these cases the responsible organization should be backed up by a full time administrative staff, for example, the staff of the proposed Project.
- pr 18, b) The Kenyan Government must define and support the objectives of a comprehensive plan for water and related land resources planning.
- pp 19, c) The Government must accept the concept of effective implementation 20 of planning based upon accepted facts, needs and policy.
- d) The Government must strongly support a training programme that allows replacement of external experts by Kenyan nationals in a reasonable period, but still allowing for effective technological aid by expert advisers. Presently Kenyans are not attracted to water resources careers because of the status of the WDD, inadequate knowledge of the discipline and low remuneration of service as water resource engineers, economists, hydrogeologists, etc. We strongly recommend that the Government adopt measures to correct this situation.

3. We recommend that presently on-going programmes, such as the WHO Sectorial Study (Reference 20), be included in the plan. The selection of p 30 the Steering Committee for the Sectorial Study should be very carefully considered and should include key persons from Ministries concerned with the aspects of the study.

4. We recommend that presently planned studies, such as the Tana River p 31 Basin Study project, be expanded and included in the national plan. Indeed, we would hope that an expanded version of the Study might be adopted as a test or pilot study within the national plan as an exemplifying operation demonstrative of the effectiveness of comprehensive planning.

5. We recommend that an operational organization to develop and manage the pp 3, water resource be created at ministerial level incorporating the now existing Water Development Division and such other elements as are deemed necessary to achieve national goals in this area. This organization should work closely with and probably eventually become the operating arm of the proposed National Water Authority.

6. We recommend that a five-year programme to inventory and determine pp 33, water needs be adopted with the idea that scientific and technical knowledge for adoption of projects be the basis for construction and management of water schemes.

7. We recommend that a survey of ground-water availability, occurrence pp 22 and utilisation and a survey of sewerage disposal, pollution and reclamation to 28 and reuse of water be initiated immediately. These studies could be a part of the Nation planning effort if the proposed Planning Project were adopted.

8. We recommend that problems involving water resources, whether geographic, e.g. local, regional or national and whether in the realm of surface (lakes and streams) or ground-water or waste disposal be reported to the Ministry e.g. the Ministry of Finance and Planning, equipped to receive, digest and distribute it in such detail that all interested parties are well aware of the water resources situation in Kenya.

9. We would be prepared to recommend that members of the Kenyan Government and this mission meet again soon, preferably between September 15 and October 15 to compose detailed terms of reference and a proposal for comprehensive national planning for water and related land resources for Kenya if all parties concerned are prepared at that time.

P 2

37.

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- 26. RECENT ADVANCES IN RICE IN KENYA, THE MWEA IRRIGATION SETTLEMENT (GIGLIOLI 1963)
- 27. SEWERAGE AND GROUNDWATER SURVEY, NAIROBI ! WHO (KEN 23)
- 28. PILOT IRRIGATION SCHEME, KANO PLAIN FAO
- 29. RANGE MANAGEMENT DIVISION OF THE MINISTRY OF AGRICULTURE AND ANIMAL HUSBANDRY - FAO (KEN 11)

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#### APPENDIX A

TERMS OF REFERENCE

OF THE CONSULTANTS TO THE ADMINISTRATOR

### Mission in Relation to National Master Plan for Water Development, Kenya

### a) Background information on the Mission

In February, 1971 the Government of Kenya submitted an official request to UNDP for a mission to study a National Master Plan for Water Development in Kenya. On the basis of the Government's request a two-man mission composed of two Hydro-Engineers with experience in planning of water supply development and economy of utilization of water resources was approved.

### b) Composition and Duration of the Mission

The mission is composed of Dr. George Maxey (Chief) and Mr. Runo E. Savisaari. The members of the mission would meet in Nairobi on Wednesday, 23 June and would stay in Kenya for approximately two weeks. Travel itinerary of Dr. Maxey would be Las Vegas to New York for two days briefing and back to New York for one day debriefing and finally to Las Vegas. Mr. Savisaari's itinerary would be Helsinki, Finland/Nairobi and then Nairobi back to Helsinki.

#### c) The purpose of the Mission

1. The consultants <u>should assist the Government in the formulation</u> of their long-term objectives for community and rural water supply <u>development in the country</u>. To this end, they would look into the <u>long-</u> term development plans, especially in the Nairobi area, and the plans for the development of agriculture, forestry, public health, industry and <u>power generation in the country as a whole</u>. Special attention may be paid to plans for sewerage development.

2. The consultants should examine the Government's needs for external assistance and, if required, they may assist in the drafting of an official

42.

## request for UNDP assistance.

They should examine the relation of this project to completed 3. and/or ongoing UNDP projects, particularly Survey of the Irrigation Potential of the Lower Tana River Basin - FAO (KEN 3), Surveys and Pilot Demonstration Sechemes Leading to the Reclamation of the Yala Swamp -FAO (KEN 6), Range Management Division of the Ministry of Agriculture and Animal Husbandry - FAO (KEN 11), Irrigation Research Station, Ahero -FAO (KEN 16), and Sewerage and Groundwater Survey, Nairobi - WHO (KEN 23). In this connection, the mission should meet with representatives of the Agencies who are responsible for the execution of the above-referred UNDP projects.

Explore the relation of this project to other than UNDP multi-4. In this connection, the mission should lateral and bilateral assistance. meet with appropriate representatives of multi-lateral and bilateral programmes in the country such as SIDA/WHO project.

The mission should also look into the institutional arrangements 5. in the country for planning, developing and managing water resources In this connection, special attention should also be given programmes. to the administrative regulations for allocating water use for surface and and groundwater and the procedures for approving water resources development schemes.

With regard to determining present and future water demand, the 6. mission should also look into the qualitative aspects of water requirements with a view to establishing the possibility of recycling of water and using reclaimed sewerage.

The mission is also expected to recommend the best possible way 7. of implementing the project including possible executing agency and sub-contracting if any.

In general, on the basis of the above, the mission should define the scope and nature of possible UNDP assistance, giving due attention to both institutional support for planning and managing water resources development, as well as timing and sequence of investment in the water

### resources sector.

9. Although the mission should feel free to discuss with the authorities concerned anything relevant to its assignment, it is not authorized to make any commitments on behalf of the UNDP.

44.

Sept. 11, 1974 (MRg. WILLIAMS) ENQUIRY FROM HORNSTEIN'S OFFICE ABOUT A DOCUMENT MENTIONED IN LETTER SENT TO THEM BY THE RES REP KENYA DATED AUG. 202, 19 1974 - MUPPER TANA CATCHMENT SURVEY -VENYA (ILACO ?: DOWMENT SENT BY POUCH 20AUG. -WILL WE CONTACT THEM F DOC. ARRIVES HERE (ETT 4914)

INTERNATIONAL DEVELOPMENT ASSOCIATION INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT INTERNATIONAL FINANCE CORPORATION (Sep. Lune)

KEN. 18

OFFICE MEMORANDUM

TO:

FROM:

Gavin E. Wyatt

DATE: August 23, 1972

SUBJECT:

KENYA - Tana River Basin Survey Mission Implementation of Prof. Howe's Report to UNDP of January 31, 1972

With reference to Mr. Stedman's letter to Mr. Michel Doo Kingue of August 5, 1972, I think the suggestion that UNDP should reserve its position in this matter to provision of consultative advice to the Board of the proposed Tana River Authority, from time to time, and that ODA in UK provide the four experts, is an excellent way to implement Prof. Howe's recommendations.

We ourselves would like to be kept in the picture as the work proceeds in view of the Bank's stake in the Kamburu Project and further power developments on the river such as Gtaru. This might best be achieved through our contacts with UNDP if the Kenya Government has no objection.

GEWyatt:mam

cc: Mr. Bailey Mr. Morse Central files

Aug. 23 Bunans ( Chee) said they thought undt Nes. Kep. proposal fine.



#### NAIROBI, KENYA

ELECTRICITY HOUSE Harambee Avenue Cables : UNDEVPRO, NAIROBI POST OFFICE Box 30218 Telephone: 28776

S August 1972

Reference: 15-3-1

Dear Michel,

#### Tana River Basin - KEN 71/010

As you know, we have been waiting for government reaction to the report of Prof. Charles Howe on the above project. Tenerday we were informed that that the Government has approved, at the Ombinet level, the Ministry of Finance and Planning's proposal that Howe's report be accepted and implemented. As our IPF funds are heavily front-leaded and fully programmed, the Government has feether to seek bilateral assistance for the establishment of a Tane diver Authority and implementation of the planning phase and its work. We were asked if UNDF wished to be associated in this effort through inputs of our own, and in all the circumstances we telt that our relationship should be limited to reserving the possibility of occasional consultative advice to the Board of the new Authority. Meanwhile the Government has had informal consultations with local UK/ODA representatives and on receipt of positive responses is preparing a formal request to the U.K. for the provision of a 4-men planning team.

I am rather pleased with the way that this project has developed, as I am sure you will be. I have marked a copy of this letter to Nike Gucevsky who has been following the project, and also to by Utdal IBRD colleagues. As you will recall, the IBRD pre-investment programme proposals included provision for a study of the Tana River Basin (Study No.1-4).

Yours sincerely, 2ECHOM SNO COMMUNIC R.B. Stedman

Resident Representative

Mr. Michel Doo Kingue Assistant Administrator and Director Regional Bureau for Africa U.N. Development Programme New York

tor cc: Mr. M. Gucovsky, UNDP New York Mr. W. Brakel, Chief of Permanent SECEIAED Mission to Eastern Africa, IBRD Miss Eileen Powell, IBRD Washington

AUG 1 5 1972

CC: Messrs. Hornstein/Kaji/Burrows

Wyatt, Engelmann, Dumoulin, Shipman, Creyke



## UNITED NATIONS

### DEVELOPMENT PROGRAMME

#### NAIROBI, KENYA

ELECTRICITY HOUSE Harambee Avenue

Cables : UNDEVPRO, NAIROBI POST OFFICE BOX 30218 Telephone: 28776

Reference: [5-]-]

§ August 1972

Dear Michely

#### Tama River Basin - KEN 71/010

As you know, we have been waiting for government reaction to the report of Prof. Charles Howe on the above project. Verbuilds we were informed that that the Government has approved, at the Oddnet level, the Ministry of Finance and Planning's proposed that Howe's report be accepted and implemented. As our IFF funds the beavily front-leaded and fully programmed, the Government has feathed to neek bilateral assistance for the establishment of a Tane Hover Authority and implementation of the planning phase and its work. We were asked if implementation of the planning phase and its work. We were asked if informal to reserving the potential that our relationship abuild be to the Board of the new Authority of occasional consultative advice informal consultations with local UK ODA representatives and has had be informal consultations in head in planning a formal to be devenant has had to the Board of the new Authority of accessional consultative advice informal consultations with local UK ODA representatives and on receipt the provision of a 4-man planning termal request to the U.K. for the provision of a 4-man planning term.

I am rather pleased with the way that this project has developed, as I am sure you will be. I have marked a copy of this letter to Mike Guesvaky whe has been following the project, and also to by dedal IMM colleagues. As you will recall, the IBMD pre-investment programs proposals included provision for a study of the Tana Hiver Basin (Study No.1-4).

> COMMUNICATIONS SECTION 1972 AUG 18 AH 9: 22

> > Hr. Mohel Doo Kingue Assistant Administrator and Mirector Regional Burcau for Africa

> > > U.H. Development Programme

Man York

eter oc: Mr. N. Cacovery, UMDF New York Hr. N. Brakel, Chief of Permanent SECEINED Mission to Restarn Africa, 1360 Miss Eilsen Fowell, IEED Washington

STER & ! DUA

CC: Messrs, Hornstein/Kaji/Burrows Wyatt, Engelmann, Dumoulin, Shipman, Creyke

INTERNATIONAL DEVELOF ASSOCIATION INTERNATIONAL BANK FOR / INTERNATIONAL FINANCE RECONSTRUCTION AND DEVELOPMENT , CORPORATION

# OFFICE MEMORANDUM

#### TO: Mr. Harold R. Shipman

#### DATE: June 26, 1972

#### FROM: V. Rajagopalan

SUBJECT:

 KENYA - (a) Tana River Basin - Survey Mission - Final Report
(b) National Comprehensive Water Resources Planning Project -UNDP Reports

I have read the above reports and the following are my comments.

#### (a) Tana River Basin - Survey Mission - Final Report

(1) This report deals with agriculture and power projects in the Tana River basin and refers to water supply aspects in passing only. This is perhaps because the terms of reference to the mission specifically mentions water supply only in connection with the assessment of the consistency of existing water allocations for power and water supply.

(2) Among the currently proposed projects in the Tana River basin and their implications for water use (pages 28 and 29 of the report) mention has been made of a "community water supply and irrigation project for the upper catchment area to experiment with bringing irrigation to established traditional agricultural areas via traditional low cost water furrows, the size of the scheme to range up to 50,000 acres or approximately one location". Perhaps community water supply in this context means the use of irrigation water by the farmers for domestic needs. I have no knowledge of this scheme.

(3) The report recommends the creation of a Tana basin planning agency with an expert team consisting of a water resources engineer, a hydrologist, a general agricultural scientist and an economist. Among the functions envisaged for the agency are the collection and storage of water related data and assistance to the proposed National Water Authority (this is recommended under the water resources planning project) in the making of groundwater investigations and inventory. The report does not mention any other role for the agency in domestic water supply. Given the composition of the expert team, it is unlikely that the team would be able to assist technically in groundwater investigation.

(4) Annex 'A' to the report refers to important activities related to integrated planning in the Tana basin and among the recommendations is a study of land disposal methods for municipal sewage by the Tana river planning agency. The study could be useful but the agency proposed may not be the appropriate one to undertake it.

(b) A National Comprehensive Water Resources Planning Project for Kenya

(5) This is in the form of a draft Kenya Government request to UNDP prepared by a consultant. It is based on an earlier mission in June 1971 by two UNDP consultants to study and report on a National Master Plan for Water Development in Kenya. Mr. Harold R. Shipman

(6) The terms of reference to the consultants for the June 1971 study clearly states under the heading "purpose of the mission" the following:

"(i) The consultants should assist the Government in the formulation of their long-term objectives for community and rural water supply development in the country. To this end they would look into long-term development plans.... .....Special attention may be paid to plans for sewerage development.

(v) The mission should also look into institutional arrangements in the country for planning, developing and managing water resources programmes. In this connection special attention should also be given to the administrative regulations for allocating water use for surface and groundwater and the procedures for approving water resources development schemes.

(vi) With regard to determining present and future water demand the mission should look into the qualitative aspects of water requirements....."

(7) The consultants indicate in their summary of the water resource situation in Kenya that the water requirements for domestic use of the present population is an insignificant percentage of the total precipitation or run-off and that "the water resources in Kenya as a whole are sufficient during the present century for domestic use". Referring to existing organizations the report details the functions of the Water Development Division which seem to be fairly comprehensive.

The report also comments on the 1970-74 development plan (8)stating that it "considers only a master water plan for development and management of rural and urban domestic water supply". On the other hand, the report also states that the allocations for rural water supply are barely sufficient to cope with the population increase during the plan period but goes on to point out that the budget for water was not fully utilized during the previous year and identifies the lack of well-trained and experienced personnel as a major problem. In the same breath, the report recommends the creation of a super-agency in the Government for preparation of a comprehensive water resource plan. The report does not critically examine why the existing Water Development Division is not able to fulfill its functions in spite of external aid, Government support and its own broad responsibility under the water act and other ordinances passed by Parliament. It seems to miss the point that the mere substitution of an existing agency by a new one will not solve the basic problem of lack of trained and experienced Kenyan personnel.

Mr. Harold R. Shipman

(9) The report proposes that the Kenya Government should set priorities for periods 3, 10, 30 and 50 years ahead and develop a "list of principles and assumptions upon which the planning is based" but does not make any recommendations for the Government's consideration in this connection. In a developing country such as Kenya is it possible for a Government to set priorities so far ahead and even if they did, would it be meaningful?

- 3 -

(10) The scope of work envisaged in the report for the proposed new agency seems to be overly ambitious. But the UNDP project proposed for 5 years, which would presumably be the main activity of the new agency during the period has only the following objectives:

- (i) Establishment of a framework for a National Comprehensive Water Resource Plan
- (ii) Development of a Water Resources Data Bank and storage and retrieval system
- (iii) Obtaining data on groundwater, land classification, economies of water use, pollution prevention and abatement and environmental conditions
- (iv) Training a minimum of six Kenyan scientists and engineers as counterparts to the six experts proposed under the project.

These objectives are a far cry from the original terms of reference mentioned in paragraph 5.

(11) The proposed UNDP project would be for 5 years involving a project manager for 5 years, 196 man-months of experts' services, 324 man-months of Kenyan professionals' services, and 1080 man-months of supporting personnels' time. The foreign currency costs of the project are estimated at about US\$958,190 and Government contribution at about US\$590,525. In the case of the Tana River planning study, the external costs are estimated at about US\$500,000 and no estimate is available for local costs. It is a moot point whether both the studies are required at this time and the country has even the manpower for training under these projects even if they could find the money to meet the local costs. Are these studies as outlined the top priority ones for fostering economic and social development in Kenya? The reports have no convincing answers.

#### VRajagopalan/lph

cc: Mr. Engelmann

INTERNATIONAL BANK FOR FORM No. 75 RECONSTRUCTION AND DEVELOPMENT (2.60) INTERNATIONAL FINANCE CORPORATION INTERNATIONAL DEVELOPMENT ASSOCIATION Date ROUTING SLIP NAME ROOM NO. F.P OWER R. J.P. DUHOULIN - 508 To Handle Note and File Appropriate Disposition Note and Return Approval Prepare Reply Per Our Conversation Comment Full Report Recommendation Information Signature Initial Send On REMARKS un 3. does at surp ailey mention Mr. House's (ONDP) & discusse .0 ۴ 0.To Grow't to. 10 loast 0.0 1 TO. a 0 From involved Peter Engelmann

#### INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

#### INTERNATIONAL DEVELOPMENT ASSOCIATION

#### OFFICE MEMORANDUM

TO: Mr. Gavin E. Wyatt

DATE: May 18, 1972

FROM: A. E. Bailey

SUBJECT: KENYA - Loan No. 745-KE - Kamburu Hydroelectric Project Tana River Development Company (TRDC) Project Supervision Back-to-Office Report

1. This report is based on information obtained during a mission to Kenya to supervise the Kamburu Hydroelectric Project and to examine progress on associated studies.

#### Loan No. 745-KE

2. The Kamburu Hydroelectric Project is proceeding satisfactorily although some 12 weeks behind schedule. The consultants hope that it will be possible to make up most of this lost time and get construction back on to schedule again by December 1972.

Appropriate actions have been taken to eliminate a squatter problem and the squatter camp should be removed by the end of May 1972.

#### Tana River Basin Study

3. The Government appreciates the urgency of getting the second phase of this study started, but the difficulty is obtaining the necessary finance and expertise. Government is currently dealing with this problem.

#### Environmental Study

4. Despite efforts to get this study moving, nothing has been achieved to date.

These are no issues requiring immediate attention and a full report will be circulated by June 16, 1972.

AEBailey:sst IBRD

cc: Messrs. Chadenet, Baum, Ripman, Rovani, King, Engelmann, Lee, Lithgow, van der Tak, Weiner, Armstrong, Howell, Berrie, Jennings, White, Saeed, Bomani Mr. G. Kaji (Eastern Africa)

Mr. K. Niemann (Controller's Department)

Mr. K. Awunyo (Legal Department)

Public Utilities Files, Central Files, Chronological File

March 23, 1972

Messrs: Kaji/Burrows Engelmann

Eileen Powell

KENYA: (a) Tana River Basin Study (KEN 3)

(b) National Master Plan for Mater Development (KEN 29)

Attached are copies of the reports of the UNDP missions concerning these two projects. As we have only two copies of each report, would Mr. Engelmann kindly pass his on in due course to Messre. Wyatt, Dumoulin and Shipman.

I shall be grateful to receive any comments you might have.

Attachment

cc: Messrs: Wyatt Dumoulin Shipman

-

EPowell/sz



PROGRAMME DES NATIONS UNIES POUR LE DEVELOPPEMENT

### UNITED NATIONS

NEW YORK

CABLE ADDRESS: UNDEVPRO . NEW YORK

TELEPHONE: 754-1234

REFERENCE: DP/KEN/71/009

16 March 1972

Dear Mr. Demuth,

#### Subject: Kenya - National Master Plan for Water Development

We are attaching herewith for your consideration two copies of the mission report prepared by Dr. George Maxey following his recent visit to Kenya as Consultant to the Administrator for the preparation of terms of reference for a National Comprehensive Water Resources Project. The mission took place between 19 December 1971 and 15 January 1972.

We look forward to receiving your comments on this report at your convenience.

Yours sincerely

Mall

Roger Garraud Officer-in-Charge Regional Bureau for Africa

Mr. Richard H. Demuth Director Development Services Department International Bank for Reconstruction and Development 1818 H Street, N.W. Washington, D.C. 20433

Cc: mesars: Eugelman



PROGRAMME DES NATIONS UNIES POUR LE DEVELOPPEMENT

#### UNITED NATIONS NEW YORK

TELEPHONE: 754-1234

CABLE ADDRESS: UNDEVPRO . NEW YORK

REFERENCE: DP KEN/71/010

16 March 1972

Dear Mr. Demuth,

Subject: Kenya - Tana River Basin Study

Please find attached herewith two copies of the mission report prepared by Professor Charles Howe following his recent visit to Kenya as Consultant to the Administrator for the purpose of co-ordinating previous studies carried out on the Tana River Basin.

We are forwarding this mission report for your consideration and would appreciate receiving your comments in due course.

Yours sincerely

· Roger Garraud Officer-in-Charge Regional Bureau for Africa

Mr. Richard H. Demuth Director Development Services Department International Bank for Reconstruction and Development 1818 H Street, N.W. Washington, D.C. 20433

CC: Mesers: Enge

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### PROGRAMME DES NATIONS UNIES POUR LE DEVELOPPEMENT

UNITED NATIONS NEW YORK

CABLE ADDRESS: UNDEVPRO . NEW YORK

TELEPHONE: 754-1234

REFERENCE: DP/SF/310/KEN 3 DP/SF/310/KEN 29

29 December 1971

Dear Mr. Demuth,

Subject: (a) Tana River Basin Study (KEN 3) (b) National Master Plan for Water Development (KEN 29)

Reference: Miss Powell's letter of 21 December 1971

I would like to acknowledge with thanks Miss Powell's letter of 21 December forwarding to us IERD's record of the meeting which took place in Washington on 5 November regarding the above projects. I have sent a copy of these minutes to our Resident Representative in Kenya who will make them available to Dr. Maxey and Professor Howe.

