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- useful background information

JW Collier 29/7/85

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TURKWEL RIVER BASIN DEVELOPMENT PLAN - DRAFT TERMS OF REFERENCE

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Chapter 1:

PROJECT BACKGROUND

INTRODUCTION

2.1 A REGIONAL OVERVIEW

The Government of Kenya is currently seeking external assistance in preparing detailed designs for the construction of a multipurpose dam to be built at Turkwel Gorge in north-west Kenya. It is considered that such a project will have wide implications for the physical and social environment both downstream and upstream of the proposed dam. It has therefore been decided to prepare a comprehensive development plan for the Turkwel River Basin so as to integrate the construction of the dam with the general development of the Basin. This plan will be prepared with assistance from Consultants who are invited to prepare technical and priced proposals in response to the Terms of Reference which follow. Instructions to Tenderers are contained in Chapter 6.

The background information on which these Terms of Reference is based is set out in Chapter 2. Chapter 3 leads on from the previous Chapter and describes the main goals of the Project i.e. the promotion of general socio-economic and physical development through the agency of the Turkwel Gorge Multipurpose Project. This is followed by a more detailed specification of the objectives of the Project which are to carry out field investigations and to formulate development strategies, plans, projects and policies in order to achieve the Project Goals.

A recent Health Delegation Report (ref. 1) states that the provision of health services in the District is inadequate. A detailed Scope of Work is set out in Chapter 4 whilst Chapter 5 makes suggestions as to a possible work programme, timing and costs for the project. Chapter 6 sets out the requirements of the Tenderers in submitting technical and priced proposals to undertake the Project. Related diseases are very prevalent on account of the traditional economy.

It is emphasised that these Terms of Reference are advisory and tenderers are encouraged to develop their own methodological approaches, manning proposals and cost proposals in accordance with their own perceptions of the Project.

Chapter 2:
PROJECT BACKGROUND

2.1 A REGIONAL OVERVIEW

Turkwel River Basin (more fully described in Chapter 2.2) lies mainly in the administrative district of Turkana in north-west Kenya. (see Figure 1). The district with an area of more than 64,000 square kilometres and a population of about 165,000 people comprises more than one-tenth of Kenya's land area. Yet it is one of the least developed parts of the country. Few reliable statistics and socio-economic indicators exist in Kenya to define comparative regional welfare standards. However, it is generally agreed that Turkana District, including most of the Turkwel River Basin, lies well below the national average in terms of socio-economic development. Some basic facts concerning the region confirm this.

About 90% of the District population rely on livestock-herding for their basic subsistence. At the same time over 80% of the rangelands used for herding fall into the lowest Eco-Climatic Zones V and VI which imply harsh ecological and climatic conditions. Extensive famines during the 1960s and 1970s are thought to be a direct result of over-grazing these relatively poor rangelands and have been attributed to the failure of the traditional pastoral economy to support a growing population.

A recent Health Delegation Report (ref.1) states that the provision of health personnel i.e. doctors and nurses in the region is well below the national average. At the same time, although no reliable statistics seem to exist, it is clear that the incidence of disease is much higher in the District than in other parts of Kenya. Water-borne and cattle-related diseases are very prevalent on account of the traditional economy.

The Turkana District Development Plan (ref.2) states that less than 20% of the Turkana population have access to safe drinking water and this compounds the health and economic problems in the District.

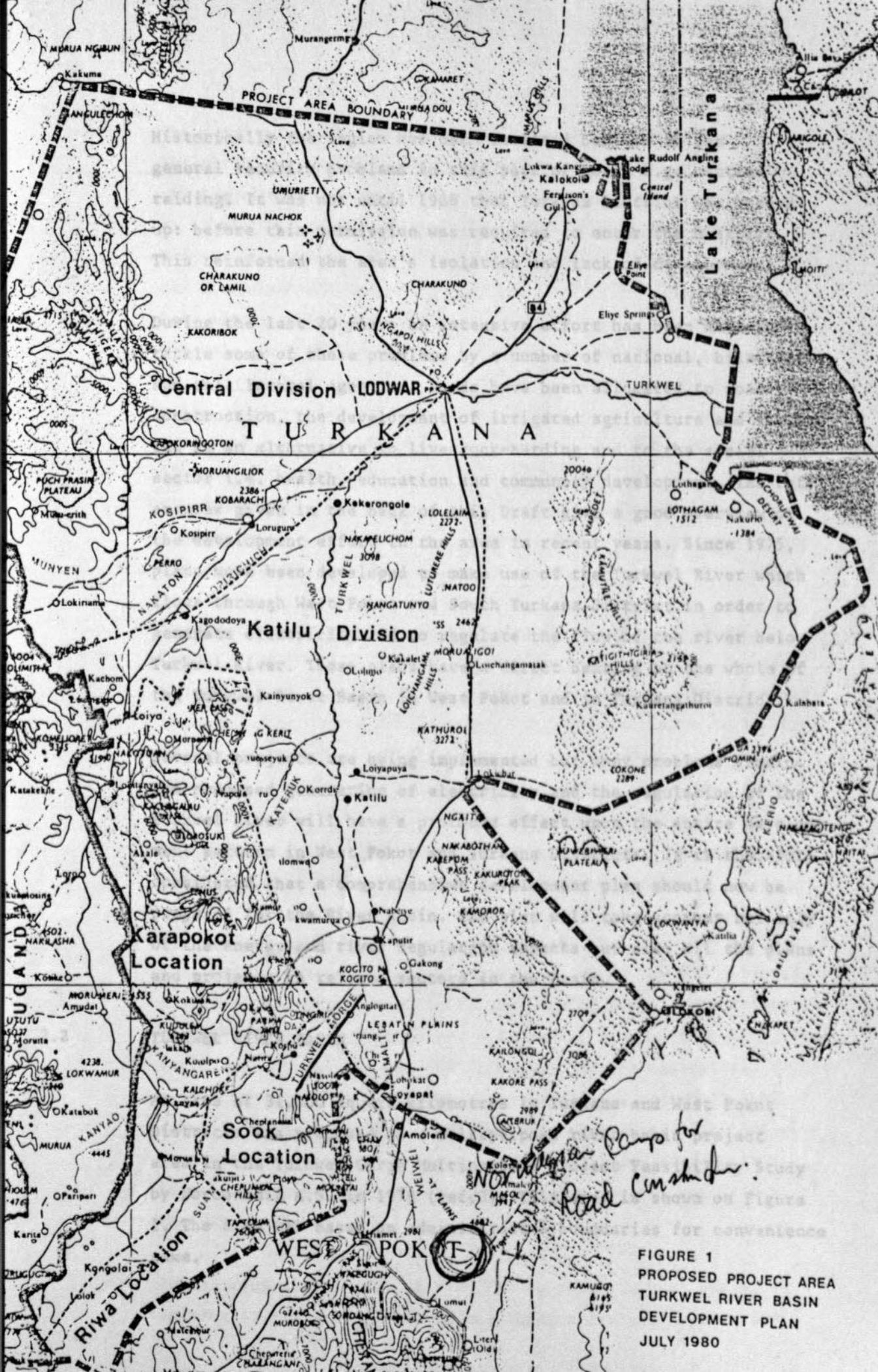


FIGURE 1
 PROPOSED PROJECT AREA
 TURKWEL RIVER BASIN
 DEVELOPMENT PLAN
 JULY 1980

Historically the region has been isolated because of the general security problems in this part of Kenya e.g. cattle-raiding. It was not until 1968 that Turkana District was opened up: before this permission was required to enter the District. This reinforced the area's isolation and lack of development.

