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MINISTRY OF WATER DEVELOPMENT

SAMBURU

DISTRICT WATER DEVELOPMENT STUDY

1993 - 2013

PART 1

WATER DEMAND AND WATER RESOURCES

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WATER RESOURCES
ASSESSMENT SECTION
NAIROBI, KENYA

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TNO – INSTITUTE
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PREFACE

It gives me great pleasure to introduce the District Water Development Study for Samburu District.

The Ministry of Water Development has the task of planning for water resources development, both at national and district levels. Districts have been assigned a major role in the development of the country as illustrated by the District Focus Strategy for Rural Development Policy. Consistent with this policy the Ministry of Water Development has put great emphasis on the studies for District Water Development Planning.

Water resources development can only be successfully undertaken if the long-term planning reflects the balance between availability and exploitation of water. Extensive investigations and monitoring are needed to determine the potential of the water resources and the effects of development on long-term basis. Presently, the Districts do not have the research capacity to carry out the necessary studies independently. To overcome this situation, the Ministry of Water Development has established a Water Resources Assessment Section that supports the Districts in carrying out these studies. The Section is being strengthened by the Water Resources Assessment and Planning Project.

The present study provides extensive information on the availability of water resources, the existing supply, the future water demand and the investments involved in developing the water resources in Samburu District. Equipped with this information the District will be in a better position to plan its supply facilities. It is only after the District succeeds in explaining to the people the limitations of the natural system and the vulnerability of the environment involving them as much as possible in the planning and construction of their water supplies, that the difficult task of providing water to the people will see a good end.

I express the wish that this important study will be optimally used to achieve this common goal.

(E. K. MWONGERA)
Director of Water Development

TABLE OF CONTENTS

Page

PREFACE i

CONTENTS iii

ABBREVIATIONS viii

SUMMARY ix

1. INTRODUCTION 1

1.1 Purpose and Scope of the Study 1
1.2 International Co-operation 2

2. GENERAL APPROACH 3

3. SAMBURU DISTRICT 7

3.1 Description of the District 7

3.1.1 Physical Features and Land Use 7
3.1.2 Infrastructure and Economy 7
3.1.3 Population 10
3.1.4 Livestock 11
3.1.5 Water Supply 13
3.1.6 Health, Education and Social Services 14

3.2 District Development Plans 15

3.2.1 Major Development Potential and Needs 16
3.2.2 Problems Constraining Development 17
3.2.3 DDC Decision on Development Priorities 18

4. GROWTH SCENARIOS AND DATA PROJECTIONS 21

4.1 General 21
4.2 Consumption Rates 21
4.3 Estimation and Projection of Baseline Data 22
4.4 Projection of Population Data 26
4.5 Projection of Livestock Numbers 26
4.6 Projection of Commercial/Institutional Facilities 27
4.7 Constraints of Scenarios 27
4.8 Processing of Water Demand Calculations 28

Page

5. WATER DEMAND 31

5.1 General 31
5.2 Baseline Data 31

5.2.1 Population 31
5.2.2 Livestock 34
5.2.3 Institutional/Commercial Facilities 35
5.2.4 Wildlife and Agriculture 37

5.3 Water Demand Figures 37

5.3.1 Overview 37
5.3.2 Domestic Water Demand 40
5.3.3 Non-Domestic Water Demand 42

6. WATER RESOURCES 43

6.1 General 43
6.2 General Description of the Water Resources in Samburu 44

6.2.1 Groundwater Resources 44
6.2.2 Surface Water Resources 45
6.2.3 Water Resources Availability 49

6.3 Analysis of the Water Resources Availability 51

7. WATER RESOURCES VERSUS WATER DEMAND 57

REFERENCES 67

LIST OF TABLES

		Page
3.1	Wage Employment and Average Earnings	9
3.2	Income from Sales of Livestock, Hides and Skins (1987)	9
3.3	Population Distribution	10
3.4	Dry Season Migration to Distant Grazing Grounds (% of population)	11
3.5	Forage, Altitude and Climate Needs of Stock Species	11
3.6	Estimate of Protected Water Supply Coverage (1988)	14
3.7	Major Diseases in Samburu District	14
4.1	Annual Growth Rates 1988-2013	25
4.2	Service Type (Percentage Connections)	29
5.1	Population Data Samburu District	32
5.2	Population Estimates and Projections	34
5.3	Livestock Numbers in Samburu District	35
5.4	Projection of Livestock Numbers	35
5.5	Projected Water Demand (m^3/day) in Samburu District	40
5.6	Projected Domestic Water Demand (m^3/day) per Supply Area	40
5.7	Projected Domestic Water Demand per Sub-Location Type	41
5.8	Livestock Water Demand	42
6.1	List of Dams and Pans	46
6.2	Flow Data of some Springs and Streams	47
6.4	Flow Duration of Laggas and Springs	48
6.5	Low and High Monthly Rainfall Distribution	48
6.6	Average Seasonal Rainfall Distribution Expressed as Percentage of Annual Average Rainfall	48
6.7	Water Resources Availability Summary	54
6.8	Water Resources Availability	55
7.1	Proposed Water Development (m^3/day)	58
7.2	Proposed Water Development for 1988 Water Demand	60
7.3	Proposed Water Development for 1993 Water Demand	62
7.4	Proposed Water Development for 2003 Water Demand	64

LIST OF FIGURES

		Page
	Regional Assessment Studies under the WRAP Programme 1981-1990 . .	xiii
2.1	Model for Preparation of District Water Development Plan	4
3.1	Samburu District Location Map	8
4.1	Model for Implementation of the Water Demand Study	24
5.1	Population Projections Samburu District	34
5.2	Projected Total Water Demand Samburu District	38
6.1	Surface Water Availability Map	50
6.2	Groundwater Availability Map	52

LIST OF PLATES

Plate 1 Schools, Health Facilities
Plate 2 Water Demand
Plate 3 Proposed Supply Development

LIST OF MAPS IN SEPARATE COVER

(refered to as figures A6.1, A6.2, etc)

A6.1 - Map 17 Vegetation
A6.2 - Map 18 Range Condition
A6.3 - Map 19 Range Units

A7.1 - *Not in this report*
A7.2 - Map 11 Landforms and Soils
A7.3 - Map 16 Soil Moisture Availability; independent of climate
A7.4 - Map 12 Relative Productive Capacity of Soils; independent of climate
A7.5 - Map 13 Soil Erosion Hazard
A7.6 - Map 14 Landforms and Soil related Restrictions in Accessibility for Livestock; Permanent non-seasonal restrictions
A7.7 - Map 15 Wet Season Restrictions in Accessibility for Livestock

APPENDICES

1. District Focus Policy
2. Basic Data for Water Demand Calculations
3. Data Entry Sheets - Demand Sheets
4. Demand Summaries
5. Water Resources Summaries
6. Rangeland Vegetation of Samburu District
7. Landforms and Soils of Samburu District
8. Livestock Water Demand and Proposed Supply Development Samburu District

ABBREVIATIONS

ASAL	=	Arid and Semi-Arid Lands Development Program
CBWDP	=	Central Baringo Water Development Plan
CC	=	County Council
DANIDA	=	Danish International Development Agency
DDC	=	District Development Committee
DDP	=	Samburu District Development Plan 1989-1993
DvDC	=	Divisional Development Committee
DRSRS	=	Department of Resources Surveys & Remote Sensing
DWDP	=	District Water Development Plan
DWDS	=	District Water Development Study
EEC	=	European Economic Commission
FINNIDA	=	Finnish International Development Agency
GOK	=	Government of Kenya
GSK	=	Groundwater Survey Kenya
GTZ	=	Deutsche Gesellschaft fur Technische Zusammenarbeit
KFRWSDP	=	Kenya Finland Rural Water Supply Development Project in Western Province
KIDP	=	Kitui Development Program
Ksh	=	Kenya shilling
KWAHO	=	Kenya Water for Health Organization
KWDP	=	Kwale District Community Water Supply and Sanitation Project
L.U.	=	Livestock Unit
LBDA	=	Lake Basin Development Authority
lpcd	=	liters per capita per day
MoA	=	Ministry of Agriculture
MOH	=	Ministry of Health
MoLD	=	Ministry of Livestock Development
MoWD	=	Ministry of Water Development
MPND	=	Ministry of Planning and National Development
msl	=	Meters above mean sea level
NGO	=	Non-Government Organization
NORAD	=	Norwegian Agency for Development
ODA	=	Overseas Development Agency
Shs	=	Kenya shilling
SIDA	=	Swedish International Development Agency
TLU	=	Tropical Livestock Unit
UNDP	=	United Nations Development Project
UNICEF	=	United Nations International Childrens Emergency Fund
USAID	=	United States Agency for International Development
WECO	=	Western College of Arts
WRAP	=	Water Resources Assessment and Planning Project

SUMMARY

The present report on Water Demand and Water Resources is Part 1 of three reports, composing the Samburu District Water Development Study. Part 1 contains the assessment of the district water demand and the results of the water resources study and the analysis of the compatibility of both. The objective of Part 1 is to enable an opinion on the feasibility of water supply development, in the context of the desired economic development and the available water resources in Samburu District.

Samburu District has a semi-arid climate except for the Leroghi Plateau in the southwest and the mountain ranges of Nyiro, Ndoto and Mathews. Most of the District has typical savannah vegetation, but forests are found on the mountain ranges and the Leroghi Plateau has extensive grasslands. Land use is mostly restricted to the grazing of livestock, but there is some rainfed agriculture (wheat, maize) in the southwest.