Yours sincerely

Michel Doo Kingué

and Assistant Administrator and Director, Regional Bureau for Africa Kadid No

Mr. Richard H. Demuth Director Development Services Department International Bank for Reconstruction and Development 1818 H Street, N.W. Washington, D.C. 20433

JAN 04 1972

Jamaary 21, 1972

DP/SF/320 KEN 3/29

Frofessor Charles House Department of Heonomics University of Colorado Colorado 50302

Dear Professor Houst

As promised at the meeting held in the Bank on January 18, I am emplosing a copy of the appraisal report prepared by the Bank for the Kamburu hydroelectric project. The report is provided for information in connection with the report you are preparing for UNDP on your mission to review development needs for the Tana River Basin. The Kemburu Report should not be quoted in any context.

He wore glad to velocas you again to the Bank and we look forward to receiving a copy of your report from UNDF in due course.

with kind regards,

Sincerely yours,

Eileen Fouell Development Services Department

Attachment

cc: Messrs. Kaji, Wyatt/Bailey

EPowell/eb

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT FORM No. 75 (2-60) INTERNATIONAL FINANCE INTERNATIONAL DEVELOPMENT ASSOCIATION Date ROUTING SLIP NAME ROOM NO. 6 38 11 To Handle Note and File Note and Return Appropriate Disposition Prepare Reply Approval Per Our Conversation Comment Full Report Recommendation Signature Information Initial Send On REMARKS 1. De Fr olde ritt

FORM No. 57

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT





# OFFICE MEMORANDUM

TO: Files

DATE: January 14, 1972

FROM:

: W. Schaefer-Kehnert and R.G. Grimshaw Projects Dept. Correspondence

SUBJECT: KENYA: Tana River Basin

ANS'D BY \_\_\_\_\_

DATE \_\_\_\_\_

1. As arranged by Mr. Brakel (see Mr. Adams memo to files on the above subject, dated January 4, 1972) a UNDP consultant, Prof. Howe, visited the office on January 12, 1972, to discuss the Tana, River Basin. He was accompanied by Miss Drouilh and Mr. Stenstrom from the Nairobi UNDP Office.

2. Prof. Howe gave us a tentative draft outline for his report on the Tana River Basin Survey (attached). Our main discussion revolved around the proposed pre-investment study for the Tana River Basin and the possibilities for the setting up of an institution for on-going planning in the Basin.

3. Prof. Howe agreed that an overall plan for the development of the Basin was a necessity, but he thought that such a plan should be prepared by a permanent planning team within a local institution such as the proposed Tana River Authority, rather than through the short-term employment of a consulting firm. The preparation of a master plan would in the main result from reviewing all the past reports and surveys on the Upper and Lower Tana to determine the relevant role and priorities of power and irrigation and to formulate the alternatives as a basis for Government decisions. We agreed that if such an Authority was adequately staffed then a master plan could be produced, and furthermore the Authority would then be in a position to ensure continuity and coordination between the planning and implementation stages.

4. However, it was pointed out to Prof. Howe that the setting up of a strong and adequately staffed Authority could be difficult, and that the Government would probably need external assistance in financing the permanent employment of 4 to 5 foreign experts required for the planning team.

5. Prof. Howe promised to keep us informed on his conclusions and would also discuss the matter with Headquarters on his return to Washington.

c.c. Mr. Brakel Mr. Engelmann Mr. Hornstein Mr. Dumoulin / Mr. Adams

WSchaefer-Kehnert/RGGrimshaw/rd.

RECEIVED

# 1972 JAN 19 AMII: 12

SECTION

#### TANA RIVER BASIN SURVEY MISSION

#### Tentative Draft Cutline of Report Dr. Charles Howe, Jan. 1972

- I. Terms of reference
- II. The range of technically feasible alternatives.
  - A. The water resource
    - 1. precipitation
    - 2. river flows
  - B. Alternative configurations of use
  - C. Mwea type irrigation development versus traditional agriculture

1 '

- D. Comparative costs of hydro and thermal power
- E. Alternatives for basin development not necessarily involving water.
- III. Factors relating to choice among alternatives.
- IV. The need for continuity in planning and implementation in the basin.
- V. Alternative institutional arrangements for on-going planning in the basin.
- VI. Miscellaneous (but important) observations.
- VII. Recommendations for action.

Detailed Outline of Part II. B: Alternative Configurations of Water Use

Alternatives to Be Assessed.

- National Power Development Plan with 500 cusecs to Upper Basin irrigation:
  - a. Mwea-type irrigation
  - b, traditional agriculture.
- 2. All water in Upper Basin reserved for power.
- 3. ILACO Upper Basin Plan (approximately 500 cusecs plus 520,000 a.f./year to non-power).
- 4. ILACO Plan plus added storage.
- 5. National Power Development Plan but 520,000 a.f./year plus 500 cusecs to traditional agriculture.
- 6. Power development stopped after Kamburu:
  - a. all water below Kamburu to Upper Basin irrigation
  - b. all water below Kamburu to Lower Basin.

### Data for Each Alternative.

- 1. Ultimate hydro-power development.
- 2. Ultimate thermal-power development.
- 3. Water available in Upper Basin for non-power purposes in acre-feet/year.
- 4. Water available to Lower Basin and Coast.
- 5. Estimated Gross Employment in Upper Basin from non-power uses.
- Estimated number of persons supported in Upper Basin from nonpower uses.
- 7. Estimated cost per person employed in non-power uses.
- 8. Estimated cost per acre of land developed.

INTERNATIONAL DEVELOPMENT ASSOCIATION INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT A KEN ALL

# OFFICE MEMORANDUM

TO: Miss E. Powell

DATE: January 19, 1972

FROM: Gavin E. Wyatt

SUBJECT: KENYA - Kamburu Hydroelectric Project Appraisal Report

> 1. Herewith a copy of the Kamburu appraisal report which we promised to give to Dr. C. Howe. Annex 11 and paragraphs 4.11 through 4.16 contain the relevant information which might be useful to Dr. Howe in his forthcoming studies of the Tana River Basin.

2. When passing on this document, Dr. Howe should be advised that this is given for information only to assist him in writing his report and should not be quoted in any context.

Enclosure.

AEBailey:sst IBRD

cc: Central Files Division Files Messrs. Kaji, Engelmann, Shipman, Wyatt, and January 13, 1972 J. Dumoulin Eileen Powell

### KENYA: Tana River Basin Study - KEN 3

This note is to confirm that the meeting with Messrs. Gabre-Madhin, Gucovsky, and Howe to hear Mr. Howe's report of his mission will be held at 11:00 a.m. next Tuesday, January 18, in Room D-860.

EP:rlu

### TANA RIVER BASIN SURVEY (KEN 71/10)

Terms of Reference for UNDP Mission

- (a) Review of existing major studies for the Tana River Basin, particularly those referred to in paragraph 2 above, as well as the 25 year power development plan and possibly Kenya's National Development Plan.
- (b) Review of existing development projects in the Tana River Basin as well as collation of information concerning proposed new projects by multilateral organisations other than the UNDP, as well as by major bilateral programmes.
- (c) Discussion with Government regarding alternative development patterns and their feelings regarding current priorities for developments in the upper and lower basins.
- (d) Determine whether any specific pilot agricultural development schemes have been identified for imminent implementation in the upper and lower parts of the basin and the proposed timing.
- (e) Assess the consistency of the existing water allocation for power and water supply with possible alternative patterns of development which could result from integrated development planning for the entire basin.
- (f) Prepare, on the basis of (a) through (e) above, and on the basis of discussions with the UNDP Resident Representative and representatives of the IBRD as well as representatives of appropriate bilateral programmes and in close consultation with the Government, an outline for the preparation of an integrated development plan for the Tana River Basin with special attention to a work programme for the initial phase of the study which would consist of elaboration of a work programme for a feasibility study for the entire Basin, including a feasibility study for one or more pilot irrigation scheme, in the upper and possibly lower Tana which the Government may require for immediate implementation.

30 December 1971

Join, 18/12 3 Provided by Proj. House

1. Tana River Basin Survey Mission Report Outline Dr. Charles W. Howe January, 1972 I. Origins of the Missim and Terms of Reference. II. Existing Major Studies of the Tana River River Basin and Their Implications for the Range of Technically Feasible alternatures: Job Job Job D TI A. The studies, then courage, shortcomings, and consistency 1. National Power Development Plan, 1966-1986. 2. ILACO Survey of the Upper Tana Catchment. 3. ILACO/Acres/FRO, Survey of the Orrigation Potential of the Lower Tana River Bain B. The water resource. 1. precipitation & Uto distribution 2. estimation virgin flows, current average flows, currents "firm" flows.
C. alternative configurations of use ; Their implications for power : irrigated acreage in the Upper ; Lower Lasine. 1. National Down Development Latter Plan with 500 cusics abstractione in the upper Dasin 2. all water in Upper Basin 3. ILACO Upper Basin Plan of 500 cusics plus 530,000 acre-feit/year abhactus in the Upper Basin In non- power purposes. 4. ILACO Plan plus added Alorage in the Upper Basin. 5. ILACO plan but water acvoted to unigating Maditimal agriculture. 6. hycho-power development stopped after Ramburu: later 2. Water below Ramburn = Kitaru - to Low britt Kamburn ( hill cor a lost kandarum ) hill bog time devoted to upper Basin irrigation b. water below Ramberry devoted to Low Basin Irrigation

D. Comparativo costo of hydro and Themae power III. Factors Relating to Choice among alternations. A. Goals and strategues per Kenya Deverpment Plan 1970-74 B. Onreverside nature of both Norigation and power developments C. Frecently unknown net employment impacts of Murea - type Norigation versus Traditional agnalture. D. Murea - Type irrigation 12 supplemontal origation to maditional agriculture E. alternatives not involving Sumiely viable lange airect water use: alternatives wil I. dry farming prospects Love unt yet read, z. cooperative organization mff. altr. In farm inputs & marketing 3. organizing FIntegnating form 4. horticulture in rain-fect Creas. 5. Management Contracto with african group-owned forms 6. eucalyptus plantations

4. 7. Other Jarm facine F. High potentile \* risks of horticultural irrigation G. Necessity of applying appropriate benefit - cost procedures to project evaluation. IV Currently Proposa Pilot Projecte: transford - 6000 acres fuel irrigation hit (upper Basin; Bura - 10,000 acres fall fit Lowa Basin; Aurowing acres Lowa Basin; Aurrowing Dekeme, 50,000 acres supplemental migation in Upper Basin Lise. still Join an bet. Dulot. Basin prop. H. agric. Aplanning. Mermen p. t. I The Need for Continuity and in Planning "Implementation in the Vana River Isasin : alternative Institutioned Orrangements VI Important activities Related To Integrated Planning in The TRB A. need for Doil Conservation measures B. need for monitoring of water abhadime C. Stimulation of developments of laborintensive methods of

5. procluction & construction D. investigation og potential of land disposal og Dewenage waster ip the much waste? VII Recommendations IN action. R. Setting up appropriate institution to guarantee Continuity, coordination, # B. Studies to be carried out by the Planning Roup C. Chease where further study probably not needed

INTERNATIONAL DEVELOPMENT ASSOCIATION

Vincent J. Riley M

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT INTERNATIONAL FINANCE CORPORATION

# OFFICE MEMORANDUM ipman, G. Wyatt, J. Dumoulin DATE: January 6, 1972 file

FROM:

TO:

Messrs. H. Shipman, G. Wyatt, J. Dumoulin P. Engelmann, J. Burrows, Miss Powell

SUBJECT:

KENYA: Tana River Basin Study - KEN 3

Mr. Charles Howe, Consultant to UNDP, who met with you on November 5, 1971 is expected to return shortly from his mission to Kenya, where he investigated the Tana River Basin Study. He, together with two UNDP staff members (Messrs. Gucovsky and Gabre-Madhin) would like to again meet with you to report on his findings and recommendations. He has cabled to New York, suggesting a meeting in Washington, January 18.

Please advise this office if this date is acceptable. We will inform Mr. Gabre-Madhin.

VJRiley/eb

December 21, 1971

DP/SF/310/KEN 3 DP/SF/310/KEN 29

Mr. Michel Doo Kingue Assistant Administrator and Director Regional Bureau for Africa United Nations Development Programme United Nations, New York 10017

Dear Mr. Doo Kingue:

KENTA: (a) Tana River Basin Study (KEN 3) (b) National Master Plan for Water Development (KEN 29)

Thank you for your letter of November 12 enclosing a copy of your note on the meeting which took place in the Bank on November 5 and three copies of Dr. Maxey's draft report.

We should like to make one observation on the proposed terms of reference for Professor Howe. It was our understanding at the meeting that Professor Howe would be required to define the scope, estimate the staffing and estimate the cost of the first phase of the preparation of the integrated development plan for the Tana River Easin.

We are attaching three copies of our own record of the November 5 meeting for your information. We thought the meeting a very useful one, and we look forward to hearing the results of both Dr. Maxey's and Dr. Howe's missions.

Sincerely yours,

Eileen Powell Development Services Department

Attachments

EP/ms

cc : J. Burrows P. Engelmann Jose Dumoulin G. S. Wyatt

FORM NO. 57

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

INTERNATIONAL FINANCE CORPORATION

## OFFICE MEMORANDUM

TO:

SUBJECT:

Miss Eileen Powell

DATE: December 7, 1971

\*

FROM: P

Peter Engelmann

KENYA - Tana River Basin Study Proposed UNDP Mission

At your suggestion I have looked over the "Note for the File" attached to Mr. Saunders' letter to you of November 12. Quick scanning has not disclosed any major problems in the part of the note covering our meeting (paras. 1 through 8), but I have some problems with what is called "the proposed IBRD feasibility study" (para. 9) and the proposed terms of reference for the UNDP mission (para. 10).

First, the study described on pages 10 and 11 of our report AE-16a dated July 30, 1971 on Kenya is not a "feasibility study"; it is "to prepare a comprehensive program for the long-range development of the waters of the Tana River..." (which does not preclude specific project feasibility studies as part of the overall development program.)

Second, the scope assigned to Professor Howe is far too extensive, overstresses the pilot irrigation scheme and does not properly focus on the study design features on which I thought we had agreed. I should very much like to see something in the terms of reference which requires Professor Howe to define scope, estimate the staffing and estimate the cost of <u>Phase I</u> of our Study No. 1-4 as defined in our report. This should take into account the ILACO Report which had not been available to us at the time and pilot irrigation schemes, <u>if any</u>, for which a clear justification can be found during Professor Howe's mission.

#### PEngelmann:vbr

cc: Messrs. Burrows, Dumoulin, Shipman, Wyatt.

Motes: John burows stil has no pushlem of undit's Tok, Jose humanlin wild, agree to Peter's point \* but not to the last sendence. the samp that we have mice reviewed the 14the report which employings a pilot

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

(2-60) INTERNATIONAL FINANCE

FORM No. 75

INTERNATIONAL DEVELOPMENT ASSOCIATION

ROUTING SLIP	Date November	r 29, 1971
NAME	1	ROOM NO.
Mr. Burrows		A-1000
Mr. Dumoulin (Agricult	are)	C-508
Mr. Engelmann		C-306
Mr. Shiyman		A-343
Mr. Wyatt		C-313
To Handle	Note an	d File
Appropriate Disposition	Note an	d Return
Approval	Prepare	Reply
Comment	Per Our	Conversation
Full Report	Recomme	endation
Information	Signatu	re
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UNITED NATIONS DEVELOPMENT PROGRAMME



#### PROGRAMME DES NATIONS UNIES POUR LE DEVELOPPEMENT

UNITED NATIONS NEW YORK

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REFERENCE: DP/SF/310/KEN 3 DP/SF/310/KEN 29

12 November 1971

Dear Miss Powell,

I am writing with reference to the meeting you so kindly arranged on 5 November regarding the forthcoming missions on the Tana River Basin Study and the National Master Plan for Nater Development in Kenya. Attached for your information is copy of a Note to the File prepared by Mr. Gabre-Madhin and Mr. Gucovsky.

Also attached for your information are three draft copies of the report prepared by Lr. George Maxey following his earlier mission to Kenya.

The hospitality and co-operation you extended to our Officers at the meeting is very much appreciated.

Yours sincerely

(1) 2. (Galace madhin) John M. Saunders

NOV 1.8 1972

John M. Saunders Officer-in-Charge Regional Bureau for Africa

Miss Eileen Powell Development Services Department International Bank for Reconstruction and Development 1818 H Street, N.W. Washington D.C. 20433 DP/SF/310/KIN-3 DP/SF/310/KEN-29

#### NOTE FOR THE FILE

### Subject: Kenya - Survey of the Irrigation Potential of the Lower Tana River Basin (KEN-3) - National Master Plan for Water Development (KEN-29)

UNDP's Consultants, Mr. C. Howe (for KEN-3) and Mr. G. Maxey (for KEN-29) met at the IBPD in the morning of 5 November with Messrs. Z-Gabre-Madhin (Country Officer for Kenya, (Regional Bureau for Africa) and M. Gucovsky (Senior Technical Adviser, TASD, "EPC) to review the outstanding issues and Terms of. Reference related to their forthcoming missions to Kenya in December 1971. In the afternoon (from 2.30 to 5.00 p.m.) the above met with the following IBRD staff: Mr. J. Burrows (Economist for Kenya, Eastern Africa Department), Messrs. H. Shipman and G. Wyatt (Division Chiefs, Water Supply and Power, res---pectively, Public Utilities Department), Mr. J. Dumoulin (Pre-investment Services-Trrigation, Agricultural Projects Dopartment), Mr. P. Engelman (Preinvestment Services Adviser, Projects Department), and Miss E. Powell of Development Services Department; except for Miss Powell and Mr. Shipman, the Bank staff attending this meeting participated in late 1970 in the-IBRD Preinvestment Mission to Kenya, Uganda and Tanzania; Mr. R.A. Hornstein, Chief, Division Fastern Africa Department, attended part of the meeting. Following is a summary of the main points discussed and their relevance to the two forthcoming UNDP missions to Kenya.

## Tana River Integrated Development (1991-3)

1. While there are considerable studies on the river's power potential, there are basically only two studies on the basin's agricultural potential; however, to-date, there has been no investigation regarding the overall integrated development of the Tana River basin, and consequently possible comprehensive development alternatives and their sequence for the basin have not been even outlined.

- 2. The basic available studies are:
  - (a) IBRD, Appraisal of the Kamburu Hydroelectric Project
     Tana River Development Company Ltd., Kenya (TRDC)
     Report PU-70, 18 May 1971)
  - (b) Balfour-Beatty and Engineering and Power Consultants' Reports on Future Power Developments in Kenya
  - (c) UNDP final report and Consultants' Report on Survey of the Irrigation Potential of the Lower Tana River Basin
  - (d) Sir Alexander Gibb and Partners.
     "Upper Tana Catchment Water Resources Survey, 1958-1959"
     April 1959
  - (e) ILACO, Agricultural Potential of Upper Tana River Basin, Mid 1971.
  - (f) IBRD, "Economic Development in East Africa (in five volumes)
     Volume II Kenya A Programme of Pre-investment studies 30 July 1971.

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3. <u>Tana River Hydro-electric Power</u>. The Tana River Basin's hydro-electric potential has been under review since 1922, and partial hydrological records have been kept since 1932. However, active consideration of power development in the basin began only in the 1950's. Since then, two hydro-electric stations have been constructed in the middle Tana with an installed capacity of 22 MW and 40 MM; A third hydro-power station (Kamburu) with an installed capacity of 60 MM is now under construction and is being financed by an IBRD loan of 23 million US dollars (approved June 1971) and a SIDA credit of 6 million US dollars, with the total cost estimated at 37.5 million US dollars. (Please refer to document 2 (a) listed above).

4. It was noted that in 1964 all except 500 cubic feet per second (cusecs) of the run of the river flow without storage were allocated for hydro-power generation; hydro-power generation uses above 4,000 cuseds when the river is in flood and about 2,000 cusecs are used during the average flow periods. This raises the question of future allocation of water for power, irrigation and other "consumptive" and "non-consumptive" uses, and whether the existing allocation referred to above could be revised should this be required for an optimal integrated development of the river basin. In this connexion, it was noted, that there exists a 25 years Power development Plan, and that although thermal power alternatives have been identified for the ceast of Kenya there has apparently not been a comprehensive analysis of hydro-power and thermal power combinations consistent with different alternatives for water supply.

5. The Tana River Development Company (TRDC) was established as a "paper company" for the purpose of constructing the Kamburu hydro-electric project financed primarily by the IBRD; it was also noted that the Government holds about 51 per cent in the TRDC and the remaining 49 per cent is held by private power companies.

Irrigation. The UNDP study referred to in paragraph 2 (c) above may be 6. considered as a pre-feasibility study for agricultural development in the lower Tana. While the recently completed ILACO study referred to in paragraph 2 (e) above may be considered only as a reconnaissance study of the agricultural potential of the upper Tana. From these two studies it would appear that the capital cost per acre of irrigated land would be US\$400 for the upper Tana only for run of river water (no storage), and US\$500 for the lower Tana, with storage. IBRD staff members familiar with the ILACO study (this is not yet available at UNDP Headquarters and should be obtained from the Resident Representative) indicate that the ILACO study envisages a development of 250,000 acres in the upper basin, with the first stage to amount to only 180,000 acres which will utilize run of river waters which it is assumed will return to the basin. This water use is regarded by the ILACO study as "non-consumptive" an assumption which needs to be thoroughly examined. It is envisaged that cotton, paddy rice, ground nuts and irrigated coffee would be cultivated in the upper Tana. It is also noted that the lack of adequate hydrological data concerning the upper Tana River basin constitutes a major constraint in planning imminent rational development of irrigated agriculture in this region. Consideration is therefore being given to the possibility of initiating as a first stage a 10,000 acre pilot development scheme in the upper Tana which will utilize about 20 per cent of the total water now allocated for agriculture. Although, at a different point in the discussion, it was noted that no serious conflict in water use between power generation and irrigation is foreseen.

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7. The above would suggest that the preparation of a comprehensive plan for the integrated development of the Tana basin would require that most careful attention be given to the question of allocation of water to various uses and particularly hydro-power and water supply for irrigation and domestic water use.

2. Institutional Aspects. Questions were raised about the appropriate counterpart agoncy to be associated in the preparation of an integrated development plan for the Tana River basin. It was felt that the present Tana River development Corporation referred to in paragraph 5 above would not be suitable for this purpose and that a new governmental authority may have to be established. In this connexion it was stressed that whatever new agency is established, it should not combine policy and planning functions with operational functions.

9: Proposed IBRD Feasibility Study. The IBRD proposed feasibility study as is outlined on pages 10-11 of the report listed in paragraph 2 (f) above. The IRRD now feels that the scope of their proposed Phase I feasibility study does not require as much time and manpower as indicated in the above document, and that the major objective of the Phase I would be to design in considerable detail the proposed Phase II of the feasibility study, which is the actual preparation of a plan for the integrated development of the Tana River Basin. It was noted that the Tana River basin development requires a comprehensive approach which does not how exist.