During the last 20 years an intensive effort has been made to tackle some of these problems by a number of national, bilateral and multilateral agencies. Funds have been allocated to road-construction, the development of irrigated agriculture and fisheries as an alternative to livestock-herding and to the social sector i.e. health, education and community development. The references given in the back of this Draft give a good overview of the development effort in the area in recent years. Since 1975, plans have been developed to make use of the Turkwel River which flows through West Pokot and South Turkana District in order to generate electricity and to regulate the flow of the river below Turkwel River. These plans have a direct bearing on the whole of the Turkwel River Basin in West Pokot and in Turkana District.

Several projects are being implemented but many problems remain. The proposed generation of electricity and the regulation of the Turkwel River will have a profound effect upon the entire development pattern in West Pokot and Turkana Districts. It is therefore considered that a comprehensive development plan should now be prepared for the River Basin. The plan will take account not only of the energy and river regulation aspects but also all the plans and projects in related sectors in the Basin.

2.2 TURKWEL RIVER BASIN

An area of 31,000 square kilometres in Turkana and West Pokot Districts was proposed as a multipurpose river basin project area in the Turkwel Gorge Multipurpose Project Feasibility Study by Norconsult A.S. in 1979 (ref.3). This area is shown on Figure 1. The area was based on administrative boundaries for convenience sake.

The proposed project area stretches the entire 300 kilometre length of the Turkwel River from its source on Mount Elgon on the Kenya/Uganda border to its mouth on Lake Turkana. The area is principally composed of the Turkana Plain in the East African Rift Valley, lying at an elevation of about 800 metres on average. The Turkana Plain is one of the most hostile environments in East Africa with annual precipitation averaging 250 mm, annual evaporation rates of up to 2,500 mm and mean maximum temperatures of 35°C. Much of the area is covered by wind-blown sandy or stony soils which generally have a low humus content. The principal source of water in the Turkana Plains are the Turkwel and Wei-Wei Rivers which are characterised by seasonal flows and periodic flooding. Vegetation is the typical sparse thornbush of the Acacia species, except along the main rivers where a dense riverine forest has developed.

Below the Gorge, the river Turkwel will be regulated in a controlled

The southern and western parts of the proposed project area, lying above the Gorge are very different in character from the Turkwel Plains because of their elevation. Average elevation here is between 1,200 and 1,500 metres and rises to almost 3,000 metres in the Sekerr and Karapokot ranges. Rainfall averages between 800 and 1,200 mm per annum and maximum temperatures are around 28°C. At higher altitudes a dense broad-leafed forest has developed whilst at lower altitudes the typical savannah vegetation has often been cleared to make way for settled agriculture.

The Turkwel Gorge Multipurpose Study estimated the 1979 project area population as 135,000 of whom about 88,000 or 65% depended on nomadic pastoralism or livestock herding for their subsistence. In recent years there has been a degree of diversification towards irrigated agriculture and fisheries and service activities. However various authorities point out that the Turkana and Pokot peoples inhabiting the Basin are traditionally, economically and socially bound to a livestock-herding economy. It is thought that this, together with population pressures has led to the over-grazing of the rangelands.

In the mountainous area of West Pokot, above Turkwel Gorge, the economy is similar to that in the Turkana Plains, despite the

environmental differences. The Pokot people are traditionally nomadic pastoralists who have been forced southwards and westwards into the lush, mountainous areas. Here, they still practise livestock herding, but have also developed a sophisticated irrigated agriculture made possible by more permanent river flows. Erosion caused by natural run-off and ill-conceived forestry and slash-and-burn agriculture is a serious problem in the higher areas.

The proposed project area therefore consists of two distinct ethnic and geographical regions i.e. the Pokot Highlands above the Gorge and the Turkana Plains below the Gorge. The impacts of the Turkwel Gorge Multipurpose project will be different for each area. Above the gorge a reservoir will be created, reducing the areas available for grazing, hunting a ceremonial purposes. Below the Gorge, the river Turkwel will be regulated in a controlled flow, reducing the dangers of flooding and creating opportunities for the diversion of river water for irrigated agriculture, forestry and livestock rearing.

2.3 TURKWEI GORGE MULTIPURPOSE PROJECT

The first technical study of the feasibility of constructing a multipurpose dam at Turkwel Gorge was carried out in 1976 by VIAK/NORPLAN in their 'Turkwel Dam and Reservoir Reconnaissance Study' (ref.4). This was followed by the 'Feasibility Study of the Turkwel Gorge Multipurpose Project' carried out by Norconsult A.S. in 1978 and 1979 (ref.3). Both studies confirmed the feasibility of constructing a high dam for power generation and river regulation. Economic analysis of the proposed project in terms of its power and energy potential has shown that the scheme will have an attractive internal rate of return of about 15%. Both studies have confirmed that the Turkwel River downstream can be regulated and that irrigated agriculture can be extended along the river banks.

It has been proposed to construct an 84 metre high concrete gravity dam, creating a reservoir of about 14 square kilometres, extending some 23 kilometres upstream. A maximum head of 360

metres is developed giving an average of 580 GWh of energy.

Hydrological data so far obtained appears unreliable and further data collection has been recommended. However, it appears likely that a constant flow of 23 m^3 per second can be obtained by regulation for transfer into the downstream reaches of the Turkwel River. This is in contrast to the highly irregular regime in the Lower Turkwel to-day which is characterised by extensive droughts and floods.

The Norconsult report concluded that an absolute maximum area of 7,500 hectares could theoretically be brought under irrigation along both banks of the Turkwel River and that this could support at least 40,000 persons. This, however, was considered realistic only in the very long run and that five potential areas totalling 600 hectares should be concentrated upon in the first instance. Such irrigated agricultural schemes would take the pressure off the traditional livestock sector where overgrazing and overstocking has led to serious socio-economic problems. The report, however, emphasises that the development of irrigated agriculture would be a slow and lengthy process.

Problems concerning a number of other issues are referred to. An area of traditional Pokot grazing and ceremonial areas would be flooded and this will cut one part of the Turkwel Basin from another, impeding traditional stock-routes. Erosion, although not a consequence of the scheme would have to be controlled to avoid excessive siltation of the reservoir. Concentrated irrigation development along the lower Turkwel could lead to extensive destruction of the riverine forest, to the introduction of bilharzia and to social problems in connection with the building of new urban communities along the river. Finally, the Norconsult report recommends further studies for comprehensive planning for the River Basin and Turkana District.

The Turkana District Development Plan for 1979-1983 covers the whole of Turkana District. The Plan summarises activities to integrate the various investment plans by various Ministries for Turkana. It appears that it is intended to spend around

2.4 OTHER STUDIES AND REGIONAL INFORMATION

The two studies referred to in the previous section undertaken by VIAK/NORPLAN and Norconsult A.S. are the principal sources for the preparation of a River Basin Development Plan. These studies also undertook special mapping programmes and these are referred to in detail in these reports.

All of the proposed project area is covered by contoured maps at 1/250,000 scale. A listing of the available topographical and soils maps for the Basin is set out in Appendix 2 of this Draft. Aerial photography carried out in connection with the Turkwel Gorge Multipurpose Project is also listed in Appendix 2. The available mapping and photography is not comprehensive and more work in this field is recommended in the Scope of Work for this project.

A great amount of literature pertaining to Turkana and West Pokot districts exists, and much of this material is summarised in the two studies referred to above. A select bibliography of the Turkwel River Basin is set out in Appendix 3. The present Draft Terms of Reference is based on the two principal studies and on the most recent studies made available for the area. These studies are the Turkana District Development Plan for 1979-1983 (ref.2), the report of a Planning Mission on Reforestation in the Turkana Area in November 1979 promoted by the Kenyan authorities and NORAD (ref.5), the report of a joint Kenyan-Norwegian appraisal mission on the further development of irrigated agriculture in the Turkana area in October 1979 (ref.6), an unpublished report on the Minor Irrigation Schemes in the Turkana Cluster by Mrs. Jean Brown, sponsored by FAO and prepared jointly with the Turkwel Gorge Multipurpose Study (ref.7) and Health Delegation Report prepared for NORAD in January 1980 (ref.1).