The population of Samburu District is estimated at 98,291 (1988). The main town is Maralal (18,000 population). Other important urban centres are Wamba (5,095), Baragoi (3,365) and Suguta Marmar (2,250). The majority of the population lives dispersed over the land in isolated non-permanent housing (Manyattas), oriented for services toward 21 trading centres. The population density is low, only 3 people/km^2.

Livestock is the major source of living and part of the population moves in the dry seasons with the animals, in search of fodder and water. However livestock movement is reducing due to various reasons and there is a tendency that an increasing number of people settle permanently.

Livestock numbers, currently increasing because of adequate rainfall in recent years, are estimated to be 230,000 TLU (1988). The rangelands survey undertaken by the MoLD with assistance from WRAP indicates that present livestock numbers are already in excess of sustainable numbers. The current condition of the rangelands is described as fair to poor. Good range is only found in the western badly accessible part of the District along the Rift Valley escarpment.

The water demand is calculated using the unit water consumption rates as specified by the MoWD. Efforts have been made to obtain the best possible estimate of the 1988 water demand, which forms the basis for the projection of the water demand during the 20-year plan period. The initial year of the DWDP, when supplies are expected to be taken into operation, is determined at 1993.

As much as possible data and growth rates are used in accordance with the Samburu District Development Plan 1989-1993. However projections are not available beyond 1993. Therefore it was decided to develop three scenarios as the basis for making the projections.

The growth rates to be applied in each of the three scenarios are determined such, that scenario 2 conforms as much as possible to the adopted growth rates at the national or district level, that scenario 1 has growth rates higher than those of scenario 2 and that scenario 3 has growth rates reflecting a realistic assessment of the limited development potential of the District.

As a first approach planning has to be undertaken on the basis of the growth rates for

scenario 3, representing a base level of investment. This planning may also be seen as the first phase of development.
The next phase of development corresponding with scenario 2, takes into account the possibility of having to extent systems to cater for demand which is realised through appropriate social, cultural and institutional changes as envisaged by the District. It is this scenario for which most of the analyses in this study have been done.

Development under the high growth scenario 1 is not likely to happen in Samburu District at this stage, considering the limited land potential for livestock and the absence of concrete economic development proposals in other sectors. Therefore, although water demand has been calculated for scenario 1, it has not been used in the present study for comparison with the available water resources or for investment planning.

POPULATION	Scenario 1	Scenario 2	Scenario 3
Applied Population Growth Rates 1993 - 2013	3.0 %	2.3 %	0.2 %
Population Projections 1993	111,224	106,552	97,858
2013	200,009	168,623	101,555

The population projection shows for the year 2013 for scenario 3 a slight increase in population numbers, while for scenario 1 population doubles.

The development of the livestock in Samburu depends more on the availability of pasture, than on the availability of water. The rangelands in Samburu can only support a limited number of animals, as specified by the rangelands surveys, which were undertaken by the MoLD with assistance from WRAP.

LIVESTOCK	Scenario 1	Scenario 2	Scenario 3
Applied Livestock Growth Rates	1.0%	0.5%	0%
Livestock Projections 1993	57,605	56,193	54,808
2003	63,632	59,067	54,808

The recommended stocking rates (54,808 TLU for the whole District) are much lower than the 1988-estimate of livestock numbers (230,341 TLU). The proposed development of livestock water supplies must be based on these lower rates, as reflected in the projections, to avoid further degradation of the rangelands.

The processing of data and the calculation of the water demand was done using a Database Management System developed by WRAP in dBase IV on a micro-computer. The demand is divided in domestic and non-domestic demand. The domestic demand comprises all demand from population, schools, health - facilities and others. The non-domestic demand comprises livestock and industrial demand.

The highest demands exist in the urban areas of Maralal, Baragoi and Wamba and in the high potential areas of the Leroghi Plateau. The demand in Maralal Location is obviously much higher than in the other Locations, the domestic demand is actually 47% of the total domestic demand in the whole district.

PROJECTED WATER DEMAND		Scenario 1 Projection		Scenario 2 Projection		Scenario 3 Projection	
(m^3/day)	1988	1993	2003	1993	2003	1993	2003
District Total	5,087	5,982	9,299	5,782	8,541	5,292	6,311
Domestic	3,708	4,533	7,700	4,369	7,055	3,913	4,932
Non-Domestic	1,379	1,449	1,599	1,413	1,486	1,379	1,379

In the rural areas domestic demand is very low. The total domestic demand in most rural sub-locations is on average 15-30 m^3/day (1988). In some sparsely populated sub-locations demands are even lower. The non-domestic (livestock) demand in the rural areas is larger than the domestic demand in only 30 of the 69 sub-locations and is on average about 42 m^3/day (1988).

The information on the water resources in the district is based on the reports of the Water Resources Assessment Study in Samburu District, made by WRAP.

Groundwater is abstracted from boreholes, or from wells dug in the sandy sediments of laggas (dry river beds). Geology consists of two types of rocks: Basement and Volcanic Rocks. Borehole yields are on average 1.4-2.5 m^3/hr in Basement and 4 m^3/hr in volcanic rocks. Groundwater quality is generally good, though saline at some places in the Basement.

Surfacewater is available in small quantities only. The only major perennial river is the Ewaso Ngiro at the southern border. Springs are found in the mountain ranges. Rainfall is low in the plains (200-500 mm/year), but higher in the mountains (700-1000 mm/year). Most rivers in Samburu only flow during short periods after rain.

At many places surfacewater is stored behind dams and in pans. However storage capacities have reduced much due to siltation, caused by erosion. The chemical quality of the surfacewater is generally good, but bacteriological contamination is common.

The analysis of the water demand versus the water resources is carried out per the smallest administrative unit, the sub-location. Samburu District numbers 69 sub-locations with an average area of 302 km^2.

The exact quantity of available water cannot be estimated, because there is not enough data. However there is sufficient information on the water resources to determine in each sub-location whether the existing or future water demand can be covered. This has been analysed in detail for the water demand of scenario 2.

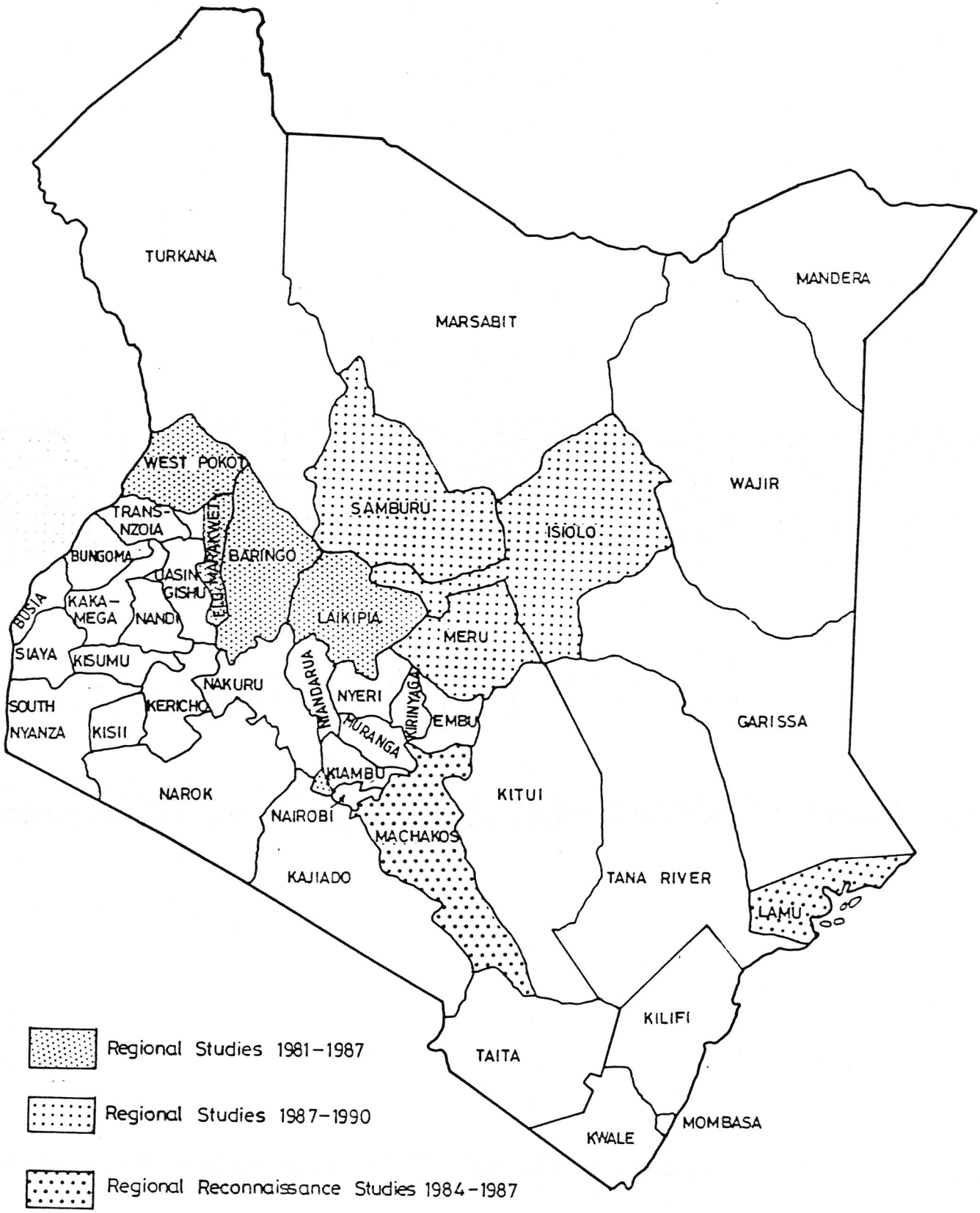
The development of groundwater (and springs) is preferred to the development of surfacewater for reasons of water quality and of supply reliability. The increase of the domestic demand until 2003 is therefore expected to be covered by groundwater resources. The non-domestic demand is supplied from surfacewater or groundwater resources, including natural sources for which no development is required. The non-domestic (livestock) demand used for the development planning is based on the dry season livestock numbers.