10. Terms of Reference for UNDP Mission. In view of the above discussion, it would appear that the terms of reference for the proposed mission by Professor Charles Howe (December 1971) should include the following major points:

- (a) Review of existing major studies for the Tana River basin, particularly those referred to in paragraph 2 above, as well as the 25 year power development plan and possibly Kenya's National Development Plan.
- (b) Review of existing development projects in the Tana River basin as well as collation of information concerning proposed new projects by multilateral organisations other than the UNDP, as well as by major bilateral programmes.
- (c) Determination of government's present priorities for development in the upper and lower River basin, and an analysis of these priorities.
- (d) Determine whether any specific pilot agricultural development schemes have been identified for imminent implementation in the upper and lower parts of the basin and the proposed timing.
- (e) Assess the consistency of the existing water allocation for power and water supply referred to in paragraph 4 with a possible integrated approach to development of the entire river basin.
- (f) Prepare, on the basis of (a) through (e) above, and on the basis of discussions with UNDP Resident Representative in Kenya and representatives of the IBRD, ASD major bilateral programmes (Netherlands, Sweden, UK, US, and West Germany) an outline for the preparation of an integrated development plan for the Tana River Basin with special attention to a detailed work programme for the initial phase of the study which would consist of elaboration of a work programme for a

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feasibility study for the entire Basin, including a feasibility study for one or more pilot irrigation scheme, in the upper and possibly lower Tana which the Government may require for immediate implementation.

## 11. Heticard Master Plan for Mater Resources Development (NEW-29)

During the briefer discussion on this satter, it was indicated by IBRD participants that in its water supply schemes, for Kenya, emphasis is placed on groundwater use; it was noted that water supply does not now include planning of severage systems except on the coast (Noubsca).

12. It was also noted that the second mission of the UNDP Consultant (Mr. G. Maxey) scheduled for December 1971 is to be viewed as a follow-up to the first two-man UNDP mission of June 1971. The major task of the follow-up mission is to define in some detail the scope and nature of an assistance programme to the Government for preparation of a Master Plan, and to finalize the Terms of Reference for the National Master Plan of Water Development.

13. The programme peterred to above will be concerned with the institutional methodological aspects of preparing a Master Plan and with the initiation of data gathering and analysis, particularly with respect to groundwater use and existing and potential water demand for all uses in the country; geographical distribution of existing and potential water use will be stressed.

14. In view of the above, it was considered useful for Mr. Howe's and Mr. Manoy's missions to overlap in part, since preparation of an integrated development plac for the Tana River basin constitutes a major aspect of the surface water component of the National Master Plan.

15. It is felt that the meeting with the IBRD was most useful and that the general cooperative spirit of the Eank is most appreciated. It might be useful to conduct a second consultation with the Bank on the Consultants' return from Kenya.

Z. Gabre-Madhin/M. Guco

cc: Mr. M. Doo Kingué Mr. J. Seunders Mr. B. Stedman (UNDP/Marobi) Miss E. Powel, IBRD Mr. C. Howe Mr. G. Maxey Mr. Linner Mr. Z. Gabro-Madhin Mr. I. Dmitriev Mr. M. Gucovsky TASD/Chrono

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## Comprehensive Water Resources Planning

in Kenya

Report of a Mission organised in June, 1971, to study and recommend on a National Water Planning Project

Dr. George B. Maxey Mr. Runo E. Savisaari CONSULTANTS

9 July, 1971

NOV 1 8 1971

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#### Summary

This report gives, with supplementary reports included in the references, an up-to-date summary of the water resources simulation in Kenya; a description of a general framework for water resources comprehensive planning, and offers recommendations for more adequate administrative and executive action in regard to water resources development and management.

The need for institutional reform is stressed, particularly in the field of high-level governmental concern for the resource and in the need to strengthen governmental action and control.

Training of personnel drawn from the population of Kenya is discussed with the idea that Kenyans must, within a reasonable time, take-over the management and development of Kenyan water resources.

Mechanics of implementation, financing, and management of the planning process are discussed largely in the light of impending Kenyandominated, as opposed to external expert controlled, management and control.

#### I. Introduction

1. In February 1971 the Government of Kenya submitted an official request to UNDP for a mission to study a National Master Plan for Water Development in Kenya (Appendix I). On the basis of this request a two-man mission composed of Mr. Runo E. Savisaari and Dr. George B. Maxey, both with experience in water resources planning, were asked to visit Kenya and advise both the Kenyan Government and the UNDP on the advisability of adoption of a comprehensive water resources plan and upon the terms of reference that this plan might have. In June 1971 the mission was organised and on June 23 first met in Nairobi, Kenya. On June 24 the mission met with Mr. Bruce Stedman, Resident Representative of the UNDP in Kenya, and with representatives of the WHO and of the Kenyan Government at which time it was made plain that:

- a) A National Water Plan for Water Development in Kenya did not exist, at least in any documents or in any way that the mission could realistically deal with the situation at hand.
- b) That the mission would do its best to develop basic considerations of a comprehensive water resources plan and, in the limited time available (two to three weeks), present this plan to the Kenyan Government and all other interested parties.
- c) That after two to three months the mission and representatives of the Government would meet again with the aim of developing terms of reference and a proposal to initiate comprehensive water resources planning in Kenya.

With these qualifications the objectives of the mission are clearly set forth in the terms of reference shown in Appendix A. of this report.

2. It should be clearly understood that Kenya has been considering comprehensive planning of water resources for many years. In 1963, as the result of a WHO/FAO joint report (Reference 12) it was recommended that a National Water Authority be established. This necessarily implied

that national water planning in some form was needed. This recommendation did not come out of the "clear blue" but was prompted by careful consideration by the Chief Hydraulic Engineer, Hydraulic Branch, PWD, of the Ministry of Works in February 1961 and by other comments by other Kenyan authorities (Reference 13). Following this report unmerous comments by many staff members and organizations indicated the necessity for specifically planning for water supply and sewerage and generally for overall water planning.

Many other comments and studies, too numerous to be commented upon by this mission, show clearly that water resources, as a sector of the national situation, needs clear and specific attention. For background material the best references presently available to the mission are the WHO/FAO studies in 1963 (Reference 12) and the WHO 1967-1968 report (Reference 13) cited above.

For many years the Hydraulic Branch of PWD (Ministry of Works) dealt with urban water supply while the African Land Development Board of the Ministry of Agriculture dealt with all water development in the African rural areas. Later they were combined to form the Water Development Department of the Ministry of Natural Resources. In 1967 the Department became the Water Development Division of the Ministry of Agriculture and continues to be the primary agency responsible for water resources development and management in Kenya. This agency, wherever its house in the administrative structure, has responsibly carried out its commission within the limits of Government support to manage and develop the water resources of Kenya. But it has never received the Governmental and popular support necessary to efficiently and properly deal with the overall water resources of the nation. In comparison with other sectors of national development the Division cannot, and has not been able, to compete on either a status or salary level in the

professional market. In part this is porbably due to the fact that the Division has concentrated its efforts mainly in water supply for domestic and livestock use and has not assumed active responsibility in other sectors mentioned or implied by the Water Act or by later Ordinances passed by the Parliament. Development management and ultimate optional use of the resource reach into most sectors of Kenyan development and ranges in importance from being almost an absolute control of development in the northern, southwestern and eastern parts of the nation to being the key to environmental management, industrial development, and municipal and domestic well-being in other parts of the country. Thus, water resources planning, development and management deserve increased recognition by the Government and the public. Such recognition should take the form of increased status in the Governmental structure, increased compensation to professional and technical civil servants and further encouragement to career-minded Kenyans to select water resources work as their profession.

Within the time limitations, the mission hopes that a viable proposition has been generated and that the responsibilities and effort needed by all parties concerned have been clearly stated. It may well be that terms of reference for a proposal for support of National Water Resources Planning exist within this report. However, the mission respectfully suggests that it and the Government may well wish to meet and to frame a proposal after a reasonable period of study and consideration. We suggest the period September 15 to October 15 as appropriate for such a meeting.

Kenya may well be the first and most appropriate African nation to adopt comprehensive national planning for water resources. With this in mind the mission recommends the consideration of a planning project provided the Government of Kenya indicates a strong desire and demonstrates the interest and capability for national water resources planning as suggested in this report.

Acknowledgement should be made of the gracious and considerate cooperation received from all parties, Government and external, that the mission contacted while in Kenya. A list of persons and organizations interviewed is appended.

#### II. THE WATER RESOURCES SITUATION IN KENYA - A SUMMARY

#### 1. General Facts - present supply and demand

The mean annual precipitation in Kenya is 20 inches and the total quantity of water falling on the land area in an average years is 235 mill. acre feet (one acre foot equals 271,000 Imperial gallons).

Stream run-off data obtained from 361 gauging stations in the five principal drainage basins give a mean annual discharge of all streams as 12 mill. acrefeet, which is only a little over 5 per cent of average yearly precipitation and varies in the five principal drainage areas from 12.3 per cent in Lake Victoria basin to 1.2 per cent in the Rift Valley.

Water requirements for domestic use of the present population of 10.9 million, using an average per capita per day figure of 10 imperial gallons, amounts to 1.5acrefeet per year, which is less than 0.06% of the total precipitation and only a little over 1% of average annual run-off. If the population grows 3% annually to the end of the century, Kenya at that time will have 27 million people, and if the average water consumption has increased to 14 gallons per day, the total annual demand would be 1,460,000 acrefeet. This is equal to about 0.6% of the precipitation at 12% of the run-off. The above figures show, that the water resources in Kenya as a whole are sufficient during the present century for domestic use.

The ground-water resources are an important factor in the overall water supply. On the average the surface of the ground waterlies 80 metres below the surface, i.e. considerably deeper than in other parts of Africa. Ground water resources, both location and amount, are poorly known in Kenya.

### 2. Availability of data

Hydrological data are to be found in Kenya for 20 to 30 years time. In 1969 the observation net consisted of the following observation stations :

Type		N:0 of
River gauging stations		361
Water level records		42
Standard rain gauges	* U	828
Autographic rain gauges		54
Storage rain gauges		42
Evaporation pans		81
Full Hydro-Meteorological	Stations	20

The observation net is mainly concentrated on the Highlands, where the main part of the population is to be found. The rainfall and weather data are regularly published by the East African Meteorological Department. The stream-flow records from 70 river gauging stations are published twice a year. This publication gives information on the mean and the extreme flows recorded during the month.

Accurate data concerning the population in Kenya is to be found in the publication "Kenya Population Census 1969". According to this publication, the population in Kenya was in August 1969 totally 10,942,705, of which 5,482,381 are men and 5,460,324 women. This means an average frequency of 19 people per square kilometre.

The accuracy of these statistics is sufficient for all kinds of planning operations. As for each province the population is divided as follows :

Central Province	1,676,000
Coast Province	944,000
Eastern Province	1,907,000
North Eastern Province	246,000
Nyanza Province	2,122,000
Rift Valley Province	2,210,000
Nairobi	509,000

Excellent maps, fully satisfactory for planning purposes, are available in Kenya. There are maps in the scale of 1:250,000 covering the whole country with contours at an interval of 200 feet, and there are also maps in the scale 1:50,000 covering the southern part of the country with contours at an interval of 50 feet. A series of 1:100,000 scale maps cover the northern part of the country, some with contours at an interval of 200 feet. Since all of these maps are developed photogrammetrically, areal photos are also available. Additionally there is the National Atlas of Kenya, published in 1970, the maps being at a scale 1:3,000,000. In the atlas is included maps and short texts describing the lakes, rivers, water falls, precipitation, temperatures per month, geology, soil, distribution of population, water supply, and industry.

## 3. Completed and ongoing water projects

- a. Sectorial Study and National Programming for Community and Rural Water Supply, Sewage and Water Pollution Control (Ref. 20). This study is being carried out by the WHO. The contract was sign d on behalf of the Kenya Government in January 1971. The last report will be given 20 months after the commencement of the field operations.
- b. Survey of the irrigation potential of the Lower Tana River Basin, FAO (KEN 3).
- c. The National Power Development Plan 1966-1986.

- d. Surveys and Pilot Demonstration Schemes leading to the reclamation of the Yala Swamp -(FAO (KEN 6).
- e. Range Management Division of the Ministry of Agriculture and Animal Husbandry FAO (KEN 11).
- f. Irrigation Research Station, Ahero FAO (KEN 16).
- g. Sewage and Ground Water Survey, Nairobi WHO (KEN 23).
- h. A study of the Upper Tana River Basin by LARCO consultants (Reference 30).

#### 4. Legal considerations

The Water Ordinance of 1952 and subsequent amendments define the ownership and control of water and the powers of the Minister responsible for water resources. It establishes the Water Resources Authority and the Water Apportionment Board. The Water Resources Authority has no executive or financial powers, but has wide advisory functions in relation to the policy of water development while the control and apportionment of water is vested in the Water Apportionment Board. The Water Resources Authority is charged with the duty to guide the investigation of water resources and to advise and make recommendations to the Minister in regard to the improvement, preservation, conservation and utilization of such resources. In all of these activities the Director of Water Development is the Technical Adviser and the Water Development Division is the chief technical arm.

The abstraction of water from surface and underground sources, the construction of dams and channels, etc. may only be carried out if a permit is issued by the Water Apportionment Board. The Board consists of eight members appointed by the Ministry, of whom four members must not be public officers and who are selected from a panel of names submitted by the Regional Water Boards.

The Regional Water Boards' main function is to make recommendations to the Water Resources Authority on water development and conservation policy within their drainage areas and to the Water Apportionment Board in regard to the apportionment of water. For the purpose of the distribution of water supplies in any area the Minister appoints undertakers, who shall be responsible for provision of an adequate supply of water for the area within their limits of supply. The Agricultural Ordinance of 1955 gives the Ministry of Agriculture the power to make rules concerning the maintenance of a body of water and other water matters, when this is deemed necessary for the preservation of the soil and its fertility.

According to the Public Health Ordinance, local authorities are obliged to take measures for preventing any pollution, dangerous to health or to a supply of water, which the public within its district has a right to use and does use for drinking and domestic purposes, and for purifying such supply which has become polluted.

#### 5. Organizations

While the main responsibility for water resources belongs to the Ministry of Agriculture, under which Ministry the Water Development Division has operated since 1967, other ministries, e.g. the Ministry of Works, the Ministry of Health, the Ministry of Local Government and the Ministry of Social Services also initiate and finance small water supplies.

The function of the Water Development Division is to implement the development and management of water throughout Kenya. The principal duties are as follows :

- to advise the Water Resources Authority and the Minister on the water resources of Kenya within a carefully planned programme designed to enhance the economic and social welfare of the country,
- to advise the Water Resources Authority on the development of water resources to serve the needs of the human and animal population, agriculture, including irrigation and ranches, manufacturing, hodro-electric power generation, etc., and to place as much water development as possible on a sound commercial basis,
- to advise the Water Apportionment Board on the conservation of the country's water resources by the control of and the apportionment of such resources, including river regulation, and the promotion of the measures designed to prevent waste and pollution,
- to assist in the preservation of forest reserves, which covers some of the principal water catchment areas in collaboration with the Chief Conservator of Forests,
- to make a continuing assessment of the surface and ground water resources of the country by a co-ordinated and systematic programme for the measuring and recording of data, such as rainfall, evaporation, river discharge, etc.,
- to operate and maintain public and government institutional water sumlies, for which the Director of the Water Development Division is the gazetted water undertaker, including the installations of the Mombasa Pipeline Board, and to plan, design and construct new supplies and the augmentation of existing supplies,

- to advise other Government Departments, including carrying out the design and construction of civil engineering works in connection with irrigation, flood protection, sewerage, sewerage disposal, etc. (Reference 31)

The Water Development Division is divided into

Planning and Operations Technical Services Development Water Resources and Conservation Administration

Subordinated to the Ministry of Agriculture are various parastatal agencies such as the National Irrigation Board and the Mombasa Pipeline Board

The power supply in Kenya is controlled by the following firms under the regulation of the Ministry of Power and Communications :

- 1. East African Power and Lighting Company
- 2. Kenya Power Company Ltd.
- 3. Tana River Development Company Limited.

Certain municipalities and most local authorities administer their own water supplies.

External assistance in water resources is supplied by the World Health Organization (WHO), the United Nations Development Programme (UNDP), the Food and Agriculture Organization (FAO), SIDA (the Swedish International Development Authority), USAID, and volunteer groups.

6. Training arrangements

Technical education, which is the basis of developments concerning water supply, is given in Kenya as follows :

- The University of Nairobi have 3-year courses for Civil and Mechanical Engineers, but in the near future the courses will last for 4 years. Due to lack of personnel and laboratory accommodations it is not possible to educate a satisfactory number of engineers,
- Egerton Agricultural College educates Agriculture Technicians,
- Kenya Polytechnic in Nairobi educates subprofessional engineers. The courses last for 3 years,
- The Mombasa Technical Institute is a bridge between the technical institutes and the technical colleges. They educate technicians in the electrical and the mechanical fields.
- The Water Development Division Training School has been operating courses for foremen/inspectors (operation and maintenance), and construction foremen and operators.

The foreman/inspector courses aim at a training of staff for the foreman/inspector cadre, which is in charge of the construction, operation, and maint nance of water supplies. The trainees spend at the present 6 months in the class room and thereafter 2.5 years training on the job.

The first construction foremen course was commenced in January 1971. This course will last for 6 months and will be followed by 2 years of training on the job. It is envisaged that the training will be supplemented by another period of 6 months in the class room.

The courses for water operators so far completed have included 6 weeks of training in class room and workshop. About 150 operators have been trained during ten such courses. 7. Source of funds for present studies and implementation

14.

 a) <u>Kenyan Government</u> - The Government includes in its budget funds appropriated for the 5-year Development Plan (Reference 1) in the total amount of \$44.85 million. These expenditures are shown in Table I according to recipients of the funds.

		··· .	1999 - 1999 1999 - 1999 1999 - 1999	Table I	(in US	million)			
		1969/ 1970	1970/ 1971	1971/ 1972	1972/ 1973	1973/ 1974	TOTAL	in the second	
1.	Central Govern- ment	2.61	3.77	4.56	5.40	6.65	22.99	×	
2.	mici- pality	2.27	3.42	5.38	5.52	4.54	21.13		
3.	Other local autho- rities	0.09	0.13	0.14	0.17	0.20	0.73		
4.	TOTAL	4.07	7.32	10.08	11.09	11.39	44.85		

A breakdown of the Central Government expenditures as shown in the 5-year Development Plan (Reference 1) is given in Table II.

Table II (in US\$ million)

		1969/ 1970	1970/ 1971	1971/ 1972	1972/ 1973	1973/ 1974	TOTAL
1.	Water Deve- bpment Division						
a)	Urban Supplie	es 0.48	0.59	0.70	0.84	1.01	3.62
b)	Rural Supplie range water	es 1.47	2.52	3.30	4.12	5 26	16.67
2.	Hg. Housing, other 1	0.44	0.48	0.42	0.35	0.31	2.00
3.	Other Minis- tries Rural Water supplies 2/	0.22	0.18	0.14	0.09	0.07	0.70
4.	Total	2.61	3.77	4.56	5.40	6.65	22 99
	See next page	2				0.00	

1/ Includes dam and borehole subsidies, small irrigation schemes, water resources surveys and misc. all mainly performed by the WDD.
 2/ Includes Ministry of Health with WHO/UNICEF contributions and local contribution through self-help labour, materials, and cash.

These tables clearly show the increase in emphasis being placed by the Government on rural water supply and the lack of emphasis on water resources studies other than water supply. However, in addition to these funds about K£2.5 million have been allocated to develop and support irrigation schemes (through the National Irrigation Board, Reference 8). This amount is broken down into K£535,000 for 1969/70, 696,000 for 1970/71, 476,000 for 1971/72, 509,000 for 1972/73 and 310,000 for 1973/74. Also about K£40,000 have been allocated by the Ministry of Economic Planning and Development for surveys relating to land reclamation schemes in underdeveloped areas, and an unknown (to this Mission) amount of government money, but probably quite small, has been or will be expended in the near future in hydropower and geothermal power studies.

Probably other sectors such as forestry, recreation and wildlife, sewerage and pollution are allotted small sums of government money to be spent on water resources but these allocations were not determined by the mission.

### b) United Nations family projects

Considerable support has been contributed annually to water resource development in Kenya through WHO, UNICEF, FAO operations and projects, most of which are enumerated in the section on Organization (II.5) of this report.

## c) Other multilateral and bilateral assistance

Financial and other support have come to Kenya from several national aid plans including SIDA and USAID and volunteer corps from Great Britain, Sweden, Denmark

III. Planning for long-term development and management of water and related land resources in Kenya

1. An ideal long-term comprehensive water plan should contain several elements as follows:

- a. It should be guided by carefully chosen and realistic objectives which demand coordination with other national planning and which allows flexibility for implementation of both short and longrange projects. These objectives should include careful consideration of all ongoing and previous project work.
- b. It should take into account the development of other sectors in the national economy and should be adjusted to contribute to the betterment of the total economic and sociological conditions in the country.
- c. It should consider all uses of water as well as the need to reserve water for recreational, environmental and dilution purposes.
- d. It should be phased in a manner that satisifies both 1) the
  limitations of the Government to initiate and maintain it and
  2) the availability of data, methodology and technology.

2. Present water resources planning in Kenya has been primarily concerned with single short-term project development. Thus, the National Five Year programme for 1970 to 1974 (Reference 1) considers only a Master Water Plan for development and management of rural and urban domestic water supplies, implementation and management of a few irrigation schemes and power development in one drainage basin. Little or no mention is made of comprehensive water resource planning and only the forementioned projects are budgeted. Further, it is estimated that the total Government budget allocated for water development plus certain implementation projects such as that supported by SIDA and local "selfhelp" projects will barely meet the requirements of the population increase thus leaving essentially the same percentage (85 per cent) of the rural population without water supplies that are reasonably healthful and accessible. Rough estimates by Government officials (Water Development Division) indicate that the present effort should be increased by a factor of 10 to 15, starting next year, if this large segment of Kenya's population is to have healthful and readily accessible domestic supplies by the year 2000. The ongoing sectorial study now being conducted by WHO will yield more accurate information on this **su**bject.

Budget allocations are similarly small in other sectors of the water resource field and no small factor in this lack of support is the fact that needs and available resources have not been systematically studied, priorities based on modern technical methods have not been set, and applications for significant budget increases to develop even study projects have not been made. In large part, this may well be the result of not only inadequate financing, but lack of availability of well-trained and experienced personnel. Perhaps evidence of this lies in the fact that there are numerous authorised but empty posts in the present organization and the budget for water was not fully expended last year.

3. Initiation of comprehensive long-range water resource planning would bring international, national and Governmental attention to water resources problems and would provide a vehicle to study and define these problems, to set rational priorities, and to develop support, both from national and international sources. Further, proper elucidation of the public in these matters might well result in attracting more people to select the water resources field as a career and thus eventually help to relieve the shortage of trained personnel.