The Turkana District Development Plan for 1979-1983 covers the whole of Turkana District. The Plan summarises and tries to integrate the various investment plans by various Ministries for Turkana. It appears that it is intended to spend around

K.Shs. 280 million on development in Turkana between 1979 and 1983 (excluding the Turkwel Gorge Project). Over half the proposed investment is in the roads and transport sectors. The Plan proposes a development strategy based on three economic 'poles' viz. fisheries, irrigated agriculture and livestock development. Of these livestock development is regarded as the most important. The purpose of the Plan is to reduce dependence on livestock by increasing this sector's efficiency and by development of other sectors.

The Planning Mission on the Reforestation of the Turkana Area point out that productivity in the characteristic semi-arid vegetation of Turkana is rapidly declining because of over exploitation by humans and animals and because of extensive water erosion. The Mission propose an immediate investment of K.Shs. 8.7 million (not included in the District Development Plan) to establish tree-planting and nurseries in threatened areas of over-concentration and to develop water-spreading schemes throughout Turkana, in order to reduce water erosion and to improve rangeland conditions.

The Appraisal Mission on Irrigated Agriculture did not examine irrigation potentials after the regulation of the Turkwel River, and they confine themselves to existing opportunities. They recommend consolidation of existing schemes along the Turkwel River and the optimal utilisation of the Wei-Wei River. A development programme at a cost of K.Shs.10.6 million is recommended for the period 1980-1984. The bulk of this investment is recommended for Sigor in the Wei-Wei Valley which will not be directly affected by the regulation of the River Turkwel. The Report emphasises the serious problem of water erosion throughout Turkana and makes proposals to reduce this on the Katilu Scheme in the Turkwel Irrigation Cluster.

The Report by Mrs Jean Brown, which has not been officially

released by FAO, examines the socio-economic responses of the Turkana and Pokot peoples to the new irrigation schemes developed along the Turkwel and Wei-Wei Rivers. The Report points out that the main impulse for the schemes was the catastrophic drought of 1961 when 30,000 people were forced on to famine relief. Because of the new irrigation schemes and because of over-grazing, it seems that the Turkana people are moving away from the traditional heartlands to settle along the rivers. This is causing a degree of social and environmental dislocation. The author states that the irrigated schemes are very popular with the local people as they form a very welcome additional source of income. However they do not offer people an alternative to nomadic pastoralism as most of the surpluses from agriculture are being ploughed back into purchasing animals. The author suggests that irrigated agriculture is being over-emphasised whilst the real issues of livestock development are being ignored. The author is in favour of developing plots for fodder production on the irrigation schemes. It is suggested that more traditional approaches to irrigated agriculture be tried, rather than the present mechanised, capital-intensive approach. The author makes a number of suggestions on the need for community development and town planning in the new agricultural communities along the Turkwel River.

A Health Delegation Report of January 1980 which examines the whole of Turkana District concludes that between 25 and 30% of the population have no immediate access to the present health facilities. Furthermore it is concluded that the greatest need is for preventative medicine while the present health service is mainly curative. Existing facilities are in poor condition and poorly staffed. Recommendations are made for an extensive improvement in the health delivery system throughout Turkana through the improvement of existing facilities and the construction of new units. The emphasis is on the expansion of preventive facilities. A total new investment of K.Shs. 21.6 million in new construction, telecommunications, surveys and community-based health programmes are recommended for Turkana District.

5 SUMMARY OF THE WORK DONE SO FAR

This section summarises the planning problems of the Turkwel River Basin as set out in the studies of the River Basin and the Turkwel Gorge Multipurpose Project described above.

It seems that almost all the physical and socio-economic problems in the River Basin can be traced back to an absolute lack of water and to an uneven geographical and seasonal distribution of water.

The arid conditions and uneven distribution of water have given rise to the particular nomadic pastoralism which characterises the local economy and which has evolved in response to the water situation in much of the proposed project area. Livestock have always been herded in different parts of the Basin, depending on season. However there is evidence of heavy and increasing concentration along the Wei-Wei and Turkwel Rivers where water supply and grazing has always been most reliable. Concentration is not therefore a new phenomenon. It is only now that it is becoming more marked with over-population, over-stocking and the progressive deterioration of the traditional rangelands.

Rapid population growth combined with a precarious water balance has led to over-stocking in some parts of the Basin. Over-stocking leads to over-grazing which, combined with periodic droughts, has frequently led to cyclical famines. These in turn have led to cattle raiding and security problems.

Lack of water and its uneven distribution has long since led to an over-concentration along the Turkwel River, especially during the dry season when vegetation is most vulnerable to destruction. This has led to the disappearance of some riverine forest and the erosion of the banks. Periodic flooding has worsened this problem. More indirectly, over-concentration has led to the further deterioration of the natural environment through charcoal burning and the use of vegetation as building materials, food, fodder and fuel by populations not directly engaged in pastoralism.

Lack of water and periodic droughts have led directly to serious famines. These natural factors have given rise to demands for alternative economies like fisheries and irrigated agriculture. These economies, depending as they do on natural distribution of water in the River Basin, have led to further concentrations of people along the Turkwel River and along the Lake Turkana shore which have led to further environmental deterioration.

The proposed Turkwel River Basin Development Plan shall be Anthropologists seem agreed that nomadic pastoralism is essential to the bulk of the local population, not only for economic reasons but for social and cultural purposes too. Nomadic pastoralism is an efficient use of land and water in the Basin as long as populations remain low. However increases in population and increased access to a cash economy have meant a big increase in livestock holdings with consequent over-stocking and over-grazing. The natural environment and water resources of the River Basin do not seem to be able to absorb the demands made on them. At its simplest, it appears that there are too many people and livestock for the land and water available.

A number of solutions have been proposed to this. De-stocking of the rangelands has been proposed but this is a long-term measure. Fisheries and irrigated agriculture have been tried as an alternative to pastoralism, but it is found that the surpluses from these are often re-invested in livestock.

The regulation of the Turkwel River may offer new solutions by changing the natural balance of water distribution throughout the River Basin. It may be possible to change to-day's seasonal distribution of water to one more practical for agricultural purposes. It may also be possible to change the geographical distribution of water in the Basin, and thereby lessen the concentration on certain parts of the Turkwel River's course. It may also be possible to achieve a wider geographical distribution of water through water-spreading techniques.

The evidence from the numerous studies already undertaken in the River Basin therefore suggest that it may be possible to change

the water balance in the River Basin through physical planning and engineering measures. The social, economic and environmental impacts of such measures must, of course, be recognised so that an overall integrated approach to development in the Basin must be adopted.

PROJECT GOALS

THE INSTITUTIONAL FRAMEWORK

The previous Chapter sets out the broad background to, and the The proposed Turkwel River Basin Development Plan shall be executed through the Ministry of Planning and Implementation who are the principal Kenya Government agency for strategic, regional economic development planning. At the regional level, the Plan will be implemented through the District Development Committee whose function is to co-ordinate sectoral development projects at a regional level. In the case of the Turkwel River Basin co-ordination between the West Pokot and Turkana District Development Committees will be required.

It is likely that the Turkwel Gorge Dam Project and river regulation will be sponsored by the Ministry of Power and Industry with the East African Power and Lighting Authority as executing agency.