	Water Demand (Scenario 2)			Proposed Development						Existing Supply	
				Domestic			Non-Domestic			Non-Domestic	Domestic
	Domestic	Non-Domestic	Total	Gw	Rw/Sw	Sp	Gw	Rw/Sw	Sp	Sw	Sw
1988 District Total	3,704	1,382	5,086	2,220	0	20	440	335	0	607	1,555
1993 District Total	4,372	1,418	5,790	2,786	0	20	458	349	0	611	1,565
2003 District Total	7,052	1,487	8,539	5,394	0	20	492	376	0	619	1,638

Gw = Groundwater, Rw = Rain Water, Sw = Surface Water, Sp = Spring

There are still many sub-locations for which not enough information is available. However the available data is considered to be sufficient to plan for the first phase of water supply development (scenario 3). The subsequent feasibility studies, implementation and exploitation of the water supplies are expected to yield more information on demand and resources. This information will make it possible to update the District Water Development Plan in future.

WATER RESOURCES ASSESSMENT & PLANNING PROJECT



Regional Assessment Studies under the WRAP Programme 1981-1990

1. INTRODUCTION

1.1 Purpose and Scope of the Study

The District Water Development Study (DWDS) of Samburu District is aimed at providing the basis for the District Water Development Plan (DWDP), which in turn will be the sector input to the District Development Plan (DDP).

The study was undertaken by the Ministry of Water Development in its role of supporting the districts in their task to develop the available water resources in a safe and sustainable way. Two conditions will have to be fulfilled to achieve this goal.

- The development of water resources must be in balance both with the capacity of these resources and with the conditions set by the environment.

- Supply of water to the community must be sustainable, meaning that the proposed schemes be designed in agreement with the technical and financial support capability of the people for whom they will be constructed.

These conditions require a thorough assessment of the situation in the districts and a planning that is in tune with the socio-economic, institutional, and technical developments.

The DWDS can be considered the first stage in the process of formulating a DWDP. The study, based on extensive assessments, describes the water resources development potential in comparison to the projected water demand, discusses the viability of different water supply options in terms of sustainability and safety, and provides estimates of the investment levels involved.

The DWDP based on the study will be more specific in that it also comprises the decisions of the district authorities regarding selection and prioritization of the water development schemes. The plan is to cover a period of 20 years, according to MoWD guidelines, starting from 1993 when operation of the first new schemes will supposedly begin. The DWDP will be an important component of the DDP which includes the entire socio-economical planning of the district in perspective to all the available resources. From the above it may be clear that both plans are closely linked and can only be successfully developed in good co-ordination.

The methodology for planning of water resources development, adopted by the Ministry facilitates full participation of the district authorities, community groups and individuals concerned in all stages of the planning process, which is in line with the District Focus Policy. An outline of the general approach is given in Chapter 2 of this report. A summary of the main aspects of the District Focus Policy related to water development planning is presented in Appendix 1.

In order to provide optimal conditions for district involvement, the DWDS is carried out in three phases. District engineers and institutions concerned with water use and water supply are extensively consulted during the periods of data collection and analysis. The final report includes three volumes, corresponding with the three phases of the study. Each of these volumes is presented and discussed at a DEC-meeting.

The present report is Part 1 of the DWDS carried out for Samburu District within the framework of WRAP. The report contains the basic data used to calculate the water demand for 1988 as well as the projected demands for the years 1993 and 2013, for different growth scenarios. It includes the analysis of these demands and the comparison with the available resources of groundwater and surface water and it presents the summaries of the calculations for each of the sublocations of the District.

1.2 International Co-operation

The District Water Development Study was undertaken under Co-operative Agreement between the Governments of Kenya and The Netherlands.

The studies are carried out by the Water Resources Assessment Section of the Ministry of Water Development, Nairobi, Kenya in co-operation with the TNO Institute of Applied Geoscience, Delft, The Netherlands, within the framework of the **Water Resources Assessment and Planning (WRAP)** project.

Consultancy services were provided by the Netherlands Economic Institute, Rotterdam, The Netherlands and the International Institute for Hydraulic and Environmental Engineering, Delft, The Netherlands.

2. GENERAL APPROACH

The District Water Development Study (DWDS) is a base study for preparation of the District Water Development Plan (DWDP). All components that constitute the DWDP are also covered by the DWDS.

The model introduced by the WRAP project for preparation of a DWDP is shown in figure 2.1. The DWDS follows this model in analysing the various components that finally will lead to the formulation of the DWDP. The study includes three phases focusing on different aspects of the planning, namely:

- the compatibility of available water resources with water demand in the present situation and for projected demand scenarios
- the viability of the technical options for water supply development based on environmental and sustainability criteria
- the investments involved in the district water development and the technical, institutional, social and financial factors determining the sustainability of selected solutions

The results obtained in the subsequent phases of the DWDS are presented in Part 1, Part 2 and Part 3 of the DWDS report. An outline of the Study is given below.

Water Demand Study (Part 1)

The water demand study comprises of analyses and projections of the water consumption by all water users in the district. The baseline data available from various sources are often incomplete and/or inaccurate. Therefore, thorough scrutiny of the data is needed to ensure sufficient reliability of further analysis. The data is processed using a Database Management System that handles both the calculation of the water demand and the projection of the baseline data.

The water demand is calculated using the procedure laid down in the Design Manual of the Ministry of Water Development. The procedure compels to projections of the water demand in 5, 15 and 25 years time. This, in turn, requires analysis of the growth trends of population, livestock, agriculture, industries, tourism, etc.

The method adopted provides for projections following three different scenarios: a high growth scenario based on optimal conditions in economical development, a medium growth scenario corresponding with national and district development expectations and a low growth scenario taking into account the less favourable conditions set by the environment.

It may be clear that the DWDS depends on the input from other sectors, such as livestock and agriculture, to complete the projections in the most realistic way.

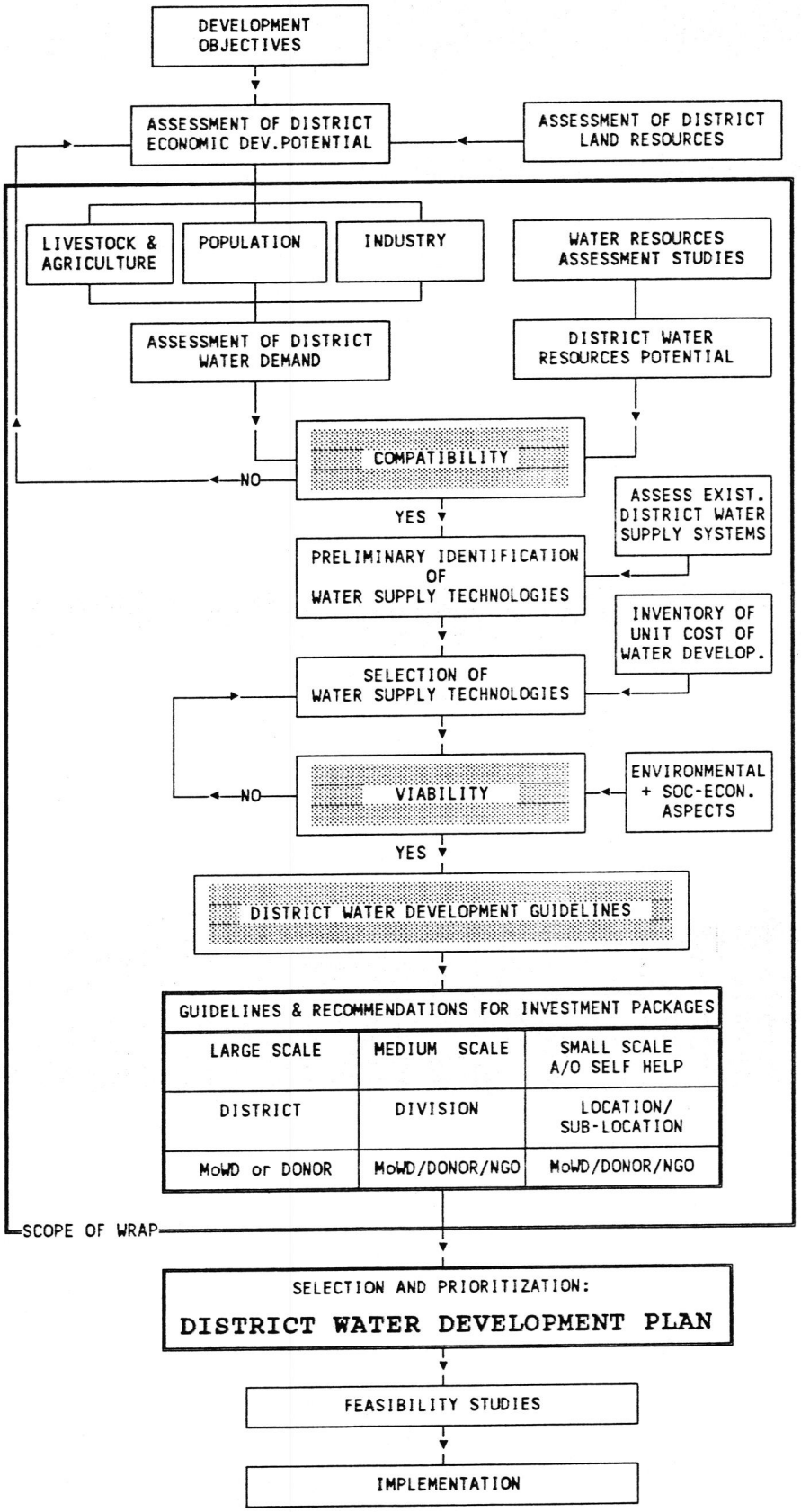


Figure 2.1 **Model for Preparation of District Water Development Plan**

Water Resources Assessment Study (Part 1)

Water resources assessment studies are an essential component of the DWDS. The assessment studies undertaken within the framework of the WRAP project comprise the following:

- An inventory of available data and studies on the water resources in the District

- A field survey including collection of data on surface water and groundwater, rehabilitation of part of the existing measuring stations, installation of temporary measuring stations. Measurements are made of the quantity and quality of water in rivers, springs, wells and boreholes.