4. This mission did not have time to develop and prepare detailed terms of reference for a comprehensive water plan project in cooperation with Kenyan Government officials. Further, the Kenyan Government agencies had no plan and could not prepare one in the alloted time for the mission. However, it was agreed by all parties concerned that the mission **s**culd develop a skeletal plan accompanied by a list of suggested

considerations and actions that the Government might take in the next two or three months. Meanwhile the mission and the Government would further study the substantive material involved and revise, enlarge or otherwise modify the skeletal plan. After this period of study and preparation the responsible Government staff and the mission would meet and develop detailed terms of reference for a comprehensive water plan project to be submitted to prospective sponsors. The skeletal plan is described in the following paragraphs.

1) <u>Objectives</u> - The Kenyan Government should define both long and short-term objectives of the Comprehensive Plan, taking into account the present development and management programmes and aims that they wish to set for periods of 3, 10, 30 and possibly 50 years. The 3 and 10 year periods may be regarded as short-term and the 30 and 50 year periods are long-term. Probably most of the effort expended in development and management in the first 10 years of the plan, that is, until 1981, would include presently ongoing and proposed projects, the implementation of which may extend even beyond this date, depending primarily upon availability of staff, available financing, required pre-investment and technical studies, and demand for power, irrigation, water supply, pollution control and conservation.

Long-term considerations through the first ten years should be made concurrently and should be carefully defined by clearly stated and understood realistic objectives. These objectives should be defined keeping in mind the unique Kenyan situation including the legal constraints; the estimated physical limits of the resources and of dependent or accessory resources such as land; sociological factors such as the educational level of potential users and constraints of the tribal systems and traditions; economic constraints including the wherewithal to finance studies, construction, management and the likelihood of industrial development; environmental constraints especially involving the preservation of the vegetative cover of the natural habitats of game animals, fish and birds, and the quality of the marine, surface, and ground waters; capacity for irrigation and stock-raising developments; development of new technology; and population growth, distribution and mobility. As far as possible the objectives, although clearly defined, should allow some flexibility which in turn will allow adaption to the dynamic, changing and largely unforeseeable future.

It should be constantly kept in mind that one of the most valuable features of a dynamic comprehensive plan is not that it allows the nation to foresee everything that will happen between 1971 and 2020, but does allow it to anticipate and ready itself for developments with enough lead time and a store of substantive material, methodology and staff to efficiently cope with such developments.

- 2) The Government should develop a list of <u>principles and</u> <u>assumptions</u> that will effectively constitute the "ground rules" upon which the planning is based. Apart from general **assumptions** such as that there will be no general war or other catastrophe or that the government will remain stable and effective, most planning schemes in the western world include the following:
  - a) That consumptive use requirements in the various sectors will either 1- increase at an agreed upon estimated rate, 2- increase for some period and then stabilize, or 3- will remain stable during the planning period;

- b) That adequate power and fuel will be available to the population throughout the planning period;
- c) That large transbasin or international exports or imports of water will not or will take place;
- d) Various assumptions based upon overall national planning unique to a given country.
- 3) Phases of the plan should include the following:
  - a) An inventory phase which allows for the collection, compilation, proper storage and provisions for ready retrieval of all relevant substantive data. Storage and retrieval should probably be accomplished by computer methods since this would allow for orderly and high capacity input and for rapid output in a wide variety of methods or programmes. The inventory will cover all of the sectors discussed in a following section of this report (see III-3-4) and general comments in regard to the completeness and availability of the relevant data are made in that section. This phase might be regarded in two parts, 1) the organisation of the backlog data already on file in some form somewhere and 2) the collection and proper storage of needed information not presently available. This data collection probably should not be done by the planners but should be collected for the planners by the appropriate agency for the various sectors.

Timing for accomplishment of the inventory is, of course, flexible and dependent upon availability of staff and other support. Greatest emphasis should be placed on this phase in the initial stages of the plan and probably part 1, the backlog, should be completed in two to four years. Part 2, of course, is continuing and will continue throughout the life of the plan. It is necessary that the Inventory phase yield enough information to accurately define the extent of the resources, the present use and abuse of it, clearly delineate the nature and extent of present problem areas and sectors where data is lacking. The continuing collection of data should be directed at filling holes in our knowledge and thus allowing the planners to more and more accurately define the water resources situation.

- b) A Water Needs phase which involves the determination of water requirements by prediction and projection for specific time horizons. It is suggested that these time horizons be set at 3 years (1974), 10 years (1981), 30 years (circa 2000) and 50 years (circa 2020). Obviously accuracy of projection for requirements in 1974 and 1981 will be far more realistic and well-defined than for longer periods. However, production of longer projections furnishes a general picture that can be progressively brought up to date as more data are produced and as development for the shorter periods is consummated. The short-term development should furnish valuable information to long-term national planning in all areas as they are consummated. Comparison of estimates of water requirements with results of the Inventory phase allows a sound scientific and technical determination of projects needed for development.
- c) <u>Development of individual project plans and assignment</u> of priorities naturally follow the above two phases. Once the limitations of the resource and the areas of need are determined individual projects can be defined, compared and assigned priorities. This phase of the planning is of great importance because it is an interface with all other development and planning. Project
priorities must be judged, not only for their own merit and in regard to the water resources sector alone, but also in regard to all other sectors in the local and national picture.

d) An implementation and construction phase which obviously is the objective of the whole process.

Phasing of the plan in this manner does not in any way imply that Phase I must be completed before Phase II is started and so on. Actually parts of all the phases from the very beginning of planning will be taking place, for presently ongoing and planned water resources projects will be incorporated into and become an integral part of the plan. Further, work in the various phases of the plan may well progress far more rapidly in certain areas or drainage basins than in others where the demand or the need is less. Inherent in the plan is the concept that study, development, and management should be approached on the basis of geographic subdivisions, most likely drainage basins, although in some instances political or other subdivisions will also have to be considered.

4) General sectors of the water resources field to be considered include:

a) <u>Water supply for domestic use</u> - This sector has been concentrated on by the Water Development Division for several years and much information and substantive data is available. In more recent years not only the WDD, but SIDA, the World Health Organization in concert with the Ministry of Health, UNESCO and the Kenyan Community Development Department have and are supporting an increased effort. The recently initiated WHO-sponsored sectorial study (Reference 20) is strong evidence of increasing attention to this sector and this study should do much to produce data and information for planning purposes.

In general, it is believed that adequate hydrologic data for planning purposes is being produced by the WDD and other data collection agencies but published hydrogeologic information, especially on ground-water occurrence, availability and utilisation is woefully lacking. This is also true in the field of waste disposal and pollution. In both cases a start will have been made to correct this deficiency in the WHO sectorial study (Reference 20) but much further work will remain to be done before both fields are adequately inventoried.

Information on water utilisation in the water supply sector is probably available in sufficient accuracy for national planning and, again, evaluation and organisation of this data should result from the sectorial study (Reference 20).

The chief responsible Government agency in this area is the Water Development Division, Ministry of Agriculture, with accessory responsibilities lying in the Ministry of Health and the Community Development Department.

Recommendations regarding critical needs in <u>all sectors</u> are included in the last section of this report.

b) <u>Irrigation</u> - Although numerous single projects have been developed and are planned for this sector of water resources, a national inventory of irrigable lands and of the projects necessary for their reclamation and use does not seem to exist. Estimates suggest that about 160,000 hectares of land with a high irrigation potential exist and that of this about 6,000 hectares are irrigated (Reference 8). Since irrigation may become one of the largest, if not the largest corsumptive use of water in Kenya and therefore possibly the chief use conflicting with use of water in other sectors, it is necessary that such an inventory be developed as soon as possible.

Experience with several small irrigation projects has indicated reasonable success in betterment of economic and social conditions. Examples include the Mwea, Ahero, Bunyala, Tana and Perkersa schemes. The total annual gross value of production from these schemes exceeded K£780,000 in 1969/70 and more than 3,700 plot-holders profited from more than 5,700 hectares. Since a plot-holder supports an estimated 11 people it can be supposed that about 40,000 people were settled and profited from these schemes (Reference 8).

Although the above figures represent a very small fraction of the total national economy they indicate the tremendous importance that properly managed and developed irrigation projects might assume in the national picture and, therefore, the importance of national planning in this sector.

Responsibility in this sector resides primarily in the National Irrigation Board, but some action on small irrigation projects is also taken by the Water Development Division, Ministry of Agriculture.

c) <u>Hydropower</u> - Rather complete knowledge of this sector is available from only one drainage basin in Kenya and less complete data is available for the rest of the country. The 20-year development scheme cited in the bibliography (Reference 10) probably forms a good nucleus for power information needed for planning purposes at this time.

Chief responsibility for hydropower lies in the Ministry of Power and Communications and the East African Power and Lighting Co. and its associated companies under the general regulation of the Ministry of Power and Communications.

- d) Water for industrial use Little if any information is available on this subject and projected needs for the future are apparently non-existant.
- e) Water reserves for recreation and wildlife including environmental and ecological considerations - It is not known whether knowledge of this area exists at this time. Inquiry by the mission established that no national plan presently exists.

f) <u>Thermal power generation</u> - The only studies available to the mission are described in the 20-year development scheme (Reference 10).

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- g) <u>Navigation and transport</u> No information on this subject was discovered by the mission.
- h) <u>Flood Control</u> Flood control has not assumed large proportions as a problem in Kenya except locally, for the most part, in the western provinces. However, with continuing development, especially along rivers, it can be expected to become a concern if measures are not taken to forestall building and other development in vulnerable areas. Planning that will result in avoidance and prevention of flood damage should be underway on a national basis. Primary responsibility for flood control is in the Water Development Division.
- i) <u>Livestock water</u> Several elaborate schemes for range management have been and are now being conducted in Kenya and data and knowledge of livestock needs for water is probably better understood than in any other sector. Since the quantities necessary for stock needs are very small, it is unlikely that major conflicts of other uses with this use will develop. However, the importance of this supply and strategic location of water points is of critical importance to the nation, espedally in northern and north-eastern an in parts of the southern provinces. Primary responsibility for livestock water resides in the Ministry of Agriculture.
- j) <u>Waste disposal and pollution</u> Very few measures to control waste disposal and pollution are presently practiced in Kenya. Definition of pllution is not available and

no Government criteria or standards are available. In the one document available to the mission on this subject (Reference 25) a good case is made regarding national needs in this sector and suggestions for implementing Government controls are made. Further, the objectives of the sectorial study (Reference 20) include allowances for study of this problem.

A national inventory of pollution and related problems is needed in order to define and implement a programme in this field. +) Further, a study is needed to determine how much reclamation and reuse of water occurs presently and under what conditions and what the future demand may be for reused water. Obviously this could be a significant source of water supply. It is doubtful that the greater part of the reused water today is properly treated or managed in any way. Undoubtedly some information and recommendations will be forthcoming from the sectorial study (Reference 20) and from ongoing work by Mr. Christiansen in the WDD (Reference 25) but a concerted effort with adequate support is needed to indicate proper institutional arrangements, necessary legislation, establishment of criteria and standards, regional requirements and a proper regulatory procedure. Lack of such action may well result in one of two developments (a) widespread pollution of water sources or (b) rigid poorly informed,

<sup>+)</sup> At the time of this writing a report entitled "National Report on the Human Environment in Kenya" was being prepared by a special Secretariat on the Human Environment in Kenya.

restrictive action which may critically impede industrial and other development in the country, or both. Presently, responsibility for plution has been assumed by the Water Development Division with accessory interest being shown by the Ministry of Health (principally health considerations) and the Ministry of Works (construction of some treatment plants).

It is readily apparent, even from these brief summaries, that there is much to be accomplished in the Inventory Phase of the plan. One major chore is the collection and compilation of all the substantive data in a Water Resources Data Bank. This Data Bank should be in the form of a storage and retrieval system which will allow rapid and efficient use of the information in a variety of programs for analysis and interpretation, and especially for simulation theory (systems analysis) studies of drainage basins described in the following section (III.3.5).

In order to handle the "backlog" part of the Inventory and Needs phases, a number of studies, varying in length and complexity, must be undertaken, or if already undertaken, should be completed and, in some instances, cnlarged. Among the most important of these are a national ground-water study which should take the form of an intensive reconnaissance by drainage basin or other appropriate subdivision; a land classification study to determine all classes and locations of irrigable lands in the country; an. industrial water use study; a study of needs for recreation and wildlife including consideration of environmental and ecological consideration; an evaluation of present and future needs for flood control; a critical, comprehensive investigation of all aspects of water pollution, reclamation and reuse of water. As has been mentioned previously, a start on some of these studies has been made in the Sectorial Study of WHO (Reference 20).

#### 5. Mechanics of analysis - The Drainage Basin approach

In order to reduce the problem of determining national water requirements to a tractable level and to assist in determining project priorities, a drainage basin model approach should be undertaken. Thus, all of the substantive data for all of the sectors in given basin can be introduced into a programme based on simulation or related theory and analysed for applicability and degree of relative accuracy. If the programme model turns out to be acceptably accurate, numerous analytical exercises can be performed and several alternative solutions can be developed.

This approach requires the use of modern computers and obviously is directly based upon the storage and retrieval system of the Water Resources Data Bank. It allows for sophisticated use of all the pertinent data and for development of many alternatives, results that cannot be attained by manual or conventional calculation in reasonable periods of time.

As previously pointed out, the Comprehensive Plan allows for all phases to be worked upon at the same time if required. Thus, in a drainage basin where adequate data is inventoried, the Water Requirements Phase can be embarked upon immediately and so on. It would appear that in Kenya much of the substantive data has been collected for the Tana River Basin, and therefore a relatively short basin study, utilizing all the previous studies and with a minimum of further data collection could result in development of a basin model to determine water requirements and project priority. Such a study could serve as a pilot and training project in the Comprehensive Plan and would demonstrate how effectively comprehensive water resources planning may be utilized in Kenya.

6. Projects of immediate concern to Comprehensive Mater Resources Planning

Implementation of a Comprehensive Water Plan has a high priority in the Kenyan Government. All of the Government staff who were interviewed

by the Mission indicated the desirability and need for such a plan. The Mission agrees in principle that Comprehensive Water Resource Planning should become a part of the policy and operations of the Kenyan Government and therefore recommends that the project of earliest concern in water resources in Kenya should be development of a proposal with terms of reference to implement a Comprehensive Water Resources Plan project to be supported by the Government and by one or any combination of supporting organizations.

If a Water Planning Project is implemented, a number of on-going or proposed studies could immediately become integral parts of it or would at least be highly important contributors to it. These studies and their possible relationship to the Planning project include:

- a) On-going projects
  - The sectorial study by WHO (Reference 20) will contribute much information and guidance especially in the water supply, water utilization, and water pollution areas. It should be closely correlated to and co-ordinated with the proposed Planning Project.
  - 2) Training of scientists, engineers and technicians. The present Government programme of training is considered by all concerned inadequate to develop a cadre of Kenyan citizens capable of developing, operating and maintaining the water resources of the country. In any case, this training programme should be enhanced and, if a Water Planning Project is adopted, should carry provisions to add materially to training at all levels from field technicians to professional engineers and scientists. All principals in the proposed Project staff should have Kenyan counterparts capable of profiting from on-the-job training as well as from special training courses.

b) Proposed projects

- If a Water Planning Project is adopted, the proposed Tana River Basin Study should be expanded and used as a pilot project in river basin analysis for planning as well as for a pre-investment study for justification of financing the proposed construction.
- 2) Several municipalities in Kenya are proposing enhancement and enlargement of present water supply and sewerage facilities. The Water Planning Project should be aware of these developments participate in their planning and assure their co-ordination with other sectors of water resources. Among these municipalities which are conducting or are proposing to conduct pre-investment studies are Nairobi, Mombasa, Nakuru, Kisumu and Eldoret in addition to the three large towns of Kakamega, Nyeri and Embu. Probably, all of these areas have inadequate sewerage treatment facilities and water supply shortages at least at times or in some places. All will be water-short within a few years (as early as 1974), if expansion of facilities is not accomplished and most are in areas of expected rapid future growth.
- 3) For many years, communities who are willing to shoulder most of the cost of water supply and sewerage facilities have asked the Government for minor assistance mostly consisting of technical supervision, design, and skilled labour. The Water Development Division has tried to furnish such assistance, but has been able to do so in all too few cases. Thus, community leaders who show great initiative become discouraged and this attempt to progress on the part of Kenyan citizens is thwarted. It is suggested that a plan be devised on the basis of a comprehensive study to correct this default and find adequate support for communities who are willing and able to carry most of the burden of development. Such a plan could be worked out under the aegis of the Water Planning Project.

### 7. Mechanics and implementation of the Comprehensive Plan Project

a) The project should be under the control of an organization at a high level in Government, preferably above ministerial level so that interministerial co-ordination can be firmly achieved. For several years establishment of a National Water Authority has been considered and studied by the Government (References 12 and 13), but the Authority has never been established. Such an Authority would be the ideal administrating agency for the planning project, assuming that the Authority would be an umbrella agency dealing with all water resources policy and presumably would be parastatal comparable, for example, to the National Irrigation Board in terms of administrative responsibilities, freedom of operation, and management of funds. It is assumed that the Water Planning Project staff would act as an executing group for the National Water Authority.

Lacking such an organization at this time, the Comprehensive Plan Project might be placed under administrative control of an inter-ministerial committee such as the one that already exists for co-ordination of water resources development and management activities. The principal advantages for this are obvious, since the committee is supra-ministerial and would allow for co-ordination of ministerial activities in the water resources Disadvantages of such a committee include, (1) that the committee field. may not function effectively because all of the members are preoccupied with other duties fully as pressing and as critical as the committee duties and (2) such committees seldom have staff to take action and prepare background material in a form that is fully informative of the issues under consideration. It is suggested that the Plan Project Manager or Co-Manager act as secretary of the inter-ministerial committee and that their staff act as an executive arm of the committee thus forestalling in part the disadvantages voiced above.

An alternative to the above suggestions would be that the Planning Project be centered in the Planning Division of the Ministry of Finance and Economic Planning. This action would probably assure co-ordination of Water Resources Planning with other planning sectors, but might place

control of the planning in the hands of staff not well acquainted with water resources problems.

The Mission recommends that the Government carefully consider each of these alternatives and any others that may be brought forward and select a course of action very soon so that terms of reference and a proposal for a Planning Project can be prepared. The mission considers that of the three alternatives, administration of the Plan by a National Water Authority holds highest priority and that administration by the Ministry of Finance and Economic Planning or by an inter-ministerial committee is less desirable.

b) Once the administering organization is selected, terms of reference and a proposal for the Planning Project can be developed. The mission suggests that these take into account essentially the material discussed in this section (Section III) of this report and in the section on recommendations (Section IV).

In regard to timing and financing of the Plan Project, considerable flexibility exists. A Plan can be produced in a relatively short time, say two to three years if support, personnel and facilities are readily available. On the other hand, none of these items are known to be readily available and it seems likely that completion of the "backlog" part of Phase I, Inventory, and Phase II, Water requirements, might more likely be accomplished in four to seven years. This is to say that by the end of the period, the planners would be in a position to consider for priority assignment for implementation all proposed projects on a nationwide basis. Previous to this time implementation would be reserved for presently ongoing and some presently proposed projects. The mission believes that the Planning Project should be initially framed for the completion of the "backlog" parts of Phase I and Phase II in five years.

- The following personnel might be needed:
- 1) External experts
  - a) Project Director an experienced water resources planner preferably with either an engineering or economics background.

- b) Water Resources Engineer or Hydrologist with experience in application of computers to hydrologic problems and in simulation or related theory. Minimum period of employment 3 to 5 years.
- c) Sanitary Engineer with broad experience in sewerage treatment and pollution problems, and preferably experience also in planning. Minimum period of employment 3 to 5 years.
- d) Hydrogeologist with experience in ground-water resource evaluation and reconnaissance exploration. Minimum period of employment 2 years.
- e) Land Classification Expert. Minimum period of employment 2 years.
- f) Economist with experience in water resources planning. Minimum period of employment 2 years.
- 2) Government professional staff
  - a) Water Resources Engineer, Hydrologist or Water Resources Planner; co-project director and counterpart.
  - b) Counterpart for Water resources engineer or hydrologist.
  - c) Counterpart for Sanitary Engineer.
  - d) Counterpart for Hydrogeologist.
  - e) Counterpart for Land Classification Expert.
  - f) Three Junior Engineers or Engineers in training.
  - g) One Junior Economist.
  - h) Three to five part-time or full-time students (preferably engineers, economists, geologists) for on-the-job training.
- 3) Government technicians and labourers
- 4) Short-term consultants as needed

The mission recognises the need for consideration of relevant subjects such as demography, ecology, water resources management and training among others and suggests that the Project Director call upon consultants in these fields. A staff esentially comparable to the above should be able to accomplish the 5-year task and, in addition, direct one pilot basin model project and recruit and train a sizable Kenyan professional group.

c) On the basis of the above assumptions the budget for the 5-year Planning Project to be supplied by external agencies might be on the order of \$1.0 million or approximately \$200,000 per year. Costs to the Kenyan Government for counterpart and trainee staff might total to between one-half and three-fourths of this amount. It is assumed that the computer competence of the Kenyan Government is adequate and available for this job, and that no special expensive equipment will be required beyond ordinary office, engineering and geological requirements. IV <u>Recommendations</u> The mission respectfully acknowledges that three weeks in a country allows little time for deep consideration of that country's problems. At the same time many of the problems we have encountered in Kenya exist in the world at large and not only "developing" nations but so-called "developed" nations must also deal with them. With this in mind we humbly submit the following recommendations.

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1. Kenya can profit immeasurably from a well-prepared national water and related land resources plan.

 Kenya must accept several responsibilities if such a plan is adopted. These include:

- a) The development of a responsible organization, such as a <u>national</u> <u>water authority</u> of <u>supra-ministerial</u> and <u>parastatal</u> level within the Government to administer the plan, or delegate the administration of the plan to an <u>inter-ministerial</u> committee that will <u>accept the</u> <u>commission</u> or delegate the administration of the plan to the Ministry of Finance and Planning which again must accept the responsibility of seeing that the Water Plan Project is carried out. In any of these cases the responsible organization should be backed up by a full time administrative staff, for example, the staff of the proposed Project.
- pr 18, b) The Kenyan Government must define and support the objectives of a comprehensive plan for water and related land resources planning.
- pp 19, c) The Government must accept the concept of effective implementation 20 of planning based upon accepted facts, needs and policy.
- d) The Government must strongly support a training programme that allows replacement of external experts by Kenyan nationals in a reasonable period, but still allowing for effective technological aid by expert advisers. Presently Kenyans are not attracted to water resources careers because of the status of the WDD, inadequate knowledge of the discipline and low remuneration of service as water resource engineers, economists, hydrogeologists, etc. We strongly recommend that the Government adopt measures to correct this situation.