A number of other Ministries will be involved in sectoral aspects of the Development Plan and it is likely that a Steering Committee for the execution of the Plan, chaired by the Ministry of Planning and Implementation will be formed. The Ministry of Agriculture through its Land Development Division is the executive agency for the Minor Irrigation Schemes and any new projects in this sector. The Soil Conservation Unit in the Ministry of Agriculture is responsible for conservation of national land resources and would be particularly involved in erosion control projects. The Ministry of Natural Resources, through its Forestry Department will be responsible for forestry project whilst the Fisheries Department is responsible for all fisheries projects. The Ministry of Lands and Settlements is responsible for preparing town planning schemes and consultation is necessary here on any aspects of community development and town planning in the proposed project area.

Chapter 3: OBJECTIVES

THE PROJECT The principal objectives of the Turkwel River Basin Development

Plan are as follows:

3.1 PROJECT GOALS

The previous Chapter sets out the broad background to, and the need for a Turkwel River Basin Development Plan. It was suggested that the purpose of the plan was to promote socio-economic development in the Basin through changes in the water balance of the Basin. The Project's principal goals are therefore as follows:

- to identify potentially harmful and beneficial impacts of the
- to promote general socio-economic and environmental development through the agency of the Turkwel Gorge Multipurpose Project
- to prepare a complete Development Strategy for the River Basin
- to identify physical and engineering measures and projects arising from the regulation of the River Turkwel which can achieve direct benefits for the socio-economy and the environment of the Basin and to reduce any negative impacts.
- to investigate natural environmental problems in the Basin, not directly connected with the Multipurpose Project e.g. existing upstream erosion in the highland areas and existing water erosion on the downstream plains

To achieve these Goals, it is considered that it is unlikely that any new studies of the socio-economy of the Basin will be required. However, in order to define projects and investigate problems certain physical and mapping investigations may have to be made. Suggestions on these are made in the next section. Once these investigations have been made, it is suggested that the impacts and consequences of the Multipurpose Project be assessed and a development strategy for the Basin Drawn up. It is then assumed that various plans and projects can be drawn up from the guidelines laid down by the Strategy.

2

PROJECT OBJECTIVES

The principal objectives of the Turkwel River Basin Development Plan are as follows:

- to review, and where possible, to up-date information, data and conclusions already developed concerning the physical, social, economic, environmental and biological features of the proposed Project Area
- to review and summarise all proposed and existing development projects and programmes currently being undertaken in the proposed project area
- to undertake a series of field investigations and mapping programmes in order to establish more precisely physical and environmental conditions within the proposed Project Area
- to identify potentially harmful and beneficial impacts of the Turkwel Gorge Multipurpose Project, through a comprehensive review, and to suggest means of reducing harmful impacts and of increasing beneficial impacts in whichever sector they may occur.
- to prepare a concise Development Strategy for the River Basin for the guidance of the responsible authorities
- to identify high priority projects for immediate implementation and to prepare order-of-magnitude costs for such projects and to identify, where possible, the beneficiaries of such projects. Such projects should concentrate physical planning or engineering measures
- to prepare an environmental conservation scheme for areas identified as under threat from physical and/or socio-economic impacts
- to prepare a plan for future productive activities in the Basin with policies for sectoral development e.g. livestock, fisheries, agriculture, forestry, tourism, mineral extraction etc
- to prepare a plan for general socio-economic development in order to meet requirements for housing, education, public health, community and urban development etc., in order to meet the requirements of the Development Strategy
- to prepare a schematic physical development plan for the River Basin, to suggest physical boundaries for the Project Area and to prepare sketch plans for any new communities considered necessary or desirable in the River Basin

- to propose projects necessary for the short- and long-term implementation of the Development Strategy in all sectors and to rank these in a serial order of priority.
- to examine existing institutional arrangements and to suggest modifications and amendments where considered necessary in order to implement the proposed Development Strategy
- to prepare a final statement of policies and projects, with indicative costs, for the development of the River Basin, which are consistent with the overall Project Goals.

The following Scope of Work is prepared for the guidance of Tenderers. It is emphasized that these are advisory and Tenderers are encouraged to submit comments on the suggested Scope of Work and develop their own approaches, methodologies and procedures in their submissions.

REVIEW OF EXISTING SITUATION

The Consultant shall prepare a comprehensive review of the National River Basin. He shall review all available sources of information dealing with the Basin i.e. literary sources and reports, maps, plans, aerial photographs and satellite imagery with a view to preparing a comprehensive report on the Basin's physical, social, economic and environmental and biological characteristics. A preliminary list of sources are set out in appendices 1 and 2 to this document and further basic references can be found in the various reports referred to in Appendix 1. The Consultant shall then draw up a comprehensive list of references, properly modified for further use by the Kenyan Government. The Consultant's review shall contain information on topography, geology, climate, meteorology, geomorphology, soils, hydrology, vegetation, ecology, fauna and flora, anthropology, socio-economy and socio-economic activities, settlement patterns, demography, physical infrastructure and mineral resources. No new data shall be generated through field surveys, although it is recommended that the Consultant visit the project area during this review in order to collect any published material which may only be available there e.g. limited circulation reports by locally based agencies.

In addition the Consultant is required to prepare a review of existing and planned projects within the River Basin by those agencies working there e.g. bilateral, multilateral agencies,

Chapter 4:

SCOPE OF WORK

INSTRUCTIONS TO TENDERERS

The following Scope of Work is prepared for the guidance of Tenderers. It is emphasised that these are advisory and Tenderers are encouraged to submit comments on the suggested Scope of Work and develop their own approaches, methodologies and programmes in their submissions.

REVIEW OF EXISTING SITUATION

The Consultant shall prepare a comprehensive review of the Turkwel River Basin. He shall review all available sources of information dealing with the Basin i.e. literary sources and reports, maps, plans, aerial photographs and satellite imagery with a view to preparing a comprehensive report on the Basin's physical, social, economic and environmental and biological characteristics. A preliminary list of sources are set out in Appendices 1 and 2 to this document and further basic references can be found in the various reports referred to in Appendix 1. The Consultant shall then draw up a comprehensive list of references, properly codified for further use by the Kenyan Government. The Consultant's review shall contain information on topography, geology, climate, meteorology, geomorphology, soils, hydrology, vegetation, ecology, fauna and flora, anthropology, socio-economy and economic activities, settlement pattern, demography, physical infrastructure and mineral resources. No new data shall be generated through field surveys, although it is recommended that the Consultant visit the project area during this review so as to collect any published material which may only be available there e.g. limited circulation reports by locally based agencies.

In addition the Consultant is required to prepare a review of existing and planned projects within the River Basin by those agencies working there e.g. bilateral, multilateral agencies,

missions and other voluntary agencies and various Ministries and Departments of the Kenya Government and any private agencies (e.g. mining enterprises) operating in the Basin. This review must include an assessment of the proposed Turkwel Gorge Multipurpose project. The Consultant should also attempt to make a brief field inspection of the Upper Turkwel Basin and the agricultural and forestry activities in West Pokot which have not been studied before and which are thought may have a significant effect upon the hydrological regime in the river Turkwel. The purpose of this review is to prepare a comprehensive description of existing and proposed projects in the Basin and to point to any deficiencies in co-ordination between agencies if these are considered to exist. The Consultant should examine closely the Draft Development Plans for West Pokot and Turkana Districts. The Consultant should also examine how projects are related to the provisions of Kenya's Five Year Plans. A summary of investments by sector should be drawn up by the Consultant divided into on-going investments and proposed investments.