- A geophysical reconnaissance survey using vertical electrical or electromagnetic soundings, aimed at providing more insight into the hydrogeological conditions. The results of the survey are checked and calibrated by drilling of exploratory boreholes and test pumping.

- An analysis of the geological, geophysical, hydrological and hydrogeological maps and data, both from the inventory and from field investigations.

From all this information and after careful and systematic analysis, water availability maps are prepared which show the water development potential of the area. The water resources assessment investigations are described in a separate report and a summary of the main conclusions on the water development potential is given in Part 1 of the DWDS report.

Comparison of Water Demand and Available Resources (Part 1)

Having estimated the water demand over the next 25 years and the water resources available in the district, a close analysis is made of the water development potential to decide whether the projected water demand can be met. This analysis of water demand versus water resources availability is carried out for the smallest planning unit: the sub-location.

When comparing the demand with the resources, priorities need to be set whether a district can best support human, livestock, agricultural or industrial development. In this respect both quantity and quality of the water must be considered.

What emerges from this process of comparing the anticipated demand with the resources, is a description of the development potential of the District, based on water availability.

Study of Water Supply Development Options (Part 2)

From the actual and projected water demand and the capacity of existing water supply schemes, the need for further development of the water supplies can be determined.

Limited water resources, contrasting interest or expected negative environmental impact may hamper further development. However, in situations with sufficient water available, often more than one supply option can be considered. A selection of the

best alternative must then be based on considerations of financial, technical and environmental viability.

Phase 2 of the DWDS includes:

- Assessment of existing district water supply systems
- Assessment of technical options for water supply improvement
- Inventory of unit costs for water development based on existing supplies
- Preliminary identification of water supply options and cost
- Study of cost-effectiveness of water supply options

The analyses, results and conclusions arrived at are presented in Part 2 of the DWDS report. Together with Part 1 this forms the basis for the 'District Water Development Guidelines'.

Formulation of Guidelines and Recommendations for Investment Packages (Part 3)

The guidelines and recommendations for the development of the district water resources result in proposals for improvement of the existing water supply situation in the district. The proposed improvements may range from very small local supplies to comprehensive water supply schemes. The investments required to improve the water supply situation have been termed investment packages.

The purpose of the investment packages is to present to the Government of Kenya and interested donors a preliminary estimate of the funds and other inputs needed for water supply development. Each investment package or a combination of them can thus form the core of a water supply project.

Phase 3 of the DWDS includes the following issues:

- Land use, environmental, social, institutional and economic/financial factors to be considered
- Guidelines for assessment of water sector investment proposals
- Examples of investment packages
- Recommendations on required institutional strengthening for implementation of the DWDP
- A framework for a proposal based on the investment packages

The analyses, results, conclusions and recommendations arrived at are presented in Part 3 of the DWDS report. The three parts of DWDS should provide the district authorities with sufficient base information for initiating further development of the water resources in the district.

3. SAMBURU DISTRICT

3.1 Description of the District

3.1.1 Physical Features and Land Use

Samburu District is located in Central Kenya and is part of the Rift Valley Province. The district covers an area of 20,801 km^2 (including 3,250 km^2 gazetted forests) and lies on the northern interface between the highlands (2000-2500 msl) and lowlands (150-750 msl). Most of Samburu district is a continuous basin sloping gently northwards to Lake Turkana. The Lorokki Plateau in the southwest, and the mountain ranges of Nyiro, Ndoto and Mathews in the east border the central plains.

Rainfall varies between 250 and 1000 mm per annum with lowest rainfall in the eastern plains, and highest rainfall in the mountain ranges. Rainfall in the central plains varies between 300 and 500 mm per annum. The district is mainly drained by two rivers, the Seiya - Barsaloi - Milgis (seasonal) in the centre of the District, and the Ewaso Ngiro (perennial) that forms the larger part of the districts southern boundary.

The soils on the Lorokki Plateau, and those near and on the mountain ranges are the best in the district. The central and eastern plains have moderately fertile soils that are however easily eroded. In fact in large areas the soils are already heavily eroded. Most of the district has typical savannah vegetation. Forests are found locally on the Lorokki Plateau and in the mountain ranges. Cultivated areas are very scarce and found only on the Lorokki Plateau.

Only about 7% of the Districts lands are classified as high and medium potential arable and range land, situated mainly in Lorroki Division. Low potential lands make up 77% of the District. Land use is therefore mostly restricted to the grazing of livestock. Only about 5000 ha is currently under rainfed agriculture, with wheat, maize, beans and vegetables. The forests are protected and some controlled grazing is allowed in the forests only during the driest months of the year.

Land has been adjudicated in about 40% of the District, which is mainly in Lorroki Division. In the past many group ranches were formed here, but lately subdivision of the group ranches is taking place, because the Samburu increasingly prefer individual title deeds.

3.1.2 Infrastructure and Economy

Samburu District is administratively divided into four Divisions (Baragoi, Lorroki, Waso and Wamba), 21 locations and 69 sub-locations. Waso Division was formed recently by splitting Wamba Division.

Samburu is very much a rural district. The only urban centre is Maralal, the District headquarters, with an estimated 1988-population of 22,677 (source: DDP; WRAP uses a lower estimate of 18,000). Other centres are the four divisional headquarters, Baragoi, Wamba, Archer's Post and Suguta Marmar, and a number of smaller trading

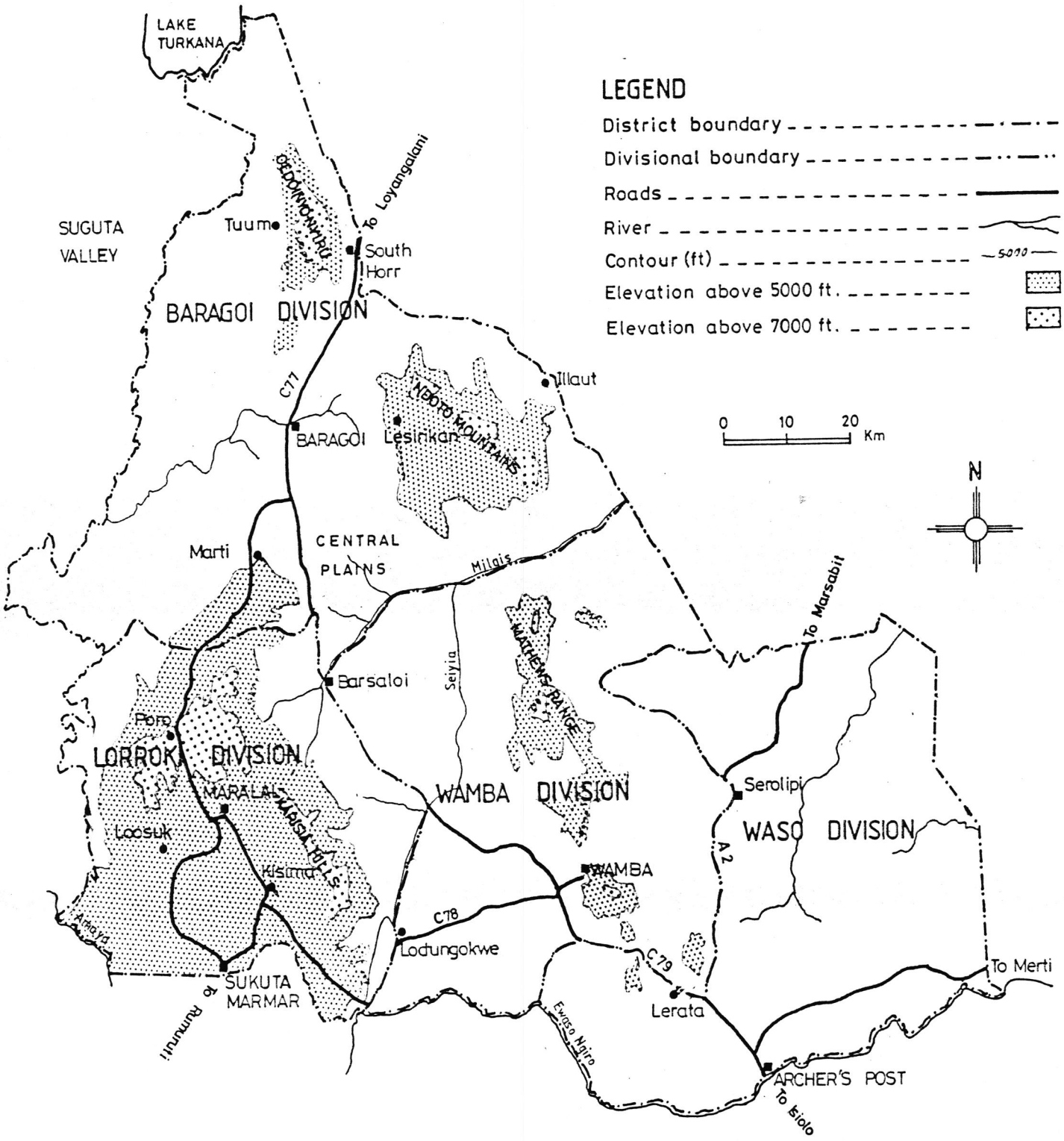


Figure 3.1 Samburu District Location Map

centres. In these trading centres populations rarely exceed 1000. The centres offer the rural population commercial, administrative and institutional services. There is little industrial activity in the district.