We recommend that presently on-going programmes, such as the WHO 3. Sectorial Study (Reference 20), be included in the plan. The selection of p 30 the Steering Committee for the Sectorial Study should be very carefully considered and should include key persons from Ministries concerned with the aspects of the study.

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4. We recommend that presently planned studies, such as the Tana River Basin Study project, be expanded and included in the national plan. Indeed. we would hope that an expanded version of the Study might be adopted as a test or pilot study within the national plan as an exemplifying operation demonstrative of the effectiveness of comprehensive planning.

5. We recommend that an operational organization to develop and manage the np 3, water resource be created at ministerial level incorporating the now existing Water Development Division and such other elements as are deemed necessary to achieve national goals in this area. This organization should work closely with and probably eventually become the operating arm of the proposed National Water Authority.

6. We recommend that a five-year programme to inventory and determine pp 33, water needs be adopted with the idea that scientific and technical knowledge 34 for adoption of projects be the basis for construction and management of water schemes.

7. We recommend that a survey of ground-water availability, occurrence and utilisation and a survey of sewerage disposal, pollution and reclamation PP 22 > 28 and reuse of water be initiated immediately. These studies could be a part of the Nation planning effort if the proposed Planning Project were adopted.

8. We recommend that problems involving water resources, whether geographic, e.g. local, regional or national and whether in the realm of surface (lakes and streams) or ground-water or waste disposal be reported to the Ministry e.g. the Ministry of Finance and Planning, equipped to receive, digest and distribute it in such detail that all interested parties are well aware of the water resources situation in Kenya.

9. We would be prepared to recommend that members of the Kenyan Government and this mission meet again soon, preferably between September 15 and October 15 to compose detailed terms of reference and a proposal for comprehensive national planning for water and related land resources for Kenya if all parties concerned are prepared at that time.

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19.	RURAL MATER SUPPLY PROJECT II. APPLICATION TO THE GOVERNMENT OF SWEDEN FOR FINANCIAL AND TECHNICAL ASSISTANCE

SECTORIAL STUDY AND NATIONAL PROGRAMMING FOR COMMUNITY AND 20. RURAL WATER SUPPLY, SEWERAGE AND WATER POLLUTION CONTROL PLAN OF OPERATION (GOVERNMENT OF KENYA - WHO, JANUARY 1971)

- 21. REPORT ON KENYAS WATER RESOURCES AND THEIR DEVELOPMENT (CEGE, MARCH 1969)
- 22. KENYA'S WATER RESOURCES: A GENERAL ASSESSMENT CURRENT RESEARCH PROGRAMME AND FUTURE NEEDS (PRABHAKAR)
- 23. THE MINOR IRRIGATION, FLOOD CONTROL AND COAST PROTECTION, UNIT (CULY)
- 24. URBAN WATER SUPPLY. PRELIMINARY REPORT (SHAH, JANUARY 1971)
- 25. PROPOSAL FOR SEMERAGE POLICY (CHRISTIANSEN).
- 26. RECENT ADVANCES IN RICE IN KENYA, THE MWEA IRRIGATION SETTLEMENT (GIGLIOLI 1963)
- 27. SEWERAGE AND GROUNDWATER SURVEY, NAIROBI ! WHO (KEN 23)
- 28. PILOT IRRIGATION SCHEME, KANO PLAIN FAO
- 29. RANGE MANAGEMENT DIVISION OF THE MINISTRY OF AGRICULTURE AND ANIMAL HUSBANDRY - FAO (KEN 11)

### LIST OF PERSONS CONTACTED

MINISTRY OF AGRICULTURE

VI.

Mr	MURENGA, J.	DEPUTY PERMANENT SECRETARI
99	KLAASSE-BOS, A.	PLANNING OFFICER
68	MWINAMO, J. MEADOWS, S.	Range Management

# MINISTRY OF FINANCE AND ECONOMIC PLANNING

		T
Mr	TATIREN'L.	40

ECONOMIC ADVISER

MINISTRY OF HEALTH

Dr. ONYANGO ASSISTANT DIRECTOR

### WATER DEVELOPMENT DIVISION

Mr	CEGE, O.S.	DIRECTOR
	CLASSEN, G.A.	ASSISTANT DIRECTOR
99	PRABHAKAR, D.R.	HEAD WATER RESOURCES AND CONSILUTION
	SHAH, P.J.	HEAD ACTIVITY PLANNING SECTION
	SVAEREN, A.	W OF HIDROLOGI SHOILON
88	HAYS, T.D.	H OF GEOLOGI SECTION
	CHRISTIANSEN, M.	SEWAGE ENGLISER
99	MUTITU, C.N.	Project Co-Manager WHO, Sectorial Study

### WDD - PROVINCIAL ORGANIZATION

RIFT VALLEY PROVINCE	
Mr BALLINGER, F.C.	PROVINCIAL WATER OFFICER
NYANZA PROVINCE	
Mr KELLY, A.	PROVINCIAL MATER ENGINEER
NATIONAL IRRIGATION BOARD	
Mr GIGLIOLI, E.F.	GENERAL MANAGER
MOMBASA PIPELINE BOARD	
Mr MATTHEWS, V.G.	CHAIRMAN

### EAST-AFRICAN POWER AND LIGHTING COMPANY LIMITED

Mr	GREEN, T.N.M.	DEPUTY GENERAL MANAGER	
9.9	FIELDER, P.W.	CHIEF ENGINEER-GENERATIO	N
20	POWER. B.D.	" -PLANNING	

#### WHO

Dr. POLAK, WHO Representative, Nairobi Mr SCHULTZBERG, G. Project Manager, Sectorial Study "FISHER, B. Sanitary Engineer Water Study "HEIDE, G. Project Manager Nairobi ground water and sewerage study.

#### FAO

Mr	STENSTROM,	L.A.	COUNTRY REPRESENTATIVE TO KENY	A
	BUNDERSON,	V.	Project Manager	
	NOBLE, D.		Hydrogeologist	

### UNDP GEOTHERNAL STEAM EXPLORATION PROJECT

Mr	MCNITT, J.	PROJECT	MANAGER
99	PARLOUR, T.H.	PROJECT	CO-MANAGER

#### SIDA

Mr	EKENGREN. L.	SENIOR CREDIT OFFICER
	NORDENSKIOLD, K.	DIRECTOR OF SIDE, NAIROBI.
	CEDERGREN, J.	CREDIT OFFICER

#### APPENDIX A

#### TERMS OF REFERENCE

#### OF THE CONSULTANTS TO THE ADMINISTRATOR

### Mission in Relation to National Master Plan for Water Development, Kenya

#### a) Background information on the Mission

In February, 1971 the Government of Kenya submitted an official request to UNDP for a mission to study a National Master Plan for Water Development in Kenya. On the basis of the Government's request a two-man mission composed of two Hydro-Engineers with experience in planning of water supply development and economy of utilization of water resources was approved.

#### b) Composition and Duration of the Mission

The mission is composed of Dr. George Maxey (Chief) and Mr. Runo E. Savisaari. The members of the mission would meet in Nairobi on Wednesday, 23 June and would stay in Kenya for approximately two weeks. Travel itinerary of Dr. Maxey would be Las Vegas to New York for two days briefing and back to New York for one day debriefing and finally to Las Vegas. Mr. Savisaari's itinerary would be Helsinki, Finland/Nairobi and then Nairobi back to Helsinki.

#### c) The purpose of the Mission

1. The consultants <u>should assist the Government in the formulation</u> of their long-term objectives for community and rural water supply <u>development in the country</u>. To this end, they would look into the <u>long-</u> <u>term development plans</u>, <u>especially in the Nairobi area</u>, and <u>the plans for</u> <u>the development of agriculture</u>, forestry, public health, industry and <u>power generation in the country as a whole</u>. Special attention may be paid to plans for sewerage development.

2. The consultants should examine the Government's needs for external assistance and, if required, they may assist in the drafting of an official

### request for UNDP assistance.

They should examine the relation of this project to completed 3. and/or ongoing UNDP projects, particularly Survey of the Irrigation Potential of the Lower Tana River Basin - FAO (KEN 3), Surveys and Pilot Demonstration Sechemes Leading to the Reclamation of the Yala Swamp -FAO (KEN 6), Range Management Division of the Ministry of Agriculture and Animal Husbandry - FAO (KEN 11), Irrigation Research Station, Ahero -FAO (KEN 16), and Sewerage and Groundwater Survey, Nairobi - WHO (KEN 23). In this connection, the mission should meet with representatives of the Agencies who are responsible for the execution of the above-referred UNDP projects.

Explore the relation of this project to other than UNDP multi-4. In this connection, the mission should lateral and bilateral assistance. meet with appropriate representatives of multi-lateral and bilateral programmes in the country such as SIDA/WHO project.

The mission should also look into the institutional arrangements 5. in the country for planning, developing and managing water resources In this connection, special attention should also be given programmes. to the administrative regulations for allocating water use for surface and and groundwater and the procedures for approving water resources development schemes.

With regard to determining present and future water demand, the mission should also look into the qualitative aspects of water requirements 6. with a view to establishing the possibility of recycling of water and using reclaimed sewerage.

The mission is also expected to recommend the best possible way of implementing the project including possible executing agency and 7. sub-contracting if any.

In general, on the basis of the above, the mission should define the scope and nature of possible UNDP assistance, giving due attention to both institutional support for planning and managing water resources development, as well as timing and sequence of investment in the water

resources sector.

9. Although the mission should feel free to discuss with the authorities concerned anything relevant to its assignment, it is not authorized to make any commitments on behalf of the UNDP.

INTERNATIONAL DEVELOPMENT ASSOCIATION INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT INTERNATIONAL FINANCE CORPORATION

# OFFICE MEMORANDUM

TO:

Files

DATE: November 12, 1971

John R. Burrows

SUBJECT:

FROM:

Meeting with UNDP on Kenya

A meeting was held in the Bank on November 5 between representatives of the Bank and UNDP to discuss the proposed visit of UNDP consultants to Kenya in connection with two projects included in UNDP's country program for Kenya for 1972-74:

(a) Tana River Basin Study

(b) National Master Plan for Water Development

Those attending the meeting were

11

I.B.R.D.

UNDP

Messrs.	Burrows (Eastern Africa)		
н	Dumoulin (Agricultural Projects, Economics and Preinvestment)		
11	Engelmann (Preinvestment Advisor)		
Miss	Powell (Development Services)		
Messrs.	Shipman (Public Utilities, Water Supply)		
н	Wyatt (Public Utilities, Power)		
Messrs.	Zaude Gabre-Madhin (Country Officer for Kenya)		
п	Mosche Gucovsky (Technical Advisory Services Division - Water Resources)		
11	Goorge Merrors (Cananitant)		

George Maxey (Consultant)

Charles Howe (Consultant)

Mr. Gucovsky reported that Messrs. Maxey and Howe were expected to visit Kenya between December 26 and January 15.

The Bank representatives were principally interested in the proposed assignment of Prof. Howe on the Tana River Basin Study. High priority had been given in the Preinvestment Study Report to a comprehensive major survey of the Tana River Basin. It had been agreed with Government that the survey would be divided into two phases. The meeting concentrated on Phase I, which would comprise a review of all existing data and documents and the identification of the additional field investigations which would be required to frame alternative development schemes for the Tana Basin. Phase I was estimated to require a team of up to seven men over a period of eight months. Subsequently the Government had requested the UNDP to supply one man to do essentially the same task, and had supplied suggested terms of reference. The first two points of these terms of reference approximated to the first phase of the survey which had been agreed between the Bank and the Government. While, following the final ILACO report on the Upper Tana Basin, Bank staff now felt that Phase I would require less than the 36 man months originally budgeted, one man could clearly not undertake Phase I in three weeks.

#### November 12, 1971

#### Files

After a general discussion on the agricultural, power and water supply aspects of the Tana Basin study, it was agreed that Prof. Howe's principal objective should be to assist the Government in redefining and preparing a revised budget for Phase I of the survey called for in the Bank's Preinvestment Study Report. This would entail (a) a quick review of the final report of the ILACO Study of the Upper Tana, many reports on power development, including the Kenya Power Development Plan, and the UNDP/FAO study of the Lower Tana River, in relation to the preinvestment survey proposed by the Bank, (b) drafting a project outline of Phase I, (c) estimating the staffing and cost involved, and (d) discussing the results with Government. Since Government was most anxious to proceed with one or two small (10,000 acres) irrigation schemes on the Tana River, Prof. Howe could also expect to be asked to help in defining suitable feasibility studies for such scheme(s). However, this should not be done at the expense of Phase I of the long-range survey.

Dr. Maxey explained that his assignment would be to define the work program for the National Master Plan more closely, and to discuss with the Government their proposals for the appropriate institution to be developed and the counterpart agency to work with the project. The proposed project should give a heavy emphasis to institution-building, training, data collection and processing and projections of demand in the first phase of the program (about 5 years). Later phases would concentrate on project preparation and implementation. The UNDP agreed to supply the Bank with a copy of the report which Dr. Maxey had already prepared on the water resources of Kenya.

It was agreed that UNDP would keep the Bank informed of developments and that further meetings between the two agencies might prove valuable.

#### JRBurrows:pb

cc:	Messrs.	Brakel
	11	Dumoulin
	"	Engelmann
	n	Hornstein
	Miss	Powell (plus four)
	Messrs.	Schaefer-Kehnert
	11	Shipman

Wyatt

#### - 2 -



# INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT



INTERNATIONAL DEVELOPMENT ASSOCIATION

1818 H Street, N.W., Washington, D. C. 20433, U.S.A. Area Code 202 • Telephone - EXecutive 3-6360

KENYA: (a) National Master Plan for Water Development (b) Tana River Basin Study

Meeting to be held Friday, November 5, at 2:30 p.m. in

Room A-800 with the following in attendance:

#### UNDP

Consultants

Mr. George Maxey Mr. Charles Howe

Staff

Mr. Zaude Gabre-Madhin (Country Officer for Kenya) Mr. Mosche Gucovsky (Technical Advisory Services Division - Water Resources)

#### IBRD

Eastern Africa Department

\*Mr. John Burrows (Economist for Kenya)

### Public Utilities Department

Mr. Harold Shipman (Division Chief, Water Supply) Mr. Gavin Wyatt (Division Chief, Power)

Agriculture Projects Department

\*Mr. Jose Dumoulin (Preinvestment Services - Irrigation)

Projects Department

\*Mr. Peter Engelmann (Preinvestment Services Advisor)

Development Services Department

Miss Eileen Powell

\* Participated in Bank's Preinvestment mission - late 1970

Hessrs. Hornstein, Burrows, Shipman, Wyatt, Dumoulin and Engelmenn Eileen Popell

November lis 1971

61.32

KENYA: (a) National Master Flan for Nater Development ) (b) Tena River Basin Study

Provision for these two projects has been made in UNDP's country programse for Kenya for the years 1972-74. A brief description of each project appears in the country programme and is attached (Exhibit A).

Last June, the Government requested UNDP to provide an expert to undertake the Tana River Basin study and, in view of the urgency, to finance it from contingency funds. Copies of the request and correspondence relating to the request are attached for background information:

- 1. Government's request (Exhibit B)
- 2. The Resident Representative's letter forwarding the request to UNDP headquarters (Exhibit C)
- 3. Peter Engelmann's letter to the Resident Representative (Exhibit D)
- 4. A further letter from the Resident Representative to UNDP headquarters (Exhibit E)

Program 1-4, the Tana River Basin, in the Program of Preinvestment Studies prepared by the Bank, is also relevant.

The UNDP has now decided to send two consultants, Mesars. Managy and Home, to Kenya to review the needs for these two projects. We will meet with them, and with Mesars. Gabre-Madhin and Oukovsky of UNDP headquarters staff, tomorrow, Friday, November 5 at 2:30 p.m. in room A-800. Prior to that there will be a meeting in Mr. Hornstein's office, Room A-1000, at 11:30 a.m. to review the Bank's position.

EP:bdb

Attachmente

#### Land and Water Use

#### National Master Plan for Water Development (KEN-71/9)

29 The need to bring more land into production, and to make land already under cultivation more productive represents a basic purpose of the Plan in the field of agriculture, in which irrigation schemes must play an important part. Competing demands for water consumption (for people, animals, irrigation and power) require the development of a national plan for development and use of water resources. A sectoral study of community water supply has already been launched with the assistance of MHO (Financed by SIDA) which is expected to form a part of the overall study leading to the national plan. The Government has already availed itself of UNDP consultant services in connection with the preparation of terms of reference for the overall study, and expects to request UNDP assistance in connection with the execution of the study, commencing in 1972.

30. Only token financial provision has been included in this programme, in the hope that the Swedish International Development Agency (SIDA) will be able to meet the foreign exchange components, through UNDP. Preliminary discussions to this effect have been held with SIDA representatives, and an application for assistance is under preparation.

#### Tana Basin Study (KEN-71/10)

31. The principal river of Kenya, the Tana, must form an important part of any national water study, and indeed various parts of the Tana have already been studied from the point of view of particular sectoral interests (see for example the UNDP/FAO study of the irrigation potential of the lower Tana KEN-3). The Tana river is one context of competitive claims for water uses for power and irrigation, which urgently require resolution, since important investment decisions on future power and irrigation schemes should be reached in the light of policy decisions of this character. The Government has requested contingency assistance from UNDP in 1971, which may well lead to a larger study of the Tana in 1972. For that purpose, provision is made here, pro memoria, for \$ 50,000.

# MIPTSTRY OF FINANCE AND PLANNING

A. 34.

P.O. Box 30007 Telephone: 24261-72 When replying please quote Ref. No....BED/SR..63/02

and date

13-

### THE TREASURY MAILODI KENYA

15th June, 1971

When ind. Have do ? how long? he contried 2 15 2 step:

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Mr. R.B. Stedran, Resident Representative, United Nations Davelopment Programme, P.O. Box 30216, NAIRORI.

Dear

### TAHA RIVER BASIN STUDY

You will no doubt be aware of the Kenya Government's need to carry out a study of the whole of the Tana River Basin which would enable the Government to evaluate and accertain a more realistic and integrated approach to the development of the whole Basin. The proposed study is expected to take into account the recommendations of the UPPER TANA CATCHMENT SURVEY, ILACO N.V., the Survey of the Irrigation Potential of the Lower Tana River Basin and the Balfous Beatty Power Study Reports, which I believe you already have copies of them. This study was included in the list of pre-investment studies recommended by the World Bank Hission which visited Kenya last year and indeed was alleanted very high priority rating by the Hission. The study is of course casential for the making of far-reaching and urgent decisions relating to major investment programmes on the Tana River.

It has been proposed that the study night be undertaken by as IERD Survey Team consisting of a hydrologist, an ecchemist, a power engineer, an aggiculturalist and an irrigation engineer. However, in view of the ungency we attach to this work, I am suggesting that it may be possible to finance the study through a contingency fund allocation and especially in view of the fact that the exercise could perhaps be carried out by only one expert. The purpose of this letter is therefore to request you to assist in getting an expert to undertake the proposed study on our behalf.

Draft Terms of Reference for the Survey Team are enclosed.herewith.

#### Yours

#### (K.N. Kipreno Biwott) (1. for PERMANENE SPORTARY

## TTRAS OF REPERANCE

3 weeks reading

The IERD should be requested to expoint a bighlavel team to study the Tana Basin as a whole with the following particular objectives:

> 1. To review all emisting informatica and A reports on the Basin. O man

2. To indicate whether any further information ( is required and its nature. Rover



6. To assess the long term benefits of various forms of development in the Basin, so as to realize the optimum potential of the River to obtain maximum benefit in power and irrigation development with particular reference to the urgent need for increased employment opportunities.

5. To prepare a plan for an integrated development of the basin as a whole in order to obtain the most eccaonic use of the water resources available.

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#### UNITED NATIONS

### DEVELOPMENT PROGRAMME

#### NAIROBI, KENYA

AGIP HOUSE Haile Selassie Avenue (Coronation Lane Entrance)

Reference:

#### BY AIR MAIL

Cables: UNDEVPRO, NAIROBI POST OFFICE BOX 30218 Telephone: 28776

22 June 1971

Dear John,

K5-3-1

#### Tana River Basin Study

Please find attached a copy of the Government's request for a study of the Tana River Basin which would review the existing studies in this respect with a view to establishing a plan for the integrated development of the basin.

This study is among those recommended by the IBRD pre-investment mission and I attach for easier reference the elevant description included in the IBRD confidential report. As you know, the conclusions and proposals of the IBRD pre-investment mission are to be discussed shortly between the Government and Bank's representatives but the Government wishes to proceed with this particular study without awaiting the outcome of these exchanges. Development possibilities of the Bastern and Northeastern regions of the country are at the moment very actively investigated as a consequence of the serious situation which steamed out of the recent drought and the proposed study fits in as a basic piece.

The more immediate pragmatic aspect of the requirement arises from the potentially conflicting or competing claims for the waters of the Tana, from hydro-power and irrigation sources.

The first task to be done is a "study of studies" including our own "Survey of the Irrigation Potential of the Lower Tana River Basin" (KEN-3). In this sense, the proposed investigation is a "follow-up" on that project, with direct consequences for investment decisions.

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Mr. John Saunders Deputy Director Regional Bureau for Africa UNDP, NEJ YORK UNITED NATIONS DEVELOPMENT PROGRAMME

Continuation Sucet

The Government expresses the view that one expert under contingency financing might be able to implement the proposed study even though a team of seven persons for various durations was foreseen in the original IBRD proposal. I believe that the present request enables us to field an expert who would later be the Team Leader if the necessity of a full team is, very likely, to be further substantiated. This expert should establish full terms of reference for the study after reviewing the situation along the lines of the IFS procedur Should you concur with this proposal, it would be very important that this expert participate in the forthcoming disucssions on the pre-investment studies concerning the Tana River Basin. As indicated earlier, these discussions are to take place at the beginning of July and I would urge that preliminary exchanges with the Bank take place as soon as possible. If the expert is able to come then precise terms of reference and precise costing can be worked out at this time. It could also be decided then whether the work to be done in addition to the expert's task should be done under subcontract or by inviting additional experts and/or consultants to join the first expert who would then become Team Leader.

#### To summarize:

Brakel

- a) The request may be viewed as a form of follow-up on KEN-3;
- b) It has a direct relationship to pending investment decisions;
- c) It was given top priority by the recent IBRD "Pre-Investment Programming Mission";
- d) IBRD has estimated the international costs of the whole team at \$142,000 (36 man-months), and it appears that the project could qualify for revolving fund finances because of its direct relationship to investment. The Government, aware of our parlous financial situation has itself suggested initially one mar on a contingency basis.

Please let us have your instructions, if possible by cable.