4.3

FIELD INVESTIGATIONS AND MAPPING PROGRAMMES

A considerable number of field investigations on geology and soils have been undertaken in the Turkwel River Basin in connection with previous studies and these will be made available to the Consultant. Further studies on the hydrology of the River Turkwel and on reservoir stratification will be carried out in connection with the detailed design of the Turkwel Gorge Dam project. These will become available during the course of the preparation of the River Basin Plan. However it is considered that further field investigations and mapping will have to be carried out and the Consultant is required to perform these. These are as follows:

1. Resources Mapping and Identification

Investigation and mapping of natural resources in the Basin have already been carried out to some extent during the Turkwel Gorge Multipurpose Project Feasibility Study and the Turkwel Dam and Reservoir Reconnaissance Study. On the basis of the results from these studies the Consultants are required to:

- identify and map areas used for grazing and browsing along the Turkwel and Wei-Wei Rivers. Particular interest will be areas where it appears conservation efforts should be concentrated, in order to prevent over-grazing and desertification.
- identify and map potential areas along the Turkwel and Wei-Wei Rivers where increases in livestock capacities may be feasible by water-spreading techniques
- identify and map potential rangelands at some distance from the rivers which could be developed by irrigation from groundwater
- identify and map forest areas along the Turkwel and Wei-Wei rivers and locate forest areas which may be under threat by over-concentration of people and livestock
- identify areas suitable for forest conservation and development throughout the Basin especially forest areas in the Upper Turkwel Basin
- Prepare a map of vegetation and land use in broad terms of the River Basin at scale 1:500,000 showing broad categories of vegetation by species, intensity of ground cover and land-use activities

LANDSAT data from earth resources satellites will be used to give a broad view of overall vegetation and land-use conditions. LANDSAT data which is available for the Basin for different years and different season is considered the best source of data where recent aerial photography does not exist. The Consultant may consider the use of digital analysis of satellite imagery where this is considered useful, in order to obtain as much detailed information as possible in areas of particular interest.

The Consultant will also have access to large scale (1/20,000) colour and colour infra-red aerial photography covering a 6 kilometre broad strip along the Turkwel and Wei-Wei rivers from Turkwel Gorge to Lake Turkana. These photographs provide an excellent basis for detailed vegetation mapping and provide excellent 'ground truth' data for satellite imagery interpretation. It is assumed that the Consultant will undertake some field work to verify interpretation

ions from aerial photography and satellite imagery. The Consultant may also recommend further aerial photography. From the work described above, the Consultant should prepare a comprehensive description of the land-use and vegetational features of the Basin and draw conclusions as to development potentials and environmental hazards within the Basin.

2. Topographical Mapping

The Consultant is required to construct topographical maps of the river courses of the Turkwel and Wei-Wei rivers at a scale of 1/20,000 with a contour interval not exceeding 5 metres. These will be constructed from the available colour and colour infrared aerial photography referred to above, taken in March 1979. The purpose of these topographical maps will be for agricultural and land-use planning. On the completion of Resources Mapping and River Channel Capacity Studies referred to in this chapter it may be considered desirable by the Consultant to construct topographical maps at larger scales e.g. 1/10,000 or 1/5,000 with contour intervals at 1 metre for areas considered suitable for environmental conservation or irrigated agricultural development.

3. River Channel Capacity Studies

The Consultant shall undertake river channel capacity studies of the Turkwel River so as to establish flood routing patterns. The purpose of these studies is to determine the flooding probabilities at areas selected for irrigated agricultural development. The Turkwel Gorge Multipurpose Project Feasibility Study indicates areas likely to be suitable for irrigation development and the river channel studies should concentrate on these areas of the river. The Consultant should also recommend other areas for irrigation projects on the basis of his resource mapping and topographical mapping studies described above. The Consultant is required to prepare a longitudinal profile of the Turkwel River from the confluence of the Turkwel and Wei-Wei Rivers to the irrigation scheme at Kekorangole. Cross sections should also be prepared at intervals of 250 metres and sections should be extended at least 200 metres on each of the river banks. Profiles and cross sections should be prepared at scales of 1/500.

Flood routing patterns should then be determined by calculating the maximum river channel capacities before flooding occurs.

Flooding probability should be estimated by using appropriate statistical methods.

4. Hydrogeological Inventory

The Consultant is required to prepare a hydrogeological inventory of the Turkwel River Basin. This inventory will be based on existing data, and no new drilling works shall be undertaken. The purpose of the inventory is to establish groundwater resources along the main rivers and in the main basin. Aquifers are of two main types: a shallow aquifer along the river courses and a deeper rock aquifer associated with various geological weakness zones within the Basin. The Consultant shall base his inventory on the interpretation of satellite imagery and aerial photographs and maps and various reports already prepared in the Basin. This may be supplemented by the collection of primary data from locally dug or drilled wells where appropriate.

The Consultant shall prepare a hydrogeological map of the Basin at scale 1/250,000 in accordance with the established UNESCO system. This map and a report will evaluate the regulation of the river Turkwel with respect to groundwater recharge, replenishment, yield and quality. The Consultant shall draw conclusions as the groundwater potentials in the Basin before and after the regulation of the River Turkwel. The Consultant shall also consider the application of conservation principles in order to reduce loss through run-off and evaporation by improving infiltration or retaining sub-surface flow. This may involve schemes such as subsurface dams, water spreading and various infiltration schemes. The Consultant shall present his conclusions clearly with recommendations for any further necessary fieldwork.

5. Field Investigations of Upstream Erosion Problems

The Consultant is required to study the problem of upstream erosion in the Upper Turkwel Basin. Preliminary evaluation has shown that large areas of the upstream catchment area of the Turkwel River are exposed to severe erosion. The Consultant is required to evaluate the causes, extent and development of this erosion and to suggest methods of reconditioning the area. The Consultant should also assess the possible impacts of continued erosion.

The Consultant shall map and classify present erosion by risk,

type, cause and extent of development. This shall be done by the interpretation of aerial photographs, maps, satellite imagery and reports. The Consultant should supplement this interpretation by site visits and brief analyses of the local geomorphology, soils and vegetation presented in map form.

The Consultant should suggest measures to prevent and control erosion and suggest measures for reconditioning, and suggest the likely impacts of forestry, livestock grazing and general human activity.

It should be emphasised that field work should be limited in carrying out the investigations recommended above, and indications as to the required extent of field work are set out in Chapter 6. Much field work has already been carried out and the results of this will already be available to the Consultant in his Review of the Existing Situation (see Chapter 4.2).

4.4 ANALYSIS OF IMPACTS

From the material assembled from his Review of the Existing Situation and the results of the Field Investigations, the Consultant is required to prepare an analysis of the likely impacts and consequences of the Turkwel Gorge Multipurpose Project i.e. the construction of a dam and the regulation of the River Turkwel. These impacts will be physical, social, economic, environmental and biological. Such an analysis should also examine problems and opportunities which exist within the Basin which are not directly related to the Turkwel Gorge Multipurpose Project e.g. groundwater resources, erosion problems upstream etc. The purpose of this Analysis is to forecast the likely beneficial and harmful impacts of the Multipurpose Project and to suggest broad measures to reduce the harmful impacts and to increase the beneficial effects. The Consultant should also identify the broad physical, economic and social potentials for development within the Basin. The Consultant is required to collaborate closely with those responsible for the design of the Turkwel Dam Project so as to be able to assess the direct physical impacts of the changes in the regime of the River Turkwel and the extent of the reservoir.

It is likely that the Consultant's analysis is likely to touch upon the impacts and potentials for the following:

- Environmental conservation
- Erosion problems
- Irrigated Agriculture
- Livestock rearing
- Fish farming
- Water spreading techniques
- Population development
- Community development
- Social and cultural impacts
- Health and Education

The above list is by no means definitive and the Consultant should endeavour to make it more comprehensive.