Infrastructure is poorly developed. Classified roads in this 20,801 km^2 district have a joint length of about 337 km, none of it tarmacked. Electricity is available from the national grid in Maralal and the divisional headquarter Sukuta Marmar. Elsewhere in the district electricity is not available, except at private institutions, like missions or tourist lodges.

The DDP 1989-1993 estimates the 1988 labour force at 41,025 people. The majority, 57% is active in livestock-related activities, whilst agriculture involves only 3.9% and the commercial and public sectors 13%. The DDP 1989-1993 expects to raise employment especially in the commercial and tourism sector, but the bulk of the population will remain dependent on livestock.

The number of wage earners in the major towns and in the whole district is summarized in the table below. The average earnings per wage earner, shown here for 1986 and 1987 indicate a low income level.

Table 3.1 Wage Employment and Average Earnings

	Estimated Wage Employment		Average Earnings (Ksh/month)	
	1986	1987	1986	1987
Towns: Maralal	776	783	1,701	2,188
Wamba	101	141	1,658	1,543
Baragoi	34	37	1,078	1,288
District	2,580	2,827	1,710	2,168

Source: Statistical Abstract 1988

The Samburu do not sell much of their livestock. The income from livestock (sales of animals and hides) per person employed in this sector is low (23,400 people are employed in the livestock sector):

Table 3.2 Income from Sales of Livestock, Hides and Skins (1987)

	Sales (No.)	Net Income to Farmers (Ksh)	Average Unit Price (Ksh)	Average Income per Farmer (Ksh)
Sheep/Goats	7,009	2,074,664	296	89
Cattle	3,179	9,096,125	2,861	389
Hides and Skins	128,168	3,517,295	27	150
Total	-	14,688,084	-	628

Source: DDP 1989-1993

The major money earner in agriculture is wheat, but this crop does not significantly benefit the district, because it is grown by large-scale contractors from outside the district. However some income is derived from the lease of the land by individuals or group ranches and possibly from labour. Maize is the main crop which is sold locally and the DDP 1989-1993 estimates that 630 households received an average Ksh. 3,263 from the sale of maize in 1987.

Wildlife is one of the District's most important resources and forms a major source of income and employment for the local people. It provides the Samburu County Council with more than 90% of its total annual revenue, which is approximately 1.5 million Shs. The District has the highest wildlife population density in the country.

3.1.3 Population

The population of Samburu District numbered 76,908 in 1979 and an estimated 98,291 in 1988, reflecting an estimated annual growth rate of 2.76%. Ethnically, 75% of the population belongs to the Samburu tribe, 17% to the Turkana tribe, the remaining 8% is made up of people from a large variety of Kenyan tribal groups.

Samburu is a relatively sparsely populated district. A large part of the population lives in the Lorokki Division, that has the highest population density in the district, but which remains far below the Kenya average: 27 people/km².

Table 3.3 Population Distribution

Administrative Division	Area		1988-Population Estimate				Rural Population Density/km²
	km²	%	Total	%	Urban	Rural	
Lorokki	4,010	19	50,712	52	20,250	30,462	7.6
Baragoi	7,022	34	25,002	25	3,365	21,637	3.1
Wamba	5,162	25	17,720	18	5,095	12,625	2.5
Waso	4,608	22	4,857	5	-	4,857	1.1
District	20,801	100	98,291	100	28,710	69,581	3.3

The majority of the population lives dispersed over the land in isolated non-permanent housing (manyattas), oriented for services toward 21 trading centres. It is only in those centres that one finds concentrations of population in village type settings.

Mostly, the rural people are pastoralists of the nomadic type. This means that although a particular household or clan belongs administratively to a particular sub-location, the entire (or at least part of the) clan may be following its' livestock in search of fodder and water. Little is known about the movements of population and livestock, however it would seem from interviews during field visits that mostly it is only the young men (Imurani or Moran) that move with the bulk of the livestock. This group makes up for about 20% of the total rural population.

The population of the 21 trading centres totalled 20,718 persons in 1979, varying between a mere 37 (Lodokojek T.C) and 10,230 (Maralal)[1]. In 1979, 28% of the population was living in the trading centres. The 1988 estimates indicate 36% of the district population to live in the trading centres, indicating a strong tendency towards urbanization, and depopulation of the rural areas (see also paragraph 5.2.1).

[1] WRAP estimates the urban population of Maralal lower at 8,000, by assuming that the 1979 census figure of 10,230 actually includes a rural population, which lives in the rural parts of Maralal location.

3.1.4 Livestock

Livestock is the major source of living and the prime social status indicator for the (rural) Samburu population. Livestock outnumber the rural population, in 1988 the ratio in L.U is about 2.3:1. Livestock consists of cattle, sheep and goats, donkeys and camels.

The livestock population was dramatically decreased in the drought of 1984, when 50 to 75% of cattle died because of lack of fodder and water. Currently livestock numbers are increasing again, because of the adequate rainfall in recent years (see also paragraph 5.2.2).

Table 3.4 Dry Season Migration to Distant Grazing Grounds (% of population)

	Average Distance in km from the Homestead							
	<50	50-74	75-99	100-124	125-149	150-174	175-199	>200
Cows	36.4	7.6	16.9	21.2	1.7	5.9	6.8	3.5
Goats	43.7	45.1	2.8	4.2	0	1.4	0	2.8
Sheep	43.9	40.4	8.8	3.5	0	1.7	0	1.7
Camels	63.6	4.5	18.2	9.2	0	0	0	4.5
Donkeys	62.5	0	0	25	0	0	0	12.5

Source: Samburu District Socio-cultural Profile (G.S. Were et al, 1986)

The mobility of cattle, and with it a part of the population (herders) is substantial. Interviews with 65 household heads revealed that the majority of the animals remain within 125 km of the homestead. Altogether 43 places with perennial forage, mostly in the mountain areas, were cited (Lorroki 21, Wamba 14, Baragoi 8).

The migrations are triggered by perceived needs for quantity and quality of fodder and water, and by attempts to prevent and reduce diseases. The basic requirements for the animals are summarized in table 3.5.

Table 3.5 Forage, Altitude and Climate Needs of Stock Species

	Type of Forage	Altitude	Climate
Cattle	Grass	high/low	cool/hot
Goats	Browse	low	cool/hot
Sheep	Grass	high/low	cool/hot
Camels	Browse	low	hot

Source: Samburu District Socio-cultural Profile (G.S. Were et al, 1986)

The rangeland condition of Samburu District was studied by WRAP in close cooperation with the Ministry of Livestock Development, Range Management Handbook Project. Studies of soils, vegetation, climate and water sources were done under the methodology developed for the Range Management Handbook. The results of the surveys of soils and vegetation are presented in Appendix 6 and 7. These surveys indicate the present condition of the rangelands of Samburu District (Figure A6.2 in Appendix 6):

- Poor range is found in the Central Plains between the Karissia Hills and the Mathews Range-Ndoto Mountains, comprising 23% of the total area of the District. The result of at least 30-40 years of overgrazing. The district as a whole has probably been overstocked for some time but unevenly. Excessive numbers of livestock have

probably been concentrated on the central plateau by shifts of stock first from the Leroghi area to escape the colonial grazing scheme and then from the eastern lowlands to escape shifta raids which began about the time of Independence and possibly now of excess stock from the group/individual ranches on the Leroghi Plateau.
Grass cover has decreased strongly. Erosion is widespread and there is evidence of continued heavy grazing and browsing pressure.
Relatively small areas of poor range condition also occur centred on the villages of Archers Post, Serolevi and Lerata along the Isiolo-Marsabit road where permanent water and protection from raiding are available.

- Fair range is the most extensive range condition in the District (65% of the total area) and exists on the Leroghi Plateau, around the mountain ranges and in the area east of the Mathews Range. Fair condition rangeland generally shows the effects of use (grazing, browsing, trampling, shrub cutting) and there may be some erosion, surface sealing, litter reduction and trails. This is not to the extent that the ability of the rangeland to support livestock has been seriously impaired. However, in the case of Samburu District, this does not necessarily mean that the existing usage is proper and should be continued.
  Erosion is common along the eastern footslopes of the Mathews Range and is associated here with seasonal streams (luggas), drainage lines, old manyatta sites and wells. This erosion probably began prior to Independence when the area was used year round by stock and manyattas were resident. Once started, however, it has not been stopped, even by the reduced use the area has seen over the past 20 years or more. This is a good example of the effect of misuse of rangeland on the long term.

- Good range is found in the western part of the District along the Rift Valley escarpment, and a small part of the Leroghi Plateau, and comprises only 12% of the District.
  Except for the possibility of locally well watered areas near and/or on the valley floor, most of the escarpment is poorly watered. It is also very dry, of low potential productivity, and poorly accessible. Thus, use by livestock has probably seldom been excessive for prolonged periods of time.
  The Leroghi Plateau, however, is potentially highly productive rangeland, easily accessible and, although primarily in fair condition, is fairly heavily grazed. The small area of good condition rangeland found in this area may then reflect deferred grazing practices on some of the group/individual ranches.