Yours sincerely,

R.B. Stednan Resident Representative

cc: Mr. Hornstein. TRRD

EXHIBIT D

# WORLD FANK

#### INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

1818 H Street, N.W., Washington, D. C. 20433, U.S.A. Ares Code 202 + Telephone - EXecutive 3 6360 + Cable Address - INTBAFRAD

July 13, 1971

a 32

Mr. R. B. Stedman Resident Representative United Nations Development Programme P.O. Box 30218 Nairobi, Kenya

Dear Bruce:

First of all let me thank you for a very pleasant ride from Arusha to Nairobi on Thursday afternoon, followed by dinner with your family. I enjoyed both very much. I was glad we had this opportunity for informal talks on a variety of subjects.

In fact, I was so engrossed in our conversation on the subjects that I forgot an item of "business" on which I had meant to talk to you. This is the Tana River Basin Study, mentioned in your letter to Mr. Saunders of June 22 (copy of which was sent to Mr. Brakel). Therefore, I hasten to write to you on this subject, hoping that it is not too late to coordinate our efforts.

As you are probably aware, this is a very complicated project. The Study Data Sheets we prepared (pages 10 and 11 of our green-cover report dated April 9) is signed by both our Agricultural and our Public Utilities Projects Departments, as both sectors are equally interested in this problem. Even though we did not draft terms of reference for this study, let me assure you that the work that was put into the statement of Purpose and Scope on this particular item was substantial; in fact, it was the result of lengthy negotiations among the various parties involved. While there are, no doubt, various ways of approaching this problem, I think our two-phased approach, as outlined on the data sheet, is basically sound.

Since there have been a large number of studies on the Tana River Basin, concerning both future and existing projects, we envisioned that the first phase would require about seven specialists who could produce a report on parts (a) and (b) of the Scope within about eight months, for a total cost of \$220,000. This would cover merely the review phase of the study and the definition of additional field investigations required. All the rest would be Mr. R. B. Stedman

in the second phase, which would comprise the execution of field investigations, the analysis of results, and preparation of an overall plan and phase program for multi-purpose development of the river basin to 1993.

-2-

The timing, scope and cost of the second phase cannot be defined until the first phase has been completed. My guess would be, however, that the second phase can cost anywhere between a quarter million and one million dollars and would require a large number of experts in the field for a period of approximately one year. As you can see from our Study Data Sheet, the investments envisioned as a result of this study are in the order of two to three hundred million dollars, so this is not out of proportion.

Now the Government of Kenya has approached you to supply one man. The application does not say how long he would be in the field, but the terms of reference attached to the government's letter to you cover in very broad language the total scope we envisage, plus the possibility of diversion of the Athi River at a point above Kamburu. What this one man can in fact do is not clear to me, but I would advise against initiating this very complex problem with a single expert on a contingency basis, as is now proposed. I would much rather suggest an attempt be made to allocate the full amount required for the first phase of this study and to earmark something on the order of a half million for the second phase of this study, to be spent over a period of approximately two years. If this is possible, you could then designate an Executing Agency and have it work out a program for doing the work.

Certainly this should be a multi-sector exercise, not just one in agriculture or power or water supply. The team to undertake this study would have to be selected with regard to qualifications in all sectors concerned; bias in favor of any one sector should be avoided, both in selecting the Executing Agency and the team. Furthermore, the government's counterpart organization should be firmly established so that the study's recommendations, which are bound to be controversial, can be acted upon.

We consider the Tana River Basin Study as one of the most important and also one of the "hottest" in the program for Kenya. While I was unable to find out who drafted the government's terms of reference, it was obviously someone who did not have a clear conception of the amount of work involved in the various areas of investigation. Mr. R. B. Stedman

July 13, 1971

I hope that you will have an opportunity to discuss this matter with Willem Brakel and others of our Permanent Mission in Nairobi. I will also advise the Public Utilities Projects Department to arrange for their staff to call on you the next time they visit Nairobi.

-3-

I would very much appreciate if you could continue to keep us informed of your actions with regard to this project.

With best regards,

Sincerely yours,

Peter Engelmann Preinvestment Adviser Office of Director, Projects

PEngelmann:pen

P.S.: As agreed during our discussions with the Government, we will add the following note under item 6 of page 10: "The Government has requested UNDP assistance for this study." In addition we will stress on page 11 that staff and cost estimates are for Phase I only.

cc: Mr. Willem Brakel Chief of IBRD Permanent Mission in East Africa, Nairobi

Messrs. H. Collier (on return)

K. G. V. Arishna

- G. Wyatt
- J. Dumoulin
- V. Riley
- R. Hornstein (on return)

EXHIBIT E



#### UNITED NATIONS

DEVELOPMENT PROGRAMME

With the Compliments of the

#### Resident Representative

Telephone: 28776

P. O. Box 30218 NAIROBI, Kenya

28 July 1971

Dear John,

#### Tana River Dasin Study Your cable 457

Thanks for your cable under reference. I have simultaneously received a long letter from Peter Engelmann about his idea on the same subject. A copy of Peter's letter is enclosed for information.

This is a complicated subject, but I shall do my best to reduce it to its essentials, as viewed from here.

In the first place, I think there is no disagreement of principle on the size of this subject and its importance to Kenya development. The Tana is the largest single river basin in Kenya. It has been the subject of a good many studies on power, irrigation schemes, settlement schemes, etc.; it has not as yet received a comprehensive and integrated study, and such a study is necessary. On this, everyone agrees.

If there are questions, they arise in connection with modalities of approach and possibly the timing of the exercise. The Government has a rather clear idea of how to proceed. It wants to begin with one man of a very high calibre who would simply review studies which already exist on various aspects of the River and give partial advice on certain questions which need early decision. He would not do original research.

Government sees as a next phase a much larger study, along the lines outlined by the World Bank in its Kenya Pre-Investment Study No. 1-4.

The World Bank, as you know, also forsees a two-phased study: the Siget phase of which would be a such larger about that that requested through us by the Government. The Bank proposes that in the first phase a study should be made of all existing data and documents, plus the identification of additional investigations which are required to formulate alternative development schemes. The first phase of the Bank's proposal is estimated at \$220,000 and would have a duration of eight months. The second phase,

Mr. John Saunders Deputy Director Regional Bureau for Africa United Nations Development Programme New York
as viewed by the Bank, would be a larger exercise lasting one year. The exact dimensions of the second phase would be determined during the first phase.

There is another important proposal to be considered. It will be found in the report by our two national water study consultants, Messrs. Maxey and Savisaari. As you will have seen from their report, they propose that the preparation of a national water development plan should include provision for full TVA-type study of the Tana basin. As you know, the Maxey/Savisaari report will require endorsement (and comments ?) by UNDP before it is submitted officially to Government. haxey and bavisaari uppe ands and of the Dank Pro Tructment Study during their visit. You will also recall that the Maxey/Savisaari report contains the recommendation which reflects the vish of the Government that they should re-visit Kenya in September to finalize preparation of the terms of reference for a National Water Development Study. As you know too, we are hoping that SIDA will finance in whole or part of the national study. The one common element in the Government's request, the IBRD and Maxey proposals is that the first step to be taken is the study of all existing studies and data. Wnether this exercise can and should be done by one paragon (Kampmeier or Drouhin (?) come to mind), by a two-man team (à la Maxey/ Savisaari) or as part of the Phase I 7-man team's job as proposed by the World Bank, is the immediate question for decision. Related questions are whether the Tana basin should at this preliminary stage be a separate subject for a special and intensive study or should be wrapped up in the national water study, and if the latter, would Maxey and Savisaari have the time and competence during their next visit to take it on, etc.

I think that we have reached the stage where you should now advise us and that we should have this advice before we go further at the Nairobi level along the lines suggested in your cable. Would it not be possible for you to arrange a session between the World Bank experts, Maxey and yourselves and then provide a guidance on recommendations I should put to the Government about next steps ? Even better, following a discussion of that kind perhaps you could send Kampmeier or equal to Nairobi to present and discuss with Government your joint advice on next steps.

I look forward to hearing from you.

Yours sincerely,

R.B. Stedman Resident Representative

EXHIBIT E

28 July 197



#### UNITED NATIONS

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With the Compliments of the

#### Resident Representative

Telephone: 28776

P. O. Box 30218 NAIROBI, Kenya

Dear John,

#### Tana River Basin Study Your cable 457

Thanks for your cable under reference. I have simultaneously received a long letter from Peter Engelmann about his idea on the same subject. A copy of Peter's letter is enclosed for information.

This is a complicated subject, but I shall do my best to reduce it to its essentials, as viewed from here.

In the first place, I think there is no disagreement of principle on the size of this subject and its importance to Kenya development. The Tana is the largest single river basin in Kenya. It has been the subject of a good many studies on power, irrigation schemes, settlement schemes, etc.; it has not as yet received a comprehensive and integrated study, and such a study is necessary. On this, everyone agrees.

If there are questions, they arise in connection with modalities of approach and possibly the timing of the exercise. The Government has a rather clear idea of how to proceed. It wants to begin with one man of a very high calibre who would simply review studies which already exist on various aspects of the River and give partial advice on certain questions which need early decision. He would not do original research.

Government sees as a next phase a much larger study, along the lines outlined by the World Bank in its Kenya Pre-Investment Study No. 1-4.

The World Bank, as you know, also forsees a two-phased study, the first phase of which would be a much larger addair than that requested through us by the Government. The Bank proposes that in the first phase a study should be made of all existing data and documents, plus the identification of additional investigations which are required to formulate alternative development schemes. The first phase of the Bank's proposal is estimated at \$220,000 and would have a duration of eight months. The second phase,

Mr. John Saunders Deputy Director Regional Bureau for Africa United Nations Development Programme New York as viewed by the Bank, would be a larger exercise lasting one year. The exact dimensions of the second phase would be determined during the first phase.

There is another important proposal to be considered. It will be found in the report by our two national water study consultants, Messrs. Maxey and Savisaari. As you will have seen from their report, they propose that the preparation of a national water development plan should include provision for full TVA-type study of the Tana basin. As you know, the Maxey/Savisaari report will require endorsement (and comments ?) by UNDP before it is submitted officially to Government. Maxey and Savisaari were made aware of the Bank Pre-Investment Study during their visit. You will also recall that the Maxey/Savisaari report contains the recommendation which reflects the wish of the Government that they should re-visit Kenya in September to finalize preparation of the terms of reference for a National Water Development Study. As you know too, we are hoping that SIDA will finance in whole or part of the national study. The one common element in the Government's request, the IBRD and Maxey proposals is that the first step to be taken is the study of all existing studies and data. Whether this exercise can and should be done by one paragon (Kampmeier or Drouhin (?) come to mind), by a two-man team (à la Maxey/ Savisaari) or as part of the Phase I 7-man team's job as proposed by the World Bank, is the immediate question for decision. Related questions are whether the Tana basin should at this preliminary stage be a separate subject for a special and intensive study or should be wrapped up in the national water study, and if the latter, would Maxey and Savisaari have the time and competence during their next visit to take it on, etc.

I think that we have reached the stage where you should now advise us and that we should have this advice before we go further at the Nairobi level along the lines suggested in your cable. Would it not be possible for you to arrange a session between the World Bank experts, Maxey and yourselves and then provide a guidance on recommendations I should put to the Government about next steps ? Even better, following a discussion of that kind perhaps you could send Kampmeier or equal to Nairobi to present and discuss with Government your joint advice on next steps.

I look forward to hearing from you.

Yours sincerely,

R.B. Stedman Resident Representative



11. 121

#### INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

1818 H Street, N.W., Washington, D. C. 20433, U.S.A. Area Code 202 • Telephone - EXecutive 3 6360 • Cable Address - INTBAFRAD

July 13, 1971

Mr. R. B. Stedman Resident Representative United Nations Development Programme P.O. Box 30218 Nairobi, Kenya

Dear Bruce:

First of all let me thank you for a very pleasant ride from Arusha to Nairobi on Thursday afternoon, followed by dinner with your family. I enjoyed both very much. I was glad we had this opportunity for informal talks on a variety of subjects.

In fact, I was so engrossed in our conversation on the subjects that I forgot an item of "business" on which I had meant to talk to you. This is the Tana River Basin Study, mentioned in your letter to Mr. Saunders of June 22 (copy of which was sent to Mr. Brakel). Therefore, I hasten to write to you on this subject, hoping that it is not too late to coordinate our efforts.

As you are probably aware, this is a very complicated project. The Study Data Sheets we prepared (pages 10 and 11 of our green-cover report dated April 9) is signed by both our Agricultural and our Public Utilities Projects Departments, as both sectors are equally interested in this problem. Even though we did not draft terms of reference for this study, let me assure you that the work that was put into the statement of Purpose and Scope on this particular item was substantial; in fact, it was the result of lengthy negotiations among the various parties involved. While there are, no doubt, various ways of approaching this problem, I think our two-phased approach, as outlined on the data sheet, is basically sound.

Since there have been a large number of studies on the Tana River Basin, concerning both future and existing projects, we envisioned that the first phase would require about seven specialists who could produce a report on parts (a) and (b) of the Scope within about eight months, for a total cost of \$220,000. This would cover merely the review phase of the study and the definition of additional field investigations required. All the rest would be Mr. R. B. Stedman

in the second phase, which would comprise the execution of field investigations, the analysis of results, and preparation of an overall plan and phase program for multi-purpose development of the river basin to 1993.

-2-

The timing, scope and cost of the second phase cannot be defined until the first phase has been completed. My guess would be, however, that the second phase can cost anywhere between a quarter million and one million dollars and would require a large number of experts in the field for a period of approximately one year. As you can see from our Study Data Sheet, the investments envisioned as a result of this study are in the order of two to three hundred million dollars, so this is not out of proportion.

Now the Government of Kenya has approached you to supply <u>one</u> <u>man</u>. The application does not say how long he would be in the field, but the terms of reference attached to the government's letter to you cover in very broad language the total scope we envisage, plus the possibility of diversion of the Athi River at a point above Kamburu. What this one man can in fact do is not clear to me, but I would advise against initiating this very complex problem with a single expert on a contingency basis, as is now proposed. I would much rather suggest an attempt be made to allocate the full amount required for the first phase of this study and to earmark something on the order of a half million for the second phase of this study, to be spent over a period of approximately two years. If this is possible, you could then designate an Executing Agency and have it work out a program for doing the work.

Certainly this should be a multi-sector exercise, not just one in agriculture or power or water supply. The team to undertake this study would have to be selected with regard to qualifications in all sectors concerned; bias in favor of any one sector should be avoided, both in selecting the Executing Agency and the team. Furthermore, the government's counterpart organization should be firmly established so that the study's recommendations, which are bound to be controversial, can be acted upon.

We consider the Tana River Basin Study as one of the most important and also one of the "hottest" in the program for Kenya. While I was unable to find out who drafted the government's terms of reference, it was obviously someone who did not have a clear conception of the amount of work involved in the various areas of investigation.

#### Mr. R. B. Stedman

July 13, 1971

I hope that you will have an opportunity to discuss this matter with Willem Brakel and others of our Permanent Mission in Nairobi. I will also advise the Public Utilities Projects Department to arrange for their staff to call on you the next time they visit Nairobi.

-3-

I would very much appreciate if you could continue to keep us informed of your actions with regard to this project.

With best regards,

Sincerely yours,

Peter Engelmann Preinvestment Adviser Office of Director, Projects

PEngelmann:pen

11: 311

P.S.: As agreed during our discussions with the Government, we will add the following note under item 6 of page 10: "The Government has requested UNDP assistance for this study." In addition we will stress on page 11 that staff and cost estimates are for Phase I only.

cc: Mr. Willem Brakel Chief of IBRD Permanent Mission in East Africa, Nairobi

Messrs. H. Collier (on return)

- K. G. V. prishna
- G. Wyatt
- J. Dumoulin
- V. Riley
- R. Hornstein (on return)

EXHIBIT C



## UNITED NATIONS DEVELOPMENT PROGRAMME NAIROBI, KENYA

AGIP HOUSE Haile Selassie Avenue (Coronation Lane Entrance)

#### BY AIR MAIL

Cables: UNDEVPRO, NAIROBI POST OFFICE BOX 30218 Telephone: 28776

Reference: K5-3-1

....

22 June 1971

Dear John,

#### Tana River Basin Study

Please find attached a copy of the Government's request for a study of the Tana River Basin which would review the existing studies in this respect with a view to establishing a plan for the integrated development of the basin.

This study is among those recommended by the IBRD pre-investment mission and I attach for easier reference the elevant description included in the IBRD confidential report. As you know, the conclusions and proposals of the IBRD pre-investment mission are to be discussed shortly between the Government and Bank's representatives but the Government wishes to proceed with this particular study without awaiting the outcome of these exchanges. Development possibilities of the Eastern and Northeastern regions of the country are at the moment very actively investigated as a consequence of the serious situation which steamed out of the recent drought and the proposed study fits in as a basic piece.

The more immediate pragmatic aspect of the requirement arises from the potentially conflicting or competing claims for the waters of the Tana, from hydro-power and irrigation sources.

The first task to be done is a "study of studies" including our own "Survey of the Irrigation Potential of the Lower Tana River Basin" (KEN-3). In this sense, the proposed investigation is a "follow-up" on that project, with direct consequences for investment decisions.

Mr. John Saunders D Deputy Director Regional Bureau for Africa UNDP, NEW YORK

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UNITED NATIONS DEVELOPMENT PROGRAMME

Continuation Swot

The Government expresses the view that one expert under contingency financing might be able to implement the proposed study even though a team of seven persons for various durations was foreseen in the original IBRD proposal. I believe that the present request enables us to field an expert who would later be the Team Leader if the necessity of a full team is, very likely, to This expert should establish full terms of reference be further substantiated. for the study after reviewing the situation along the lines of the IFS procedur Should you concur with this proposal, it would be very important that this expert participate in the forthcoming disucssions on the pre-investment studies concerning the Tana River Basin. As indicated earlier, these discussions are to take place at the beginning of July and I would urge that preliminary exchanges with the Bank take place as soon as possible. If the expert is able to come then precise terms of reference and precise costing can be worked out at this time. It could also be decided then whether the work to be done in addition to the expert's task should be done under subcontract or by inviting additional experts and/or consultants to join the first expert who would then become Team Leader.

To summarize:

- a) The request may be viewed as a form of follow-up on KEN-3;
- b) It has a direct relationship to pending investment decisions;
- c) It was given top priority by the recent IBRD "Pre-Investment Programming Mission";
- d) IBRD has estimated the international costs of the whole team at \$142,000 (36 man-months), and it appears that the project could qualify for revolving fund finances because of its direct relationship to investment. The Government, aware of our parlous financial situation has itself suggested initially one man on a contingency basis.

Please let us have your instructions, if possible by cable.

Yours sincerely,

R.B. Stedman Resident Representative

c: Mr. W. Brakel Chief of IBRD Permanent Mission in East Africa, Nairobi

cc: Mr. Hornstein, IBRD Washington

EXHIBIT B





THE TREASURY NAIRODI KENYA

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par i

15th June, 1971

Mr. R.B. Stedman, Resident Representative, United Nations Development Programme, P.O. Box 30218, NAIROBI.

Dear

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## TAMA RIVER BASIN STUDY

You will no doubt be sware of the Kenya Government's need to carry out a study of the whole of the Tana River Basin which would enable the Government to evaluate and ascertain a more realistic and integrated approach to the development of the whole Basin. The proposed study is expected to take into account the recommendations of the UPPER TAMA CATCHMENT SURVEY, ILACO N.V., the Survey of the Irrigation Potential of the Lower Tana River Basin and the Balfour Beatty Power Study Reports, which I believe you already have copies of them. This study was included in the list of pre-investment studies recommended by the World Bank Mission which visited Kenya last year and indeed was allecated very high priority rating by the Mission. The study is of course casential for the making of far-reaching and urgent decisions relating to major investment programmes on the Tana River.

It has been proposed that the study might be undertaken by an IERD Survey Team consisting of a hydrologist, an eccmenist, a power engineer, an agriculturalist and an irrigation engineer. However, in view of the ungency we attach to this work, I am suggesting that it may be possible to finance the study through a contingency fund allocation and especially in view of the fact that the exercise could perhaps be carried out by only one expert. The purpose of this letter is therefore to request you to assist in getting an expert to undertake the proposed study on our behalf.

Draft Terms of Reference for the Survey Team are enclosed herewith.

Yours

(K.N. Kipreno Biwott) (1) for <u>PERMANENT SECRETARY</u>

ENC:

c.c. Permanent Secretary, Office of the President, <u>NAIROBI</u>.

> Permenent Secretary, Ministry of Agriculture, NAIROBI

Permanent Secretary, Ministry of Power & Communications, NAIROBI

## TERMS OF REPERENCE

The IERD should be requested to empoint a highlevel team to study the Tana Basin as a whole with the following particular objectives:

- 1. To review all emisting informatica and reports on the Basin.
- 2. To indicate whether any further information is required and its nature.
- 3. To investigate the possibilities of supplementing the water resources of the Tana by diversion of the Athi River at a convenient point above Kamburu.
- To assess the long term banefits of various forms of development in the Basin, so as to realize the optimum potential of the River to obtain maximum benefit in power and irrigation development with particular reference to the urgent need for increased employment opportunities.
- 5. To prepare a plan for an integrated development of the basin as a whole in order to obtain the most economic use of the water resources available.

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UK (KEN) 3



Distr. RESTRICTED

SF/R.5/Add. 37 22 March 1962

\$974,100

\$323,000

ORIGINAL: ENGLISH

GOVERNING COUNCIL Eighth session Agenda item 5

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**WBG ARCHIVES** 

KEN 3

Recommendation of the Managing Director

UNITED KINGDOM: KENYA

Survey of the Irrigation Potential of the Lower Tana River Basin

Governing Council earmarking: 1/

Government's counterpart contribution\_/ estimated at equivalent of:

Duration:

Three years

Purpose:

To survey the irrigation potential of the Lower Tana and to prepare a phased plan for the optimum exploitation of the river's resources

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Executing Agency: The Food and Agriculture Organization of the United Nations

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The Government's cash payments towards local operating costs are included in 1/ the Governing Council earmarking and not in the Government's counterpart contribution.

62-05899

SF/R.5/Add.37 English Page 2

#### I. Introduction

1. The Managing Director submits the following report and recommendations on the application of the Government of the United Kingdom on behalf of the Government of Kenya for assistance in a survey of the irrigation potential of the Lower Tana River Pasin.

#### II. Background

2. The Tana river is the largest river in Kenya. It is believed to have an ultimate irrigation potential of about 400,000 acres. The river is divided into three reaches - the Upper, the Middle and the Lower Tana. Investigationns were carried out in the Upper and Middle Tana by private firms of consultants. Out of a total irrigation potential in the Upper Tana of 93,000 acres, partial development has already taken place in a compact block of 23,000 acres in Mwea with 5,000 acres under rice cultivation. The Middle Tana is the main potential source of hydro-electric power in the catchment.