4.5

DEVELOPMENT STRATEGY

It will be necessary to prepare a Development Strategy for the Turkwel River Basin. The purpose of this Strategy will be to formulate an overall policy for socio-economic development within the Basin, in the light of the Turkwel Gorge Multipurpose Scheme. Such a Strategy should seek to maximise the benefits obtained from the Scheme and to reduce the disbenefits. Given the importance of the river regulation component and the dependence of the Basin on a reliable supply of water, it is likely that a central theme of the Strategy will be a policy for water development. This policy is likely to be linked closely to policies for land development, environmental development and conservation, economic development and social and community development. The Consultant is therefore required to prepare a Development Strategy on the basis of his Review of the Existing Situation, his Field Investigations and Analyses of Impacts. The Strategy should therefore contain policies for land and water development in the Basin, with indications of physical and geographical priorities where possible. Environmental and economic issues e.g. the continued role of different forms of economic activity in The Basin should also be discussed within the formulation of the Development Strategy. Possible trade-offs between sectors e.g. environment versus economic and/or social development should also be examined. It is also

important that the Strategy be justified in terms of the overall goals of this project, in terms of the District and National Development Plans where this is possible. The impact of the Development Strategy upon existing or planned projects within the Basin should also be assessed. and such projects might include the development of tree nurseries, erosion recondit-

The contents of the Development Strategy and its developmental emphasis is likely to affect the contents of all subsequent work on the preparation of a Turkwel River Basin Development Plan. The proposed Strategy will therefore require to be approved before subsequent work can continue. The Consultant should express the Development Strategy as concisely as possible. be drawn up so scale 1/500,000.

4.6

PROJECTS FOR IMMEDIATE IMPLEMENTATION

ECONOMIC DEVELOPMENT PLAN

After the approval of the Development Strategy, the Consultant is required to develop projects which can be implemented quickly and which are likely to have a high impact in relation to cost. These projects may include further physical investigations of particular aspects raised by the earlier work. However, the Consultant should define, where possible, physical projects which could be implemented quickly to achieve immediate results. At least some of these projects are likely to be in the field of environmental conservation e.g. erosion control measures, but could also include projects in the productive sector e.g. design of an irrigation project, establishment of livestock holding grounds etc. The Consultant should define the project components, the required investment, a description of the justification of the project, a description of the intended beneficiaries and a proposed method of implementation. The projects should be discussed with the District Development Committee before finalisation.

4.7

ENVIRONMENTAL CONSERVATION SCHEME

The Consultant should define the necessary capital and labour. The Consultant is required to draw up an Environmental Conservation Scheme for the River Basin. This should outline broad policies for environmental conservation and development throughout the Basin, supported by specific policies for particular problem areas or areas of opportunities which may present themselves. The

Consultant should then prepare recommendations for projects for environmental improvement or conservation to a sufficient degree of detail for detailed design. A number of such projects are already suggested in the Report of the Planning Mission on Reforestation in the Turkana Area (ref.5) and such projects might include the development of tree nurseries, erosion reconditioning schemes, grassland management and rangeland improvement schemes. In particular the Environmental Conservation Scheme should try to use the opportunities presented by a regulated river flow and the potentials for water-spreading schemes. The Environmental Conservation Scheme should be presented in the form of policies and plans and a Scheme should be drawn up at scale 1/500,000.

ECONOMIC DEVELOPMENT PLAN

The Consultant is required to prepare a plan for the development of productive activities in the Basin. These activities include but are not necessarily confined to rainfed and irrigated agriculture, forestry, inland fisheries and aquaculture, tourism, small industry and crafts, livestock rearing and agricultural processing. Necessary marketing activities should also be examined. The Economic Development Plan will be based on the Development Strategy and should include forecasts of numbers employed and/or numbers subsisting in the various sectors. These forecasts should be prepared for five year periods, and should clearly define the impact of the Turkwel Gorge Multipurpose Project on the economic potentials of the Basin. The Plan should also make tentative forecasts of the manpower available and the capacity of the recommended economic activities to absorb this manpower. Suggestions as to action required should be made where there is a shortfall between economic capacity and manpower available. Suggestions for the integration of women into economic activities should be made.

The Consultant should define the necessary capital and labour inputs for economic activity and define the requirements for training. Proposals for infrastructural development should be made where considered necessary to achieve economic development. The geographical location of economic activities should be defined

4.8

and the likely impacts of economic activity upon the environment, the social pattern and the cultural conditions in the Basin must be considered. The contents and proposals of the Plan should be worked out in collaboration with the District Development Committees in West Pokot and Turkana Districts and should be consistent with the regional proposals and investments proposed in the Five Year Plan. If they are not, the reasons for the discrepancies should be justified.

4.9 SOCIO-ECONOMIC DEVELOPMENT PLAN

A Socio-Economic Development Plan should be drawn up for the Basin in conjunction with the Economic Development Plan. This Plan should reflect the targets set in the Development Strategy and the Economic Development Plan. The Socio-Economic Development Plan should take into account the impacts of the proposed economic activities and measures. The Consultant should define policies for socio-economic development i.e. employment, community development, housing, the participation of women in society, health, education and vocational training and other sub-sectors he considers should be examined. The Consultant should recommend projects for social development, taking account of the existing social development programme of the Kenyan Government and other voluntary and aid agencies. The Consultant should consider the impact of social and economic development upon the urbanisation issue, and make appropriate recommendations. He should also draw up a list of projects in the social and community development sectors, health and education. He should provide indicate capital and operational costs and indicate the likely implementation agency. The content and proposals of the Plan should be worked out in collaboration with the District Committees in West Pokot and Turkana and should be consistent with the regional proposals and investments proposed in the Five Year Plan.

4.10 PHYSICAL DEVELOPMENT PLAN

The Consultant should prepare a Physical Development Plan for the River Basin. This should be based on a 20 year time horizon with intermediate plans for each five year period. The Plan should

should be schematic and give indications of the proposed distribution of settlement in the five year periods, the major infrastructural components and the proposed distribution of economic activities and social infrastructure. Policies for dispersal of population should be considered if over-concentration along the river courses appears to be a major problem. A plan at the scale of 1/500,000 should be prepared for each five-year period. The Plan should be worked out in collaboration with the District Development Committees.

Broad physical planning standards for housing and community facilities provision should be prepared for future adoption and justified in terms of the population's 'ability to pay'.

Sketch plans for any new communities which are considered to be required within the 20 year time horizon will be drawn up by the Consultant. These new communities are likely to be those associated with the irrigation schemes and with a construction camp to be sited near Turkwel Gorge. These plans should be prepared at 1/20,000 scale and should show access, proposed water supply, drainage and sewerage provisions, internal circulation, housing areas and open space and spaces for forestry, grazing and other economic activities.

4.11

PROJECT PREPARATION

The Consultant is required to prepare projects in all sectors for the purposes of funding. The purpose in preparing these projects is to arrive at a position where detailed design (where necessary) and construction can proceed almost immediately. It is recognised that the Consultant cannot prepare detailed feasibility studies for each project selected as these would require detailed engineering expertise in a large number of professional disciplines. The Consultant is, however, expected to prepare a full technical description of the proposed project, as far as his manning permits. He should set out the project's background and justification and its relation to other proposed projects. He should describe the project's components and specify the actions necessary to implement it. He should describe the required timing and capital investment

costs and potential sources of funding. He should describe the proposed project's institutional setting and the likely method of implementation and the responsible agency for implementation. Where possible the Consultant should also indicate the project's recurrent costs. For any well-defined and limited project, the Consultant should attempt to specify the target beneficiaries and the revenues accruing from the project. Where possible social benefit/cost ratios should be developed.