Herlocker (1989) lists four recommended objectives of range management in Samburu District (see Appendix 6):

(a) Reduce accelerated erosion presently underway on poor condition rangelands.
(b) Attain a more optimal balance between woody and herbaceous vegetation on rangelands which have been invaded by shrubs.
(c) Improve the cover, vigour and composition of the grass layer.
(d) Conserve/improve the value of mountainous range units for watershed and emergency drought grazing.

Herlocker also describes the approach and the methods to achieve these objectives (Appendix 6). It is stated that over 20% of the district's rangelands are in poor condition and subject to accelerated soil erosion. If this erosion is not soon halted or significantly slowed there is a real danger -especially on shallower and steeper soils-

of a irreversible decline in the potential of these rangelands to support a productive livestock system.

Improvement of the cover of the grass layer is needed to reduce soil erosion and reduce woody plant cover. Subsequently, improvement of grassland vigour and composition is required to attain optimal range and livestock productivity of grassland communities. To achieve this, the annuals and low quality perennial found on the degraded perennial grasslands of the district need to be replaced with high quality perennial grasses which are then kept vigorous and healthy through proper range management practices.

The mountainous areas of the district combine their highly valuable functions of water shed protection and emergency drought grazing reserves with a particular vulnerability to incorrect usage in the form of uncontrolled burning and grazing. Steep slopes increase the susceptibility of soils to irreversible degradation through erosion. It is extremely important to minimize the impact of both fires and grazing in these range units.

Herlocker describes that the most important means by which to attain most of the objectives discussed above is through some form of deferred/controlled grazing. This includes an eventual reduction of livestock numbers. Only in this way will it be possible to improve the cover, vigour and composition of the grass layer to the point where soil erosion can be reduced, controlled burning supported and the production of perennial grasses and livestock optimized.

3.1.5 Water Supply

The availability of protected water supply for domestic purposes is restricted mainly to the trading centres and existing supplies appear to be mostly located in a narrow band on either side of the Archer's Post-Wamba-Maralal-Baragoi road. An estimated 26 supplies are operational. Of these, 14 are operated by the MoWD, the other 12 are operated by other organisations, mainly missions. Another 5 supplies (4 MoWD, 1 CC) are currently not working, 3 of these are under construction. The 18 water supplies developed by the MoWD are all piped supplies, abstracting water from rivers (2 no.), dams (4 no.), springs (3 no.), and boreholes (9 no.). Physio-chemical treatment and disinfection is practised at the Maralal supply, disinfection at Archers Post, the other supplies are untreated.

The rural population relies for its' drinking water needs on dams, pans and wells dug in the dry river beds (lagga). With possible exception of the latter, certainly the quality of this water does not comply with drinking water quality standards.

Livestock watering from natural sources is limited to rainfall periods. A number of dams and pans have been developed to cater for livestock (and domestic) water requirements. The 27 units constructed since 1980 by DCU5 have storage volumes ranging from a mere 4,000 to 230,000 m^3 (Nundoto dam, source of Maralal water supply). The fenced-off Naisunyai Dam supplies piped water through a short gravity main to a filter-preceded handpump and to a cattle trough.

Reliability of the systems appears rather low. Of the 14 commissioned MoWD supplies, only 7 systems perform reliably. Of the 12 other supplies, 6 systems perform reliably. Breakdowns occur, sometimes in excess of 3 months. In these cases water for domestic purposes is carried over long distances from unprotected water sources.

The present protected water supply coverage may be estimated at 64% of the urban population and 13% of the rural population. More information on the existing water supply in Samburu District is in chapter 4 of Part 2.

Table 3.6 Estimate of Protected Water Supply Coverage (1988)

	Urban (4 towns) 1)	Rural	Total
Total population	28,710	69,580	98,290
Served Population	18,250	5,736	26,986
Service Coverage (%)	64	13	27

Note: 1) Urban centres are settlements with more than 2000 inhabitants. In Samburu these are Maralal (18,000), Wamba (5,095), Baragoi (3,365) and Sukuta Marmar (2,250)
2) The Maralal supply alone covers 10,000 population (estimate)

3.1.6 Health, Education and Social Services

The health facilities in Samburu District are distributed wide apart. There are two hospitals (Maralal and Wamba), two health-centres (Baragoi and Wamba) and 17 dispensaries. The distances travelled by the people to the nearest health facility is on average 20 km in Lorroki Division; 30 km in Baragoi Division and 20-30 km in Wamba Division. The migratory behaviour of the population causes poor sanitation conditions in the settlements and in such circumstances diarrhoea, skin diseases and worms are quite common. Malaria cases in Maralal were increasing, but a campaign against the mosquitos caused a reduction in 1988. The major diseases are presented in table 3.7.

Table 3.7 Major Diseases in Samburu District

Diseases	No. of Cases	
	1987	1988
U.R.T.I.	9,749	5,323
Malaria	6,910	3,605
Skin Infections (Scabies)	255	368
Dysentery		726
Amoebiasis, Salmonellosis		153
Worms (Taeniasis)		616
Gastro - enteritis		212
Pneumonia		1,466

Source: MoH, Annual Report 1988

The health facilities are not used efficiently by the Samburu. They readily consult their traditional healers when they are sick but only seek modern medicine as a last remedy. Infant mortality in 1987 was for 0-1 year old: 64/1000 and for 0-5 years old: 98/1000. This is much higher than elsewhere in Kenya.

Sanitation is the responsibility of the MoH, which carries out regular inspections and gives health education on the importance of improving sanitation. The MoH is involved in a SIDA assisted project in water supply and sanitation, which includes construction of demonstration VIP-latrines, protection of dug wells, construction of ferro-cement

tanks and other health/sanitation related activities. The project sites are South-Horr, Loosuk and Poro.

The attendance in schools is low in Samburu District, because the Samburu parents are not convinced of the necessity of school education, especially for girls. In 1988 there were 76 primary (14,503 students) and 4 secondary (678 students), 65% of all primary schools are under-utilized.

School attendance is low, especially in the rural areas, because some parents prefer children to look after the family livestock. Education is a long term economic investment, while looking after cows gives an immediate dividend. School drop-out rates are high in the rural areas, caused by the migrations of the families. The Ministry of Education is trying to reduce this and at the same time trying to increase the enrolment by increasing the number of schools with boarding facilities from 19 to 29.

The Ministry of Culture and Social Services assists the local communities to become self reliant, by involving them in the planning of rural development initiatives. Progress is being made and at some places committees have been formed by the community to organise grazing, dip facilities etc. However the self-help movement has proven difficult to catalyse among the Samburu. This must be considered when preparing new projects by allowing sufficient time for consultation with and information of the people.

In order to make community participation successful in Samburu District (but also elsewhere) a good knowledge is needed of the social structure. The elders, the traditional leaders of the Samburu people still have much authority and therefore the communication with the people should be done both through them and through the chiefs.

A description of the social structure and much more useful information can be found in the Samburu District Socio-cultural Profile (G.S. Were et al, 1986).

3.2 District Development Plans

The district development objectives form an important input to the preparation of the DWDP, as the projections for future use of water need to be based on the expected or planned economical growth (Figure 2.1).

The District Development Plan is the major source of information on the district's economical development potential. It consists of three parts. The first part contains mainly background information on the District's resource base and the state of development. The second part describes the development of the District, regarding strategy, potential, constraints, and proposed solutions and actions. The third part provides for each sector the district policy orientations and a list in order of priority of the major projects and programmes. A summary of the second part follows here to present the assessment by the District of it's potential economic development.

The DDP 1989-1993 for Samburu District does not provide the detailed basis required for accurate projection of the economic growth (or development in which sectors). Therefore estimates had to be made in this study in order to project future water demand. This is described in chapter 4.

3.2.1 Major Development Potential and Needs

Any serious development of Samburu District has to be based on livestock and an important priority of the District is increased productive investment and growth in output of livestock and livestock products. In addition to livestock the District has abundant potential for honey production, which currently is mainly done for subsistence.

The development of agriculture is another priority because most of the food crops consumed in the District come from outside. Since the Samburu people have shown a positive attitude towards eating foods crops, cultivation should be encouraged.

In Samburu District the level of community participation has been low in planning, construction, managing and maintaining facilities. More self-help groups should be promoted to enhance participation of the people in improving their own welfare. A growing responsibility for the operation and maintenance of facilities through collective efforts for the benefit of Samburu people should be very strongly advocated and the local leaders should be properly educated to steer the community towards this goal.

There is great potential for increasing the water resources by constructing dams to harness the sub-surface run-off in the many existing dry riverbeds which carry large amount of water during the rainy periods.

Samburu District has in the past been drastically deforested due to devastation from fires and drought. A re-afforestation programme parallel to other soil conservation programmes should be initiated, including primary and secondary schools, training institutions, private organizations and Harambee groups. There is currently a total ban on exploitation of the remaining forest.

In terms of wildlife research, conservation and exploration the expansion of game reserves should be continued while simultaneously exploiting available potential for roads and airstrips. While conservation of wildlife is emphasized, the District should at the same time give priority to protecting people from the wildlife menace to their lives, crops, livestock and other property. Adequate and timely compensation should be devised where those who contribute directly or indirectly to wildlife development (e.g. group ranches, individual ranches) shall benefit from the tourism revenue.

There is also high potential for fishing on the Lake Turkana. The large dams constructed throughout the District are ideal for fish farming.

The District has abundant sunshine which should be exploited to provide solar power for lighting individual homes and institutions and pumping water from the boreholes for livestock and human consumption and maintaining electrical fences.

Potential exists for better utilisation of the existing secondary schools through adding streams, providing laboratories and equipment. Most of the primary schools have too few children which means that teachers and facilities are under utilized.

The existing market centres lack essential infrastructure like water, market stalls and public toilets. This situation is particularly evident in Baragoi, Wamba and Sukuta Marmar where the vendors spread their ware on the ground along the streets and under trees.