3. The Lower Tana, with its extensive unpopulated areas of desert soil lying close to a good source of irrigation water, is the most suitable region in Kenya for agricultural development under irrigation and for settling surplus farm population from the densely populated areas in other parts of Kenya. About 60 per cent of the 39,300 square miles of the catchment area of this region has an annual rainfall of less than 20 inches. The low rainfall zone is located in the hot desert areas in the lower portion of the basin. The topography appears to be favourable for low-cost irrigation development by a gravity distribution system from a barrage across the river. If a suitable barrage site can be selected, irrigation facilities for about 75,000 acres by run-of-river flow could be provided. Further development would require the construction of a series of storage reservoirs. It is believed that an ultimate potential of 250,000 to 300,000 acres could be developed, to provide an assured livelihood for perhaps 50,000 families.

4. A 500 acre pilot irrigation scheme was established at Galore on the Lower Tana in 1957 to provide basic data on soil-crop-water relationships and to determine the suitability of desert soils for economic crop production under irrigation. The results to date have been very encouraging and have demonstrated the suitability

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of the soils for irrigation. Experience at the Mwea irrigation scheme in the Upper Tana basin has shown that the local farmers are eager to take advantage of the opportunities offered by irrigation and are ready to accept its basic organizational requirements.

#### III. The Project

The project consists of a survey of the irrigation potential of the 5. Lower Tana and the submission of recommendations for its phased development. The studies will comprise a preliminary reconnaissance survey of about 3,000,000 acres, the selection of about 1,200,000 acres for detailed examination and the preparation of soil maps. Hydrological investigations to supplement and amplify the existing data will be carried out. Suitable dam sites will be selected for storage of water. The problem of flood control over the whole catchment will be given due consideration. The existing proposals for irrigation development in the Middle Tana will be carefully considered when planning development for the Lower Tana to ensure that optimum use is made of the water resources of all portions of the catchment. The existing 500-acre pilot irrigation scheme is to be expanded to 12,000 acres, and the scope of experimental work broadened. The project will also provide suitable training for local personnel to act as instructors and supervisors in new areas as the development expands. Finally, plans for the phased development of the irrigation potential of the Lower Tana will be prepared.

6. The duration of the project will be three years. The Special Fund assistance will comprise 25 man years of expert services, six fellowships of 12 months each, equipment and supplies, aerial photography and mapping and miscellaneous expenses.
7. The Government contribution will cover counterpart professional staff, administrative staff, local facilities and labour.

#### IV. Executing Agency

8. The Food and Agriculture Organization of the United Nations has indicated its readiness to serve as Executing Agency.

#### V. Financial Provisions

9. It has been estimated that the total Governing Council earmarking will be as follows:

	Total cost	Phasing of Expenditure					
	(in \$US)	lst Year	2nd Year	3rd Year			
Experts de la la la la company se la serie	502,500*	150,000	250,000	102,500			
Fellowships	30,000	15,000	15,000	1			
Equipment and supplies	125,000	80,000	45,000	Se velation			
Sub-contracts	200,000	100,000	100,000	n'i n' <b>-</b> k od			
Miscellaneous	30,200	9,000	15,000	6,200			
Total project cost	887,700	354,000	,425,000	108,700			
Executing Agency overhead cost	86,400			to sperts			
Total Governing Council earmarking	974,100	BARRIE STREET		Land when			

\* Gross cost representing 25 man years.

1. Sector

10. Included in the total Governing Council earmarking is an amount estimated at the equivalent of \$81,400 representing 15 per cent of the estimated gross expert cost, including the expert component of sub contracts, which will be paid by the Government as a cash contribution towards local operating costs of the project. In addition the Government is expected to make a counterpart contribution estimated at the equivalent of \$523,000. The exact amounts will be determined at the time of signature of the Plan of Operation.

11. To the extent administratively desirable, it is the intention of the Managing Director, subject to the concurrence of the Government, to include in the gross project budget any part of the counterpart contribution which the Government agrees to make in cash, and to show a Special Fund allocation increased accordingly.

#### VI. Recommendation

12. The Managing Director

(a) RECOMMENDS that the Governing Council approve an earmarking of \$974,100 for this project, of which \$887,700 will be for project costs, and

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SF/R.5/Add.37 English Page 5

\$86,400 for clearly identifiable additional costs incurred by the Executing Agency in the execution of the project; and

(b) REQUESTS the authorization of the Governing Council to conclude the appropriate arrangements.

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February 12, 1962

506

Your Ref: SF 310 (UK) KEN 3

Mr. Myer Cohen, Director Bureau of Operations United Nations Special Fund New York, New York

Dear Myer:

I am replying to your letter of January 10, 1962 to Mr. Demuth in which you ask for the Bank's comments on the request from the Government of Kenya for assistance from the Special Fund for a survey of the Irrigation Potential of the Lower Tana River Basin.

This survey is a high priority undertaking for the future development of large-scale, low-cost irrigated farming in Kenya. It would help meet the needs for land settlement and for increased agricultural output. The Bank feels in general that this request should be supported. However, we have a number of reservations as to the approach and methodology suggested in the project proposal.

In answer to the specific points which you raised in your letter of January 10 to Mr. Demuth, we feel that as mechanized cultivation has already proven successful elsewhere in Kenya on the basis of equipment owned cooperatively or by the government, the provision for demonstrating the use of mechanized equipment might well be retained. FAO's advice on this point\*would be helpful.

With regard to the particular provision of the caterpillar tractor with dozer and the caterpillar motor grader, these machines are perhaps not in the category of "mechanical equipment for farming", and certainly not comparable with "human and animal labour which the local cultivator could easily afford." these machines are more likely to be used in road making and laying out of lands for farming. They would probably be handled by contractors or agencies, quite irrespective of the cultivation machinery (whether animal drawn or mechanized) used for the actual tillage operations.

On the question of mapping, we feel that it is unnecessary to make a reconnaissance survey of 3,000,000 acres. Aerial photography at a scale of 1:20,000 would be desirable. Detailed mapping of 1,200,000 acres of land seems unwarranted and it should be possible to reduce this even by preliminary reconnaissance survey. Depending on the uniformity and assuming there is a water supply for about 400,000 acres of the area, it should be possible by

reconnaissance surveying to select about 600,000 acres for detailed field classification and mapping. Depending also on the uniformity of the area, topography with one-foot contour interval is most desirable - using the aerial photos for mapping at a scale of 1:4800.

We agree that the sum stated as Kenya's local contribution (about 1 800,000) may be questioned as it includes outlays already made. However, there is plant and equipment already built or purchased which, for financial reasons, cannot be used adequately except as part of a new project with outside financial support. These capital items would be made over to the survey project. Above all, we urge that, in view of the scute financial difficulties of the Kenya Government, the local contribution should be kept as low as possible. The government's estimate of its contribution as 40 percent of the total constitutes a high ratio for a Special Fund project, and even if part of past expenditures is eliminated, the proportion would still be high. We have no comment on the question of the costs of the prefabricated houses.

The proposed budget and the numbers and kinds of personnel required for the work might require some revision. For instance, six soil surveyors appear to be excessive. FAO has had considerable experience in estimating survey costs and standards and this point could be checked against their experience.

In summary we feel that the survey is of high priority for the development of Kenya and should be supported. We also feel that some of the specific points mentioned above warrant reconsideration.

Sincerely yours.

J. E. Twining, Jr. Development Services Department

JET: ias

Cleared with and cc:

Mr. Evans (TOD) A-33 Mr. Thompson (E.A.& A.) 414 cc Central Files Dr. Strong (Kenya Mission)



# UNITED NATIONS SPECIAL FUND



CB.7/2/Add. 39 5 February 1962

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CONFIDENTIAL Sec. 4

CONSULTATIVE BOARD Seventh meeting 16 February 1962

an even of both a set of stat being with the AUG 0 5 2022 United Kingdom (Kenya): Irrigation Potential of the Lower Tana River Basin

The Government of Kenya has requested assistance from the Special Fund for a 1. survey of the irrigation potential of the Lower Tana River Basin.

The Tana river is the largest river in Kenya. The Middle Tana is the main 2. potential source of hydro-electric power in the catchment, while the Lower Tana, with its extensive unpopulated areas of desert soil lying close to a good source of irrigation water, is the natural region for agricultural development under irrigation and for settling surplus peasant population from the densely populated areas in other parts of Kenya. It is believed that an ultimate potential of 250,000 to 300,000 acres could be developed.

The Special Fund is requested to allocate over three years an amount of 3. \$1,166,000 covering experts, fellowships and equipment. The Government's counterpart contribution will be \$799,000.

The project is being evaluated in consultation with the Food and Agriculture 4. Organization of the United Nations, the International Bank for Reconstruction and Development and the United Nations.

The project will comprise a preliminary reconnaissance survey of about 5. 3,000,000 acres, selection of about 1,200,000 acres for detailed examination and preparation of soil maps. Hydrological investigations to supplement and amplify the existing hydrological data, including those on the Middle and Upper Tana catchments, will be carried out. Suitable dam sites will be selected for storage of water, and the problem of flood control over the whole catchment will be studied. Finally, recommendations for phased development of the area will be drawn up.

Subject to completion of evaluation, the Managing Director proposes to request 6. that the Governing Council authorize an amount of \$904,600 to cover the estimated project costs of this project over a period of three years. Of this \$532,600 would be for 26.5 man-years of expert services, \$30,000 for six fellowships of 12 months each, \$110,000 for equipment, \$200,000 for aerial photography and mapping (subcontracts) and \$32,000 for miscellaneous costs. The Government's counterpart

CB.7/2/Add. 39 page 2

contribution is estimated at \$307,000, and in addition the Government will be expected to contribute in cash a sum equivalent to fifteen per cent of the expert services.

7. The Managing Director proposes to recommend that the Food and Agriculture Organization of the United Nations be invited to serve as Executing Agency for the project.

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INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

Mr P. J. Equire L. J. C. Evans (16

DATE: January 29, 1962

TO:

FROM:

FORM NO. 57A (5-48)

SUBJECT: U.N. Special Fund Request from the Government of Kenya (KEN 3) for assistance in a survey of the Irrigation Potential of the Lower Tana River Basin

I attach a note by Mr Mitchell on the proposed UNSF scheme for a survey of the Lower Tana River Basin in Kenya. I have myself known something of the previous surveys of this area and I agree with Mr Mitchell that the UNSF project as planned probably needs some revision, especially of emphasis and priorities. Specifically, the emphasis should in the first instance be on hydrology and survey of water resources. Until much more is known under this heading, it would be a mistake to plan soil surveys in too much detail. The plans for land and soil surveying need revision along the lines suggested by Mr Mitchell whose views, I think, are in general supported by the comments of the Water Resources Development Center.

I have now seen a copy of Mr Lejeune's comments to Mr Iverson, dated January 26, on this project, in which the views of the Kenya General Survey Mission are quoted. I concur with the views of the Kenya mission members as quoted in para 5 of Mr Lejeune's memorandum; the members disagreed with the suggestion of Mr Cohen that the use of human and animal labour might be advocated rather than the use of mechanical equipment for farming. From my knowledge of Kenya, I would certainly agree with the mission members that mechanized cultivation is likely in the new areas. There may, however, be some misunderstanding as to what is intended in the project. Mr Cohen suggests the deletion of the provision for Caterpillar tractor with dozer and Caterpillar motor grader. These machines are perhaps not in the category of "mechanical equipment for farming" and certainly would not be comparable with "human and animal labour which the local cultivator could easily These machines are more likely to be used in road making and laying out afford". lands for farming and would probably be handled by contractors or agencies, quite irrespective of the cultivation machinery (whether animal drawn or mechanized) used for the actual tillage operations.

c.c. Mr Lejeune

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

# OFFICE MEMORANDUM

#### TO:Mr. Kenneth R. Iverson

DATE: January 26, 1962

#### FROM: M. L. Lejeune

FORM NO. 57

(5-48)

#### SUBJECT: Kenya - Government Request for U.N. Special Fund Assistance in Survey of Lower Tana River Basin.

1. We have discussed the request of the Kenya Government and also the comments of Mr. Cohen with members of the General Survey Mission which returned from Kenya late last month. On the basis of their judgments, it would seem that the request merits the support of the Bank.

2. The survey is a high priority undertaking for the future development of large-scale, low-cost irrigated farming in Kenya. It would help meet the needs for land settlement and for increased agricultural output, the area being capable of carrying a wide range of products from long-staple cotton to vegetables. If the survey proves that large-scale development would be viable, the project itself would take place late in the '60's and would require sub-stantial capital assistance, including the provision of adequate road facilities from Nairobi and the coast.

3. It is agreed that the sum stated as Kenya's local contribution (about 1800,000) may be questioned as it includes outlays already made. However, there is plant and equipment already built or purchased which, for financial reasons, cannot be used adequately except as part of a new project with outside financial support. These capital items would be made over to the survey project. Above all, the Mission urges that, in view of the acute financial difficulties of the Kenya Government, the local contribution should be kept as low as possible. The government's estimate of its contribution as 40% of the total constitutes a high ratio for a Special Fund project, and even if part of past expenditures is eliminated, the proportion would still be high.

4. Mr. Cohen questions the estimates of survey costs and standards, and the Mission suggests that this matter be checked with FAO which has had considerable experience in this field. The provision for six soil surveyors may be excessive, as suggested by the U.N., and this point could also be checked against the experience of the FAO.

5. Mission members feel that mechanized cultivation is likely in the new areas: it has already proven successful elsewhere in Kenya on the basis of equipment owned cooperatively or by the government. The provision for demonstrating the use of mechanized equipment might therefore be retained: on this point, too, the advice of FAO would be helpful.

Kuthopy -

FORM No. 57 (5-48)

#### INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

OFFICE MEMORANDUM

DATE: January 23, 1962

TO: Mr. L. J. C. Evans

MUDIFICT. II. N. Special Fund Demost from the Comm

SUBJECT: U.N. Special Fund Request from the Government of Kenya (KEN 3) for assistance in a survey of the Irrigation Potential of the Lower Tana River Basin.

> The limited information submitted with this request indicates that considerable investigation work has already been done in the Upper, Middle and Lower Tana River Basin. Studies were initiated as early as 1934 and have continued from time to time up to the present. Without having access to this data, it is most difficult to determine precisely what is required to complete an adequate project investigation. However, this proposal appears to be an unusual program for project planning purposes.

In a situation such as this, it would seem desirable to first definitely determine the maximum potential water supply. This would include selection of dam sites, reservoir capacity determination and reservoir operation studies, taking into account evaporation and transportation losses and power and consumptive use requirements. The selection of lands to be irrigated can then proceed, fitted to the potentially available water supply.

Based on a similar program, the following comments on the Kenya proposal are in order:

- 1) Insufficient funds provided for hydrelogic surveys and reservoir selection and operation studies.
- 2) Hydrology should be firmed up in first year.
- 3) Selection of lands could be made latter part of first year or whenever water supply is known.
- 4) Seems improbable that 3,000,000 acres will need reconnaissance survey - no topography necessary. Aerial photos desirable scale 1:20,000.
- 5) Detailed mapping of 1,200,000 acres of land seems unwarranted; depending on the uniformity and assuming there is a water supply for about 400,000 acres of the area, it should be possible by reconnaissance survey to select about 600,000 to 800,000 acres for detailed mapping. Again, depending on uniformity of area, topography with one-foot contour interval is most desirable. Use aerial photos for mapping - scale 1:4800.

- 6) Additional Research Station should await selection of area to be irrigated.
- 7) Consistent with the above approach, the proposed budget and the numbers and kinds of personnel require major revision.

MAL. Twine

#### WATER RESOURCES DEVELOPMENT CENTRE

### UNITED NATIONS

### NATIONS UNIES

#### INTEROFFICE MEMORANDUM

D.

TO: Mr. E. Lopez-Herrarte International Bank for Reconstruction and Development

> J. Dumoulin, Technical Secretary, Water Resources Development Centre

Date:\_\_\_\_\_22 January 1962

FILE NO .: EC 132/226/1 UK TT NSGT

FROM:

SUBJECT: KENYA: Pre-investment survey of the irrigation potential of the Lower Tana River Basin

I am attaching for your information the comments of the Water Resources Development Centre to the Special Fund concerning the above-mentioned project. Mr. Hyor Cohon, Diroctor Burcau of Operations, Special Fund

#### 19 January 1962

EC 132/226/1 UK TT HEOT

J. Dumoulin, Tochnical Socrotary 7. ). Nator Resources Development Contro 7. ).

KINA: Pro-invostment survey of the irrigation potential of the Lower Tana River Basin

1. This is, undoubtedly, a very ambitious and grendiese project, by reason of the very large area to be surveyed (3,000,000 acres), the aerial photography and mapping and dotailed soil survey to be carried out (1,200,000), and the amount of memory required from the Special Fund (31,166,000).

2. The main purpose of the project is a pro-investment curvey of the irrigation potential of the Lewer Tana basin and the subsequent procentation of recommendations for future phased development.

3. The future irrigation scheme would be designated on the basis of on existing 500 acro pilot-scheme and partly on the assumption that a suit 310 dan site can be selected.

4. In our opinion the approach, as outlined in the request, is too vague and extrapolation from a small-size pilot area to a big area is used on a rather risky basis. Irrigation development for such a vast area should be planned applying an interdisciplinary study of the other existing natural resources or other unter resources, because development of storage facilities upstream will always affect the lower part of the river and vice versa.

5. Another point to be considered is that the future irrigation command of a 1,200,000 acro scheme (which is not clearly shown in the request) might require the construction of one or several important dan reservoirs by means of which hydro-cleatricity could be produced. It can also be assumed that other developments might be considered in the river basin.

6. It would be advisable to reconsider the project presently submitted and suggest the zformulation of a request which would be frinced in such a way that the principles, the specific problems, to be resolved and the general approach would be these of the concept of an integrated river basin development, i.e. the assessment of needs and the inventory of resources. This last romark is justified by the request itself makin; reference to other studies end developments which "are carried out in a menner which does not projulice the optimum exploitation of the river's resources."

7. Those commonts and our semuchat negative opinion toward this project are such that no suggestion can be made at this stage, for a possible mounting Agency.

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

# OFFICE MEMORANDUM

Department of Technical Operations

TO: Department of Operations - Europe, Africa and DATE: January 12, 1962 Australasia

FROM: Kenneth R. Iverson

SUBJECT: Request to U.N. Special Fund from the Government of Kenya (KEN 3) for assistance in a survey of the irrigation potential of the Lower Tana River Basin.

> copy of the original project request and a Attached is a/resume arxix received by the United Nations Special Fund. The Special Fund has asked for any comments which the Bank might wish to make on this project.

Please let me have any views which would be useful for us to pass on to the Special Fund. If there are no comments, I would also appreciate a note to that effect in order that we can reply promptly to the request.

FORM NO. 57A (5-48)

TERI

CABLE ADDRESS: SPECFUND NEW YORK

SPECIAL FUND



FONDS SPECIAL

UNITED NATIONS NEW YORK

TELEPHONE: PLAZA 4-1234

REFERENCE: SF 310 (UK) KEN 3

10 January 1962

Dear Dick,

Ort.

I am enclosing herewith five copies of the summary of the project request from the Government of Kenya for survey of the Irrigation ..... Potential of the Lower Tana River Basin. A copy of the original project request is enclosed.

You will notice that the project request contains mention of certain items of expenditure already incurred by the Government but accounted for as Government contribution towards this project. The Special Fund will not agree to such expenditure being considered as Government contribution towards the project. For preliminary reconnaissance survey of 3 million acres, preparation of 25 ft. interval contour maps does not seem to be necessary. The cost of aerial photography and mapping of 1,200,000 acres of selected area for detailed investigation appears to us to be very excessive. Similarly, provision of 6 soil surveyors for two years for soil survey could be reduced. The provision under experts, will require close examination so as to increase it, if necessary, to provide for all aspects of the project including experimental work. Special Fund contribution asked for towards prefabricated houses would not be admissable. All housing construction should be with the local available material.

At the present stage of the country's economy, perhaps, demonstrating use of mechanical equipment for farming may not be of much use to the country. The use of human and animal labour which the local cultivator could easily afford might be advocated. We would, therefore, delete the provision of caterpillar tractor with dozer and caterpillar motor grader as provided under equipment. Instead some extra provision could be made for equipment for experimental work.

We trust the above remarks would be found useful for evaluating the project. I should be grateful for your early comments so that we might be able to process the request further.

Yours sincerely.

heralden

Myer Cohen Director, Bureau of Operations

Mr. Richard Demuth, Director Technical Assistance and Liaison Staff International Bank for Reconstruction and Development 1818 H Street, N. W. Washington 25, D. C.

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#### UNITED NATIONS SPECIAL FUND

Request from the Government of Kenya for assistance in Survey of the Irrigation Potential of the Lower Tana River Basin

#### SUMMARY

Date request received	28 December 1961
Amount requested from the Special Fund:	\$1,166,000
Government counterpart contribution (equivalent of)	\$ 799,000
Duration of the Project:	3 years
Type of assistance requested:	Experts, fellowships equipment

#### Background:

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The Kenya Government has long recognized the need to develop the irrigation potential of the Tana River and a number of investigations have been undertaken in the Upper, Middle and Lower reaches of the river.

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A detailed investigation of the Upper catchments was recently carried out by Sir Alexander Gibb and Partners. The estimated irrigation potential of the Upper Tana is 93,000 acres. Part of this consists of a compact block of 23,000 acres in Mwea where partial development has already taken place and 5,020 acres are under rice cultivation. The Middle Tana, which lies in a steaply sloping stretch of river between Seven Forks and Grand Falls is the main potential source of hydro-electric power in the catchment. It has been investigated by Messrs. Balfour Beatty, consultants, and proposals prepared for phased hydro-electric development involving the construction of a series of power plant with an ultimate installed capacity of 400 megawatts. The Lower Tana, with its extensive unpopulated areas of desert soil lying close to a good source of irrigation water is the natural region for agricultural development under irrigation and for settling surplus peasant population from densly populated areas in other parts of Kenya. The rolling topography of the Upper Tana provides more suitable storage sites than the level plains of the Lower Tana, and therefore, large scale development of the latter region will involve investigations of storage sites and water requirements in the Upper portion of the catchment. It will be necessary to consider the entire catchment as a unit when planning development of the lower portion only.

It is believed that the Tana River, which is the largest river in Kenya, may have an ultimate irrigation potential of about 400,000 acres. About 60 per cent of the catchment area of 39,300 square miles has an annual rainfall of less than 20 inches. The low rainfall zone is located in the hot desert areas in the lower portion of the Basin. The topography appears to be favourable for low cost irrigation development by gravity distribution system by a barrage across the Tana River. If a suitable barrage site can be selected, irrigation

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facilities for about 75,000 acres by run-of-river flow could be provided. Further development would naturally require the construction of a series of storage reservoirs. It is believed that an ultimate potential of 250,000 + 300,000 acres could be developed.