It is only when the Development Strategy, Economic Development Plan, Socio-Economic Development Plan and Physical Development Plan have been prepared that it will be possible to specify and prepare projects. However it appears likely that projects will probably emerge in the following sectors:

- Water development e.g. flood control, water spreading, river channelisation etc
- Land development e.g. rangeland improvement, irrigation development
- Environmental Conservation e.g. erosion control
- Forestry
- Fisheries
- Social Infrastructure
- Physical Infrastructure
- Institutional Development
- Further Engineering Studies and Designs

The Consultant is required to limit the number of projects recommended to twenty (20) and to rank projects in a serial order of priority.

4.12

INSTITUTIONAL ARRANGEMENTS

In the light of the projects recommended for implementation the Consultant should examine existing institutional arrangements and relationships in order to assess their relevance for project and plan implementation. The Consultant should consider the suitability of existing institutions for implementing projects, and consider where short-term improvements and modifications could be made to improve institutional capacities. The Consultant shall

also make recommendations for practical improvements to the existing institutional framework and he should suggest new institutions only where it is considered practical in terms of manpower to set these up. The Consultant should examine the operation of the Kerio Valley Development Authority in this connection. The Consultant is required to bear in mind the acute shortage of trained manpower in north-west Kenya in making his recommendations.

PREPARATION OF RIVER BASIN DEVELOPMENT PLAN

A final statement of policies and projects for the overall development of the Turkwel River Basin shall be prepared by the Consultant. This statement shall be consistent with plans and projects already prepared for the Basin by other authorities and shall be technically consistent with the Turkwel Gorge Multipurpose Project. The River Basin Development Plan will be described in a Draft Final Report for the Project setting out a description of the findings of the review of the existing situation and the findings of the field surveys. The Development Strategy adopted for the Basin will be presented and recommendations on projects and the necessary institutional apparatus will be set out. The Plan will also consist of the economic, socio-economic and physical policies and plans developed during the Project.

The Consultant shall list proposed projects in serial order of priority and set out indicative costs. The Consultant shall also set out all projects necessary to achieve the goals of this Project with indicative costs. A Development 'Budget' shall be derived setting out the anticipated order of cost in implementing the provisions of the Plan. This will be compared with development revenues where these are possible to derive.

The Plan will therefore contain both a report and the plans necessary to illustrate the proposals. The Consultants will also be required to prepare oral and visual presentations of his findings so that these can be presented to the widest possible audience. These presentations will be used to present the Consultant's findings to the local people in order to determine the acceptability of the proposals at a local level.

4.13

3.2

PROJECT TIMING, MANNING AND REPORTING REQUIREMENTS

5.1 THE SCALE OF THE PROJECT

The basic function of the Turkwel River Basin Development Plan will be to act as a catalyst for action. This action may take the form of further physical investigations or detailed designs. Or it may take the form of concrete physical projects to reduce the impacts of the Turkwel Gorge Multi-purpose Project or to take advantage of the opportunities the Project offers.

As the purpose of the Plan is action, it is considered that the proposed Plan can and should be prepared quickly with a relatively limited input of professional consulting services. More detailed studies and investigations can be undertaken as and when the need arises. There is another reason for preparing a Plan quickly. If the Turkwel Gorge Project is implemented as planned, it will be completed well before 1990. A River Basin Development Plan should be prepared well in advance of the completion of the dam, so that changes to the Plan can be incorporated quickly and flexibly. Some projects e.g. environmental improvement and the development of a construction camp may have to be undertaken well before the completion of the dam, so that the preconditions for the dam construction have been fulfilled in good time.

5.2 PREPARATION OF THE PLAN

The Table which follows sets out a very approximate estimate of the input of professional services thought necessary to complete the tasks set out in the Scope of Work described in Chapter 4. It is emphasised that this Table is set out for guidance for Tenderers only. The Tenderer is at liberty to suggest variations in the Scope of Work and the manning, according to his own perceptions of the Project's components.

SCOPE OF WORK - SUGGESTED PROFESSIONAL INPUTS FOR GUIDANCE

1. REVIEW OF THE EXISTING SITUATION
Approximate Professional Input: 6 man-months
Approximate Duration: Month 0 - Month 2

2. FIELD INVESTIGATIONS AND MAPPING PROGRAMMES
Approximate Professional Input: 18 man-months
Approximate Duration: Month 0 - Month 4

3. ANALYSIS OF IMPACTS
Approximate Professional Input: 4 man-months
Approximate Duration: Month 3 - Month 4

4. DEVELOPMENT STRATEGY
Approximate Professional Input: 4 man-months
Approximate Duration: Month 5 - Month 6

5. PROJECTS FOR IMMEDIATE IMPLEMENTATION
Approximate Professional Input: 3 man-months
Approximate Duration: Month 7- Month 8

6. ENVIRONMENTAL CONSERVATION SCHEME
Approximate Professional Input: 5 man-months
Approximate Duration: Month 7- Month 8

7. ECONOMIC DEVELOPMENT PLAN
Approximate Professional Input: 5 man-months
Approximate Duration: Month 8 - Month 9

8. SOCIO-ECONOMIC DEVELOPMENT PLAN
Approximate Professional Input: 5 man-months
Approximate Duration: Month 8 - Month 9

9. PHYSICAL DEVELOPMENT PLAN
Approximate Professional Input: 5 man-months
Approximate Duration: Month 8 - Month 9

SCOPE OF WORK - SUGGESTED PROFESSIONAL INPUTS FOR GUIDANCE

10. PROJECT PREPARATION
Approximate Professional Input: 4 man-months
Approximate Duration: Month 10 - Month 11
11. INSTITUTIONAL ARRANGEMENTS
Approximate Professional Input: 2 man-months
Approximate Duration: Month 11 - Month 12
12. PREPARATION OF DEVELOPMENT PLAN
Approximate Professional Input: 6 man-months
Approximate Duration: Month 12 - Month 14
- 1-12 TOTAL PROJECT
Approximate Professional Input: 67 man-months
Approximate Duration: Month 0 - Month 14

The expected level of professional input is therefore put at an estimated 67-75 man-months over an approximate duration of 15 to 18 ~~man~~ months (depending on field surveys). These figures are given simply as guidance to Tenderers as to the scale of input and degree of detail intended. Tenderers are, however, at liberty to place emphasis wherever they think fit in accordance with their own manning proposals. Survey staff, field assistants, draftsmen and secretaries are not included in the estimated time required.

PROFESSIONAL INPUTS

Because of the multi-disciplinary nature of the Project, numerous disciplines will be required --- probably in the form of a number of intensive, short-term inputs. The Project Team could draw upon the following disciplines amongst others:

- Project Manager (Engineer, Economist or Regional Planner)
- Regional Planner
- Water Engineer
- Agronomist
- Livestock Expert

- Irrigation Engineer
- Hydrogeologist
- Soils Expert
- Hydrologist
- Surveyor
- Forestry Expert
- Inland Fisheries Expert
- Architect Planner
- Ecologist
- Public Health Expert
- Institutions Expert
- Geographer
- Economist
- Financial Analyst

End of Month	Copies
1	10
2	10
3	10
4	50
5	10
6	10
7	50
8	10
9	10
10	10
11	50
12	100
13	10
14	10
15	10
16	10
17	10
18	10
19	10
20	10
21	10
22	10
23	10
24	10
25	10
26	10
27	10
28	10
29	10
30	10
31	10

REPORTING REQUIREMENTS

The Consultant is required to submit a series of Reports at various stages in the Project. He is also required to submit Monthly Progress Reports. The Monthly Progress Report will be brief detailed the tasks undertaken during the previous month, progress on tasks undertaken in relation to the overall time-schedule, the personnel engaged on the project and a monthly financial summary to support the submission of Invoices. The required Reporting Schedule is set out in the table overleaf. All Reports shall be in the English language.