3.2.2 Problems Constraining Development

Constraints in the development of livestock have hitherto involved the lack of water in regions with sufficient grass and recurrence of droughts and animal diseases, and underdeveloped rural infrastructure leading to poor delivery of animal health care. The level of education, culture and traditions of the local people with resistance towards change is a further constraint. There is also the problem of the undeveloped livestock marketing system.

There are many cases of livestock destruction by wildlife. The best grazing areas happen to be in the gazetted forests which are out of bounds for the pastoralists. Erratic rainfall hinders exploitation of honey potential. Many Samburu people still regard bee-keeping as an inferior activity exclusively for the Dorobo. The Samburu, who need honey and its by-products for various purposes would rather obtain it in exchange for pastoral products.

Constraints in the development of food crops involve the following:

- destruction of crops by game
- lack of locally-available agricultural inputs (fertilizer, seeds, chemicals, machinery)
- lack of loan security in the form of title deeds to individual farmers because the land is communally owned
- pastoralist traditions - thus the local people are not used to growing crops.

Most of the surface water dams and pans scattered throughout the District dry up due to drought and soil erosion. The District has very low underground water potential due to poor natural recharge and the occurrence of the basement rock formation. (The true situation is not as negative as described. The investigations by WRAP indicate that groundwater is a feasible option, although borehole yields in the Basement area are generally low). The District has no important rivers. The nomadic movements of the population make it difficult to optimally site wells and boreholes.

The gazetted forests which form the main game-habitat are also used for drought period grazing of livestock. The urbanization process and the frequent migration of livestock has interfered with any proper game conservation management. The District has more wildlife outside the National Reserve than inside.

The area with fish potential on the Samburu side of Lake Turkana is presently inaccessible due to lack of roads. The area is also far removed from any trading centre.

Exploitation of solar energy is a relatively new idea which has just been introduced in the District. Although economical in the long run, solar energy is expensive to install initially.

The parents have not participated effectively in provision of educational facilities. As a result, most of the primary and secondary schools lack essential classrooms, workshops, science laboratories and dormitories.

3.2.3 DDC Decision on Development Priorities

To exploit the identified potential in livestock development the following priority measures will be pursued:

- introduce better methods for utilizing range land. The District's grazing land is semi-arid and is in a very fragile environment. Its improper use could easily degrade it and reduce the livestock potential. Investment in disease control and marketing facilities and the proper administration of the marketing system are needed
- introduce dairy cattle in appropriate areas such as parts of Lorroki Division which are presently underutilized
- introduce more and better breeds of camels
- introduce quality bulls to upgrade the local zebu
- introduce modern beehives and construction of honey collecting centres in the honey potential areas.
- call upon the water sector to provide water for livestock at specific areas in order to minimize livestock movements and the destruction of environment
- compensate pastoralists adequately and in time for the livestock killed or destroyed by wildlife.

To exploit the idle land with agricultural potential requires intensified agricultural extension services, provision of adequate credit facilities, inputs (farm machinery, seeds, fertilizers, pesticide, storage facilities) and other necessary incentives to potential farmers. All these are presently not available in the District. Introduction of drought-resistant crops must be given high priority in the marginal zones. Since the Samburu people have shown a positive attitude towards eating food crops, it is necessary to encourage them to cultivate these crops to avoid importation from other Districts.

In developing water sources deliberate efforts will be made to site them within the main grazing areas in order to minimize livestock movement and reduce land degradation. The highest priority will be given to the construction of dams/pans in order to make full use of the Dam Construction Unit presently located in the District. Efforts will be made to equip and develop the boreholes successfully drilled by the Water Resources Assessment Programme (WRAP) all over the District. The existing water schemes in the Divisional Headquarters at Wamba, Baragoi and Sukuta Marmar will need to be rehabilitated and expanded to cope with the demand due to increased population.

The potential expansion of game reserves should be continued while simultaneously exploiting available potential for increasing the hotels and lodges and improving tourist roads and airstrips. Other arrangements should be devised where those who contribute directly or indirectly to wildlife conservation (group ranches, individual ranches,) shall benefit from the tourism revenue.

Arrangements will be made to open up the access road to the coast of Lake Turkana.

The Ministry of Energy will be asked to provide information on the possibility of introducing this alternative source of energy (solar) to selected institutions in the District. The Ministry of Tourism and Wildlife should explore the possibility of erecting electric fences using solar energy to keep game off the farming areas.

High priority will be given to improving the quality of education in the District by increasing the number of standard 8 classrooms, workshops and laboratories in order

to complete the 8:4:4 educational requirement. Campaigns will be motivated to make parents aware and accept to share in the cost of providing these facilities. Parents will be urged to send their school-aged children to school, both male and female.
Due to the acute shortage of housing in Maralal, the Town Council should accelerate the rate of completion of the NHC rental scheme and embark on Phase II.

Other market centres, Wamba, Baragoi and Suguta Marmar need to be provided with market stalls, public toilets, slaughter slabs and adequate water supply. All the upcoming trading centres should have proper physical plans to avoid haphazard development.

In a District where land is still considered clan land, environmental conservation works have not really featured. More efforts will be made to identify all the areas requiring urgent soil conservation and reafforestation measures. Priority should be given to the protection of water dams by fencing and planting trees and grass around them.

(From: Samburu District Development Plan, 1989-1993, Ministry of Planning and National Development).

4. GROWTH SCENARIOS AND DATA PROJECTIONS

4.1 General

The activities necessary for the preparation of Part 1 of the District Water Development Study (DWDS) were coordinated through the District Water Engineer and the District Development Officer. They included the following:

- meeting with the District Executive Committee (DEC) to explain the objectives and intentions of the project;
- meeting with all government departments present in the district to obtain information about their short term development priorities and the influence on water needs;
- follow-up visits to the same government departments to obtain data necessary for water demand calculation;
- visits to government departments in Nairobi;
- field visits by the Planning Section of WRAP to collect data directly;
- analysis of relevant publications.

The data presented in this report was partly collected by WRAP and partly obtained from other sources. An important source of information is the District Development Plan (DDP), which contains basic data provided by each governmental district office.

WRAP has tried to achieve the best possible accuracy of data, but this could not always be fulfilled satisfactorily, because of insufficient quality or incompleteness of the source data. WRAP considers the presented data as the best possible estimate at this stage of the study.

The quality of the DWDP depends on the data on which the Plan is based. Accurate and realistic planning is only possible if reliable baseline data is available. In this respect the assistance from other ministries, local authorities, projects etc. is very valuable, but also necessary, because the DWDP cannot be prepared without it. WRAP therefore recommends that much attention is given by all government ministries to the collection and dissemination of up-to-date baseline data.

4.2 Consumption Rates

The calculation of water demand for the DWDP is made using the unit water consumption rates and related guidelines as specified by the 'Design Manual for Water Supply in Kenya', a publication by the MoWD (Appendix 2). The consumption rates include the water demand for population, livestock and commercial/institutional facilities. Unit rates for other users (e.g. wildlife or agriculture) are not specified, therefore these are dealt with separately in this study (see paragraph 5.2.4).

The rates:

- include about 20 % allowance for water losses through leakage and wastage
- represent consumption for which systems have to be designed, without applying peak factors

- are proposed as a guide and may be adjusted if different rates are found appropriate
- represent the consumption of the average consumer category; within a category there may be considerable variations.

Specific consumption rates are not available for Samburu District. In general the impression exists that actual consumption is somewhat lower than the 'Design Manual' consumption rates. WRAP has not tried to obtain specific rates for Samburu District because for planning purposes it was considered that the rates from the Design Manual are adequate. The resulting water demand is possibly higher than the currently existing demand, but this has to be used in the planning exercise, because:

- the comparison of water demand with the existing water resources needs to be done for the in the future expected water consumption, which must be based on generally accepted consumption rates

- the development of the water sources will be planned in phases, in which the total demand will gradually be met and only the last phase will attain the optimum and total supply coverage.

4.3 Estimation and Projection of Baseline Data

The execution of the water demand study can be summarized in 3 phases:

- determine present water demand
- determine methods for projection of future water demand
- determine future water demand

The main baseline data needed for the calculation of the water demand is on population, land potential (high/medium/low) of the rural areas, assessment of percentage distribution of high/medium/low class housing for the urban areas (including trading centres), type and number of livestock units, and commercial/institutional facilities.

The main source of up-to-date information is the DDP 1989-1993. Other reports dealing with planning in the District e.g from departments or projects, may also provide suitable information. For Samburu such reports were not available.
Publications providing specific data were:

- for population: Census 1979, CBS
- for land potential: Farm Management Handbook, MoA.
- for livestock: Livestock and Wildlife Data Summary, DRSRS Annual Reports, MoLD, Maralal
- others: Annual Reports of District Offices MoH, MoE, etc.

WRAP has tried to verify all the available data both in the field and in the offices of the various departments. This has been a major task, because rarely complete summaries are available, which cover the entire District. The main data are summarized in Appendix 2.

The projection of the future water demand has to be based on growth rates, which have to be applied in conjunction with the baseline data. For the short term such growth rates can be found in the DDP, which specifies the economic development until 1993. For the long term growth rates are not determined at district level, but these may be obtained from publications by the Ministry of Planning and National Development. However the information in these publications is not always directly applicable to the Samburu situation.

The projection of the water demand suffers from the poor availability and low accuracy of data and of growth rates:

- 1988 baseline data are in itself projections (e.g population estimate is based on 1979 census) or are not accurate (e.g livestock numbers are estimates, because a proper livestock census was not yet carried out in the district)

- growth rates have to be based on too few and often unreliable data available from the district and cannot be directly derived from rates used in other areas in the country, due to the different character of Samburu District.