A 500 acres pilot irrigation scheme was established at Galore in the Lower Tana in 1957 to provide basic data on soil-crop-water relationships and to determine the suitability of desert soils for economic crop production under irrigation. The results to date have been very encouraging and have demonstrated the suitability of the soils for irrigation. Experience at Mwea irrigation scheme in the Upper Tana Basin has shown that the local peasants have the ability and energy to acquire the techniques required for irrigation. The Lower Tana is considered to be the most suitable region in Kenya for large scale irrigation, and full development of the area is expected to provide an assured source of livelihood for 30,000 to 75,000 landless peasant families.

#### The Project:

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The project consists of survey of the irrigation potential of the Lower Tana and submission of recommendations for its phased development. The principal features of the project may be summarized as follows:

- 1. preliminary reconnaissance survey of about 3 million acres for the purpose of selecting about 1,200,000 acres for detailed survey. Mapping 3 million acres to a scale of 1 over 100,000 with 25 ft. interval contours;
- 2. aerial photography and mapping to a scale of 1 over 10,000 with 5ft interval contours of 1,200,000 acres selected for detailed examination. Soil maps to the same scale will also be required.
- 3. hydrological investigations to supplement and amplify the available hydrological data will be extended to include the Middle and Upper Tana catchment:
- 4. selection of suitable dam sites. Existing proposals for irrigation development in the Middle Tana will have to be given due consideration when planning development in the Lower Tana, to ensure that optimum use is made of the water resources of all portion of the catchments. Flood control will also have to be considered over the catchment as a whole;
- 5. It will be necessary to extend the scope of experimental work in the 500 acre pilot irrigation scheme now being expanded to 12,000 acres;
- 6. emphasis will be placed on the training of suitable African personnel to act as instructors and supervisors in new areas as development expands;

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7. preparation of final plans for the phased development of irrigation potential of the Lower Tana.

#### Financial and Administrative data:

#### a. Special Fund Contribution

		Total	1st Year	2nd Year	3rd Year
1.	Reconnaissance Surveys of 3,000,000 acres	20,000	20,000		• • • • •
2.	Detailed mapping of 1,200,000 acres	390,000	250,000	140,000	
3.	Surveys of dam sites, etc.	9,000	6,000	3,000	-
4.	(a) Scil surveys: 3,000,000 in outline followed by 1,200,000 in detail	¢ 204,000	102,000	102,000	
10.	(b) Transport and unskilled labour	idente Plantes		e til <del>i</del> teos	anton et anton et
5.	Expert personnel	+ 245,000	64,000	100,000	81,000
6.	Research Station	. 75,000	25,000	25,000	25,000
7.	Housing (prefabricated)	50,000	50,000	-	-
8.	Equipment	137,000	137,000	wites-tests	anat <del>r</del> i e
9.	Fellowships		12,000	12,000	12,000
	Totals	1,166,000	666,000	382,000	118,000

+ The expert personnelwill be as follows -

1 water development specialist - 3 years

- 1 irrigation agronomist 3 years
- 1 cotton specialist 2 years
- 1 appraisal economist 2 years
- 1 irrigation engineer with dam experience 1 year

: - .

1 irrigation layout specialist - 2 years

¢ 6 Soil Surveyors for 2 years

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b. Government counterpart contribution

1.	Reconnaissance Surveys of 3,000,000 acres	<u>Total</u> \$ 25,000	Already Contributed \$ 25,000*	<u>lst Year</u> \$ -	2nd Year \$ -	<u>3rd Year</u> \$ -
2.	Detailed mapping of 1,200,000 acres	30,000	e -	20,000	10,000	-
3.	Surveys of dam sites, etc.	. 3,000	-	3,000	-	-
4.	Transport and unskilled labour	20,000	-	10,000	10,000	-
5.	Expert personnel	96,000 <sup>X</sup>		32,000 <sup>X</sup>	32,000 <sup>X</sup>	32,000 <sup>X</sup>
6.	Research Station	575,000*	× 500,000*	25,000 <sup>X</sup>	25,000 <sup>X</sup>	25,000 <sup>X</sup>
7.	Housing (prefabricated)	50,000		50,000		
	Totals	799,000	525,000	140,000	77,000	57,000

\* Estimated value to project of expenditures already incurred by Kenya Government.

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X Estimated value to preject of new expenditure which will be incurred by the Kenya Government within existing resources.

S. R. Vasudev/vcd

#### KENYA GOVERNMENT

## REQUEST FOR PRE-INVESTMENT SURVEY OF THE IRRIGATION POTENTIAL OF THE LOWER TANA RIVER BASIN IN KENYA.

#### SUMMARY.

The request is for a pre-investment survey of the irrigation potential of the Lower Tana River and the preparation of detailed recommendations for the development of this potential.

Over much of Kenya rainfall is low and evaporation losses high and a relatively small area of the country is sufficiently well provided with water to support an intensive system of agriculture. The population, however, is rapidly increasing and there is an acute shortage of land even in areas where rainfall is barely sufficient to support a subsistence level of agriculture. Moreover, the numerous land consolidation schemes which have been carried out during the past few years have tended to increase rather than reduce the number of landless peasants. Large areas have been subdivided into a number of small viable units, each individually owned, in contrast to the old system of tribally owned land which permitted an indefinite degree of overcrowding. Kenya has insufficient primary and secondary industries to absorb the rapidly growing number of unemployed and even if all land of high potential now farmed in large units in the Highlands were divided among "yeomen" African farmers there would still be a big unsatisfied demand for land. One of the best solutions to this problem is to bring lands, now unproductive because of insufficient rainfall, under beneficial development in catchments where river water is available for irrigation.

It is believed that the Tana River, which is by far the largest river in Kenya, may have an ultimate irrigation potential of the order of 400,000 acres. About 60% of the catchment area of 39,300 square miles has an annual rainfall of less than 20 inches. The low rainfall zone is located in hot desert areas in the lower portion of the Basin. These desert soils support only a sparse cover of shrubs and grasses. Ground slopes are generally uniform over wide areas and average about 1 in 400. Hence the topography appears to be very favourable for low cost irrigation development by a gravity distribution system based on a barrage across the Tana River near Garissa. If a suitable site can be selected the barrage would represent the first stage in phased development, and might be used initially to irrigate about 75,000 acres by run-of-river flow. Further development would naturally require the construction of a series of storage reservoirs. If sites for these can be found it is believed that an ultimate potential of 250,000 to 300,000 acres could eventually be developed.

A 500 acre Pilot Irrigation Scheme was established at Galole in the Lower Tana in 1957 to provide basic data on watersoil-crop relationships and to determine whether, in fact, desert soils are suitable for economic crop production under irrigation and whether the indigenous African has the potential of a good irrigator. Based on earlier observations in a small experimental area, the cropping system of the pilot scheme involves the growing of cotton, maize, and legumes.

The results to date have been most encouraging, and have demonstrated the suitability of the soils for irrigation. Salinity and low permeability have proved to be less significant factors than originally anticipated and very satisfactory and profitable yields of cotton have been obtained. The River Tana water is of excellent quality and the uniform impermeability of the soil militates against excessive water use on upland crops and the establishment of a regional high ground water table. Consequently, no deterioration of soil conditions as a result of irrigation is anticipated. On the other hand, as the cultivators acquire increasing skill in irrigation and in the cultivation of the new crops which they will be growing, and as strains of these crops which are adapted to local conditions are found, an improvement of the existing general level of production is to be expected. In illustration, while the 1960 cotton crop on the pilot scheme averaged 1080 lbs. Grade A seed cotton per acre, yields of up to 3900 lbs. per acre have already been obtained in farm experiments.

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The Lower Tana is considered to be the most suitable region in Kenya for large scale irrigation, and full development of the area would provide an assured source of livelihood for between 50,000 and 75,000 landless peasant families whose labours would not only bring prosperity and economic well being to themselves but would also contribute materially to the wealth of the country.

At the inception of the Filot Scheme some apprehension was felt concerning the willingness of the local people to accept the disciplines which are so essential to the successful operation of an irrigation scheme. These fears have proved just as groundless at Galole on 500 acres as they have on the 5000 acre mixea irrigation scheme in the Upper Tana Basin. Experience at mixea has shown that the local peasants have the ability and energy to acquire the techniques required for irrigation and that the prospect of a radical improvement in their living standards has brought forward a much larger number of applicants for holdings than can be absorbed within the present limits of development.

Twelve hundred and fifty families are now settled on the invea scheme and the average output of rice (padi) on the scheme after less than 3 years of operation is more than 2 tons an acre which is an extremely high figure by world standards. This experience has convinced the Kenya Government that irrigation schemes which are economically viable will have no difficulty in securing the required number of good tenant farmers.

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#### BACKGROUND.

The Kenya Government has long recognised the need to develop the irrigation potential of the Tana River and a number of investigations havebeen undertaken in the Upper, Middle and Lower reaches of the river. Annexure 'A' entitled "Water Development in Kenya - The Tana River Basin", gives a general description of the Tana Basin, and summarises the investigations and development works carried out to date.

-3-

A detailed investigation of the upper catchment was recently carried out for the Kenya Government by Sir Alexander Gibb and Partners and their "Upper Tana Catchment Water Resources Survey 1958/9" (Annexure 'B') contains much information which is relevant, not only to development in the Upper Tana, but also to the Lower Tana. The estimated irrigation potential of the Upper Tana is 93,000 acres. Part of this consists of a compact block of 23,000 acres in Mwea, where partial development has already taken place and 5,020 acres are under rice cultivation. The other areas are widely dispersed and consist of small units in altitudes and rainfall zones suitable for coffee growing under supplementary irrigation.

The Middle Tana, which lies in a steeply sloping stretch of river between Seven Forks and Grand Falls (see map attached to Annexure 'A') is the main potential source of hydro-electric power in the catchment. It has been investigated by Messrs. Balfour Beatty, Consultants, and proposals prepared for phased h dro-electric development involving the construction of a series of power plants with an ultimate installed capacity of the order of 400 megawatts. The Consultants also recommend the construction at Seven Forks of a storage reservoir of approximately one million acre-feet capacity to enable the competing water requirements of hydro-power and of irrigation development upstream to be satisfied simultaneously. The rolling topography of the Upper Tana provides more suitable storage sites than the level plains of the Lower Tana, and hence large scale development of the latter region will involve investigations of storage sites and water requirements in the upper portion of the catchment. The Seven Forks site is probably the best storage site in the Tana basin and the design The Seven Forks site is proposed by the Consultants may have to be modified to provide needed storage for irrigation development in the Lower Tana. A decision on this aspect is urgently required as negotiations for the development of the Seven Forks site for power purposes are already at an advanced stage.

The Lower Tana, with its extensive unpopulated areas of desert soils lying close to a good source of irrigation water, is the natural region for agricultural development under irrigation and for settling surplus peasant population from densely populated areas in other parts of Kenya.

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Further details of the history of investigations on the Tana are given in Annexure 'A'.

The project, when fully developed, is expected to add greatly to the country's export of cotton, one of the cash crops currently being fostered in an endeavour to raise the standard of living of the people. The present 500 acre pilot scheme, now being expanded to 1200 acres, operates on the basis of cotton in the season April-October. Food crops are grown during the rest of the year. While it is anticipated that cotton would continue to be the major product of the scheme, other crops and products can undoubtedly make an important contribution.

If it is assumed that 300,000 acres are irrigated, all planted to oction in the warch-October season, and yielding at a rate of 1500 lbs. seed cotton/acre the ultimate production would be 375,000 bales/annum, worth on average (AR & BR) £40 per bale, or in all £15,000,000. Naturally any decision to utilize the land to this extent for cotton growing would depend, amongst other things on the long term world outlook for this crop. At present Kenya cotton enjoys a good reputation because of its quality and achieves prices only about 3 cents less than Uganda cotton (Jonular type). and 3 cents more than Tanganyika. The present price for Kenya AR lint is 202 cents per lb. East African production is at present about 600,000 bales/annum, of which Kenya produces only about 20,000 bales. With the full development of the Tana scheme Kenya's total production could be raised to some 475,000 bales, and the ultimate East African production to about 1,300,000 bales. The present East African output of cotton represents only about 0.25% of world production and the projected expansion will only raise this figure to about 0.6% of world production. It is not therefore considered that development of the Tana project will adversely affect other producers in the world market, while it will mean at least an additional £15,000,000 to Kenya's Agricultural Exports.

To deal effectively with 375,000 bales of cotton 30-40 new ginneries would be required, involving new capital investment of about £120,000/ginnery, or a total of £3,600,000 to £4,800,000. In addition, assuming each ginnery would employ 100-150 labourers, employment can be found for up to 4,500 men.

While cotton may prove to be the most important export crop other crops can be expected to be of great importance to the prospective settlers. These crops would mean a full subsistence and reasonable affluence for 75,000 families at present living at a minimum subsistence level. The gross production from a 300,000 acre scheme could be of the order of £24,000,000 of which £15,000,000 would be cotton.

Research, at present being carried out on a limited scale, will require to be directed largely lowards cotton, but to avoid too great a dependence on this crop it will also be necessary to investigate various semi-permanent and permanent crops including dates, citrus, bananas, and sugar cane and livestock production. In regard to the latter it is considered that with irrigation 5-6 stock units an acre can be kept in the area, producing a return for each stock unit of about £8 an acre or about £40-£48 an acre per annum. All these possibilities should therefore be investigated thoroughly.

The preparation of a phased plan for the Lower Tana would enable the Kenya Government to develop the agricultural potential of this area with the maximum degree of efficiency and ensure that other developments such as the Seven Forks Hydro-Electric Project (to which reference has already been made and concerning which there is now a considerable degree of urgency), are carried out in a manner which does not prejudice the optimum exploitation of the river's resources.

#### 6-6-

#### THE PROJECT.

The project consists of a pre-investment survey of the irrigation potential of the Lower Tana and the subsequent presentation of recommendations for phased development.

It is estimated that the ultimate potential of the area, based on the limiting factor of water availability, is about 300,000 acres. The recent disastrous floods in the Lower Tana have demonstrated the inherent hazards of large scale development in the low lying flood plain and coastal delta areas. High level desert hinterland areas have the basic advantage of being above maximum flood level, and the success of the 500 acre Pilot Irrigation Scheme has established that irrigated desert soils can grow crops with very satisfactory results.

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5/ ...
It is therefore considered that the proposed investigations should be confined to desert areas and the higher portions of the flood plain.

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Assuming an ultimate irrigation potential of 300,000 acres net, and allowing 25% for villages, roads, canals and drains, the gross irrigable area will be about 400,000 acres. Provision must also be made for the possible introduction of fallows into crop rotation systems and hence the total scheme area might well be between 500,000 and 600,000 acres.

A preliminary investigation of a considerably larger area will be required in order to ensure that irrigation development is carried out on the best desert land which can be commanded and it is believed that this reconnaissance will have to cover as much as 3,000,000 acres. The degree of detail required, however, will not be great and the reconnaissance need not therefore be expensive in either time or money.

1/500,000 maps with 500 foot contours are available for preliminary programme planningand a number of 1/100,000 uncontoured maps have recently been completed by the Survey Department of Kenya. These cover the greater portion of the Lower Tana and could be used, in combination with ground surveys, for the preparation of 25 foot contour maps of the 3,000,000 acres selected for preliminary investigation.

When this investigation has been completed, it will be possible to select the most suitable portions, amounting to about 1,200,000 acres, for more detailed surveys and investigations.' 1/10,000 soil and topo maps will be propared, and from these maps the final development proposals will be drawn up.

The principal features of the project may therefore be summarised as follows:-

- 1. Preliminary reconnaissance of 3,000,000 acres for the purpose of selecting 1,200,000 acres for detailed examination. Maps to be to a scale of 1/100,000 with contours at 25 ft. intervals.
- Aerial photography and mapping, to a scale of 1/10,000, with 5 ft. contour intervals, of the 1,200,000 acres selected for detailed examination. Soil maps to the same scale will also be required.
- 3. Concurrently with the above surveys, hydrological investigations will be carried out to supplement and amplify, as required, the considerable amount of hydrological data already available on the catchment.

The hydrological studies will be extended to include the middle and upper portions of the Tana catchment, as it will be necessary to consider the entire catchment as a unit even when planning the development of the lower portion only. The most suitable dam sites will probably be located more than one hundred miles upstream of the areas selected for development in the Lower Tana. Existing proposals for irrigation development in the Upper Tana and for hydro-electric development in the middle Tana will have to be given due consideration when planning development in the Lower Tana, to ensure that optimum use is made of the water resources of all portions of the catchment. Flood control will also have to be considered over the catchment as a whole.

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- 5. It will be necessary to extend the scope of experimental work in the 500 acre Pilot Iprigation Scheme, now being expanded to 1,200 acres. Exphasis will also be placed on the training of suitable African personnel to act as instructors and supervisors in new areas as development expands.
- 6. Preparation of final plans for the phased development of the irrigation potential of the Lower Tana.

Linistries of Agriculture and Works, Kenya Government. Nairobi.

13th December 1961.

## LIST OF ANNEXURES.

- A. "Water Development in Kenya. The Tana River Basin". Hydraulic Branch, M.O.W., November 1961.
- B. "Upper Tana Catchment Water Resources Survey 1958-9". Sir Alexander Gibb and Partners, April 1959.
  - Other Reports Relevant to the Investigation. (These and the maps referred to in the text are available in Kenya and copies can be forwarded if required).
- C. "Report on the Tana River Expedition, 1934". D.G. Harris and H.C. Sampson, Colonial Office Advisers, Nairobi, 1934.
- D. "Report on the Upper Tana River Irrigation Project". Hydraulic Branch, P.W.D., October 1948.
- E. "Development of the Tana River". F.A. Brown, Agricultural Adviser, Colonial Office. Nairobi, February 1955.
- F. "Irrigation Projects on the Lower Tana River".
   G. Lacey, Irrigation Adviser, Colonial Office.
   Nairobi, February 1955.
- "Proposed Iprigation on Desert Hinterland Soils."
   Bellis and B.R.C. Koch. Nairobi, April 1955.
- H. "Reassessment of Seven Forks Hydro-electric Project Kenya'. Balfour Beatty & Co. Ltd., London.

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	Total Cost	Special Fund	Kenys Government Contribution	
	\$	g		
<ol> <li>Preliminary reconnaissance surveys of 3,000,000 acres, including preparation of 1/100,000 topo maps with 25 ft. contours, showing also outline soil types (Note: The Survey of Kenya has already completed 1/100,000 maps - non contoure of most of the area).</li> </ol>	d 45,000	20,000	25-000 *	
2. Aerial photography and mapping of 1,200,000 acres selected for detailed investigation; mapping to be to a scale of 1/10,000 with 5 ft. contours.	420,000	390,000	30,000	
3. Detailed surveys and investigation of dam and barrage sites and of any other river or flood control works required.	12,000	9,000	3,000	
<ol> <li>Detailed soil survey of the 1,200,000 acros selected for close examination and mapping.</li> </ol>				
(a) 6 Irrigation Soil Surveyors for 2 years = 12 expert years @ \$ 17,000 p.a.	204,000	204.000	1 -	
(b) Transport and unskilled labour.	20,000	-	20,000	
. 1 Water Development Specialist. 3 years (Team Leader)	75,000	75,000	-	
. 1 Irrigation Agronomist 3 years	51,000	51,000		
. 1 Cotton Specialist 2 "	34,000	34,000	-	
. 1 Appraisal Economist 2 "	34,000	34,000	-	
. 1 Irrigation Engineer with dam experience 1 year	17,000	17,000	-	
1 Irrigation Lay-out specialist 2 years.	34,000	34,000	-	
C/Fwd.	946,000	868,000	78,000	

BREAKDOWN OF ESTIMATED SURVEY COSTS

12.00

Page 2.

			Total Cost	Special Fund Contribution	Kenya Government Contribution	
		B/livid.	946,000	868,000	75,000	
11.	Supporting staff by Kenya Government: Equivalent to 8 expert years @ \$ 12,000		96,000	-	96,000 X	
12.	Research into soil-crop-water relationships, crop varieties and cropping systems. (These experiments were started in 1958 on completion of the 500 acre Pilot Irrigation Scheme at Galole. The scheme is now being expanded to cover 1200 acres).					
	Estimated portion of capital cost chargeable to investigations essential to the present survey.		300.000		300,000 *	
	Estimated pro rata annual operating cost chargeable to inves- tigations over period 1958-1965		350,000	. 75,000	200,000 * 75,000 X	
13.	10 Prefabricated houses @ \$ 10,000		100,000	50,000	50,000	
14.	quipment. 10 Land Rover or Jeep Type Vehicles 4-5 ton Lorries 1 - D6 Caterpillar (Type) Tractor with Doger	27,000 15,000			Ϋ́Υ.	
	and Ancillary equipment 1 Caterpillar No.12 (Type) motor grader Caravans and tenting equipment Soil testing and hydrological aggirment	22,000 23,000 15,000			2 · · · · ·	
	including mobile labs.	35,000 137,000	137,000	137,000		
15.	Fellowships		36,000	36,000		
-		TOTALS:	1,965,000	1,166,000	799.000	

\* Estimated value to project of expenditures already incurred by the Kenya Government.

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X Estimated value to project of new expenditure which will be incurred by the Kenya Government within existing resources.

-			SPECTAL NEWS COMPLEMENTO?				KENYA GOVERNEED CONTRACTION				
	CI DY	To+	lst Year	2nd lear	3rd Year	Total	Already	lst Year	2nd Year	3rd Year	
	on si	ş.	\$	\$	ø	s contra	S	\$	\$	\$	
1.	. Reconnaissan Surveys of 3,000,000 acros.	20,000	20,000	-		25,000	25,580		all's	*	
2	. Detailed mapping of 1,200,000 acres	390,000	250,000	140,000		30,000		20,000	10,000	-	
3.	. Surveys of dam sites, etc.	9,000	6,000	3,000	-	3,000		3,000		-	
4.	. (a) Soil surveys: 3,000,000 in outline										
	in detail.	204,000	2,000	102,000	a	-	-	49-4 -	-	-	
	(b) Transport and unskilled labour.	-	-	· · · _ ,		20,000		10,000	16,000		
5.	. 11. Expert personnel.	245,000	64,000	100,000	81,000	96,000X	10.0	32,000X	32,000X	32,0004	
	12. Research Station	75,000	25,000	25,000	25,000	575,000*X	500,000*	25,000 <sup>X</sup>	25,000X	25,000 <sup>A</sup>	
	13. Housing	50,000	50,000			50,000	-	50,000	-		
	14. Equipment	137,000	137,000		÷ 1.				-	441	
	15. Fellowships	36,000	12,000	12,000	12,000	-	-	-			
	TOTALS:	1,166,000	666,000	382,000	118,000	1 799,000	525,000	140,000	77,000	57,000	

SUMMARY OF TOTAL AND ANNUAL CONTRIBUTIONS BY SPECIAL FUND AND KENYA GOVERNMENT

\* Estimated value to project of expenditures already incurred by Kenya Covernment.

I Retinated while to project of new expenditure which will being used by the Kenya toveroment within existing recourses.