A period of two weeks will be allowed for reviewing and comment-
 ing on the Development Strategy Report.

REPORT SUBMISSIONS SCHEDULE

Report Title	End of Month	Copies
Monthly Report	1	10
Monthly Report	2	10
Monthly Report	3	10
Review of Existing Situation	<u>3</u>	50
Monthly Report	4	10
Monthly Report	5	10
Monthly Report	6	10
Results of Field Work	<u>6</u>	50
Monthly Report	7	10
Development Strategy	<u>7</u>	100
Monthly Report	8	10
Monthly Report	9	10
Monthly Report	10	10
Environmental Conservation Scheme	10	50
Economic Development Plan	10	50
Socio-Economic Development Plan	10	50
Physical Development Plan	10	50
Draft Final Report	15	100

A period of one month will be employed for the review of the Draft Final Report, and the Final Report will be completed within two months of receiving the comments on the Draft Final Report. A period of two weeks will be employed for reviewing and commenting on the Development Strategy Report.

EQUIPMENT

The Tenderer should specify separately in Tender A any special equipment considered necessary for the execution of the project. Such equipment may include, for example, the hire of aircraft and/or boats, the purchase of special vehicles, spares and parts, camping equipment etc. These should be priced in detail in the Priced Tender.

Chapter 6:

REQUIREMENTS OF THE TENDERER

THE PROPOSAL

The prospective Tenderer is required to submit his Proposal in two parts. These are (A) a Technical Tender and (B) a Priced Tender. Five copies of each Tender shall be submitted. In the Technical Tender, the Tenderer is required to set out his qualifications and experience for carrying out the work described. Particular weight will be given to experience from similar work in Africa. The Tenderer should also give his comments on the Scope of Work and the Terms of Reference as a whole and set out briefly his proposed approach to the work and the methodology which will be adopted. The Tenderer must describe his proposals for manning the project and should attach the Curricula Vitae for all professional manpower proposed for the Project. In the Priced Tender, the Tenderer should present the overall price demanded for the work described in the Terms of Reference. The Tenderer should set out the monthly billing rates for each professional proposed for the project. Costs of international travels, costs of junior staff and of miscellaneous items e.g. accommodation, subsistence, local transport etc should be set out separately and in detail. The Technical Tender and the Priced Tender shall be submitted in separate envelopes.

EQUIPMENT

The Tenderer should specify separately in Tender A any special equipment considered necessary for the execution of the project. Such equipment may include, for example, the hire of aircraft and/or boats, the purchase of special vehicles, spares and parts, camping equipment etc. These should be priced in detail in the Priced Tender.

APPENDIX 1:

REFERENCES IN THE TEXT

A Health Delegation Report - prepared for the Norwegian Agency for International Development, in 2 volumes, January 1980

Turkana District Development Plan 1979-1983, published by the Turkana District Development Committee, in 1979

Turkwel Gorge Multipurpose Project Feasibility Study, prepared for the Ministry of Water Development Kenya, by Norconsult A.S., in 6 volumes, July 1979

Turkwel Dam and Reservoir Reconnaissance Study, prepared for the Ministry of Water Development, Kenya, by VIAK/NORPLAN, in 2 volumes, 1976

Report on a Planning Mission on Reforestation in the Turkana Area for the Norwegian Agency for International Development, in November 1979

Joint Kenyan-Norwegian Appraisal Mission on the Further Development of Irrigated Agriculture in the Turkana Cluster, prepared in October 1979

Unpublished Report by Mrs Jean Brown, prepared for FAO, on Socio-Economic Responses to Irrigated Agricultural Schemes in the Turkana Cluster, 1979

NOTE:

Most of the reports referred to above are available in very limited, cyclostyled editions. Copies can be obtained from the Norwegian Agency for International Development (NORAD)

Topographical Maps

The entire proposed Project Area is covered by contoured maps at 1/250,000. These are considered suitable for preparing Development Strategy and sectoral Plan and policy maps. Additional topographical maps of the Turkwel Gorge area and the dam site were prepared in 1976 by VIAK/NORPLAN at scales of 1/5,000 and 1/500 respectively. Subsequently a reservoir area map has been prepared from aerial survey at a scale of 1/10,000 with 5 metre contour intervals. This map covers an area of 120 square kilometres. Relatively detailed soil maps have been prepared by the Kenya Soil Surveys of the Turkwel Plains flood area. These maps were prepared from aerial photographic interpretation at a scale of 1/50,000 in 1974. These maps are useful in identifying areas suitable for irrigated agricultural development but should be supplemented by more detailed levelling and contouring (see Chapter 4.3).

Aerial Photography

For the purposes of surveying the agricultural potential of the area, infra-red aerial photography has been carried out for the area between Twin Islands and the confluence of the Turkwel and Wei-Wei Rivers. This was prepared in 1977. In March 1979, infra-red false colour photography was taken at a scale of 1/20,000 for the entire flood plain area of the Turkwel River from the confluence of the Turkwel and Wei-Wei Rivers to the mouth of the Turkwel in the Turkwel Delta. These photographs are particularly useful in the construction of further topographic maps and for the interpretation of vegetation and land-use distribution in Turkana District.

Satellite Imagery

The entire project area is covered by two satellite imagery 'scenes' at a scale of 1/1,000,000. The quality of these pictures

is excellent. Imagery exists for a number of years and a number of seasons so that historical changes may be observed. Digital tapes for most scenes can be purchased from the EROS Data Center in the United States.

APPENDIX 3 : OTHER USEFUL REFERENCES ON THE PROJECT AREA

Appendix 1 gives a list of the references used in compiling the Draft Terms of Reference. However a great amount of literature and technical reports pertaining to Turkana and West Pokot Districts is known to exist.

It is suggested that the Consultant refer to the following works which are very useful in obtaining an overall picture of the problems in the River Basin:

GEORG HENRIKSEN: "Economic Growth and Ecological Balance, Problems of Development in Turkana" - University of Bergen, 1974

P:H.GULLIVER: "The Family Herds" - London, 1972

D.J.PRATT & M.D.GWYNNE: "Rangeland Management and Ecology in East Africa" , London, 1977

I.R.DALE and P.J.GREENWAY : "Kenya Trees and Shrubs" , Glasgow 1961

ROYAL GEOGRAPHICAL SOCIETY : "The Papers of the South Turkana Expedition 1968-1970", published between 1970 and 1978 in London

The above publications are all essential reading to understanding the complex relationship between land and water resources, the traditional culture, livestock and economy.

Appendix 1 gives a list of the references used in compiling the Draft Terms of Reference. However, a great amount of literature and technical reports pertaining to Turkey and West Bank Districts is known to exist.

It is suggested that the Consultant refer to the following works which are very useful in obtaining an overall picture of the problems in the River Basin:

CRONK HEMALAN: "Ecologic Growth and Ecological Balance, Problems of Development in Turkey" - University of Bergen, 1974

P.A. GILLIEN: "The East's Harbors" - London, 1972

D.J. PRATT & M.D. OWEN: "Regional Development and Ecology in East Africa" - London, 1971

I.A. BALK and P.J. GREENWAY: "Konya Truss and Basin" - Glasgow 1961

ROYAL GEOGRAPHICAL SOCIETY: "The Factors of the South Turkish Expedition 1923-1927" - published between 1929 and 1932 in London

The above publications are all essential reading to understand the complex relationship between land and water resources, the traditional culture, livestock and economy.