Due to the shortage of accurate information it was decided to develop three scenarios as the basis for making the projections. Although this in itself does not address the problem of the low accuracy of data and uncertainty in projected growth rates, the creation of scenarios, and the resulting range of possible water demands, will provide a basis for a flexible approach to development planning.

The growth rates to be applied in each of the three scenarios were determined such:

- that scenario 2 conforms as much as possible to the adopted growth rates at the national or district level;
- that scenario 1 has growth rates higher than those of scenario 2 based on maximum foreseeable development potential and
- that scenario 3 has growth rates reflecting a realistic assessment of the limited development potential of the District, given current physical, social and institutional constraints.

The third scenario or bottom scenario represents the minimum growth which may occur in the District. It takes into consideration current assessment of possible limitations set by the physical environment. In the pastoral livestock economy of Samburu District development is determined by the potential of the rangelands. The information on this potential is therefore of the utmost importance for the planning of the water development in the District.

The Ministry of Livestock development is in the process of preparing the Range Management Handbook, which contains the necessary information on rangeland potential. WRAP has collaborated with the MoLD in the preparation of the reports and maps for Samburu District and a summary of the findings is included in Appendices 6 and 7.

As a first approach planning has to be undertaken on the basis of the growth rates for scenario 3, representing a base level of investment. This planning may also be seen as the first phase of development.

The next phase of development corresponds with scenario 2. With appropriate social, cultural and institutional changes, such growth rates as envisaged by the District in the DDP are achievable. Thus, investment planning should take into account the possibility of having to extent systems to cater for this level of demand in a 'second phase'.

Planning for a high growth scenario 1 is only realistic if supported by strong evidence that a high development potential will be realised. This is not likely in Samburu District at this stage, considering the limited land potential for livestock and the absence of concrete economic development proposals in other sectors. Therefore, although water demand has been calculated for scenario 1, it has not been used in the present study for comparison with the available water resources or for investment planning.

The water demand is calculated for each of the three scenarios and it is presented in chapter 5. The comparison of the compatibility between water demand and water resources is at this stage done only for scenario 2 and 3 (chapter 7). It is considered that these scenarios represent the first phases of development.

The adopted model for the implementation of the water demand study is presented in figure 4.1.

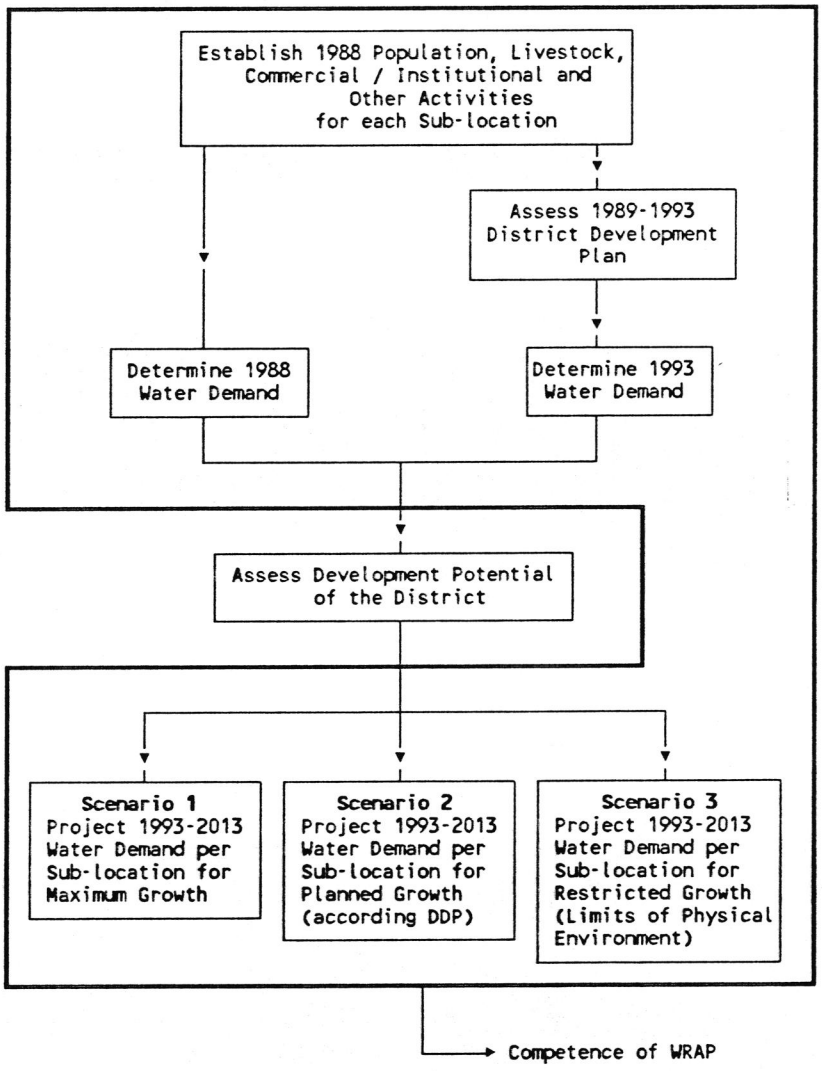


Figure 4.1 Model for Implementation of the Water Demand Study

The model indicates that the water demand needs to be determined per sub-location for the years 1988, 1993 and 1993-2013:

- The analysis of demand versus resources is carried out per geographical sub-area. It was decided for Samburu District to establish water demand as per the smallest administrative unit, the sub-location. The boundaries and names of the sub-locations used here represent the situation in September 1988 and were obtained from the Central Bureau of Statistics (unpublished data), which at the time had a team in the district preparing for the 1989 census.
  The district numbers 69 sub-locations (Plate 1) with an average area of 302 km^2. The smallest is Baragoi sub-location: 14 km^2; the largest is Serolipi sub-location: 1514 km^2.

- According to the Design Manual the water demand study should yield quantities of water required in the 'initial', in the 'future' and in the 'ultimate' year at the end of the design period. The initial year is defined as the year when the supply is expected to be taken into operation, the future year is 10 years later and the ultimate year is to be taken as 20 years from the initial year. Considering an earliest commissioning in 1993 of projects initiated by the presently prepared DWDP, then water demands are to be established for 1993, 2003 and 2013.

The model for the implementation of the water demand study includes three scenarios. The first two apply uniform growth rates, the third scenario projects development from the available potential.

The applied annual growth rates are summarised in table 4.1. The growth rates are discussed in the remainder of this paragraph.

Table 4.1 Annual Growth Rates 1988-2013

	Scenario 1	Scenario 2	Scenario 3
Applied Population Growth Rates			
Major Urban Areas 1)	5%	5%	2.5%
Minor Urban Areas	5%	1%	0%
Rural Areas	1%	0%	-1%
Resulting District Population Growth Rates			
1988 - 1993	2.5%	1.6%	-0.1%
1993 - 2013	3.0%	2.3%	0.2%
Applied Livestock Growth Rates	1.0%	0.5%	0%
Applied School Growth Rates 2)	8%	5%	2.5%
Applied Health (No. of Beds) Growth Rates	5%	5%	2.5%
Applied Commercial/Administr. Growth Rates	5%	5%	2.5%

Note: 1) Maralal, Suguta Marmar, Wamba, Baragoi
Scenario 3: Only Maralal and Suguta Marmar.
2) Maximum number of pupils not more than 36% of sub-location population.
3) Growth rate scenario 1 for 2003-2013 is reduced from 8% to 5%

4.4 Projection of Population Data

The DDP 1989/1993 uses a district population growth rate of 2% between 1988 and 1993. The expected growth rate beyond this period is not specified, and efforts to obtain an estimate from CBS were also not successful.

The growth rates of the rural and urban population are not specified in the DDP 1989/1993 and therefore these had to be estimated. The urban areas are divided in major and minor urban areas, of which the major urban areas generally have a higher growth rate.

The growth rates of urban and rural areas were estimated such that the resulting district population growth rate is about 2.5 - 3.0% for scenario 1, about 2% for scenario 2 and about 0% for scenario 3.

The adopted growth rates are summarized in table 4.1 for all three scenarios. The percentages reflect the variation in rates which may prevail in the district until 2013 (District population growth rates increase with time due to the increasing effect of the growth of the urban population). The district population growth results from the sum of the rural and urban population growth (eg. 5% annual urban growth and 1% annual rural growth applied to the 1988 Samburu urban and rural population is equal to 2.5% annual district population growth between 1988 and 1993).

The major urban areas are expected to continue growing at a rate between 2.5 to 5%. The minor urban centres (trading centres) will be affected by the rural development and growth rates are between 0% and 5%. Under scenario 3 it is assumed that only Maralal and Suguta Marmar maintain a positive growth rate of 2.5% because of a better potential for trade due to the possible tarmacking of the Rumuruti - Maralal road.

The rural population will not increase and may even continue to decrease and here growth rates between -1% and 1% are applied. The negative growth reflects that a person needs an increasing number of livestock for his livelihood and this means at constant livestock numbers under scenario 3 that part of the rural population will have to move to the trading centres or leave the district.

4.5 Projection of Livestock Numbers

The projection of livestock numbers in the future by using a straightforward percentage is for the purpose of capacity planning only. The livestock population in Samburu District depends mainly on the natural conditions and these cannot be predicted.

In a report for the Kenya Meat Commission (Union International Consultants, 1989) the number of livestock in the northern semi-arid areas of Kenya is assumed to increase on average with about 0.5% per year until the year 2000. In the estimate also the effects of drought years are included. It was assumed that a similar growth rate can be applied to the livestock numbers in Samburu District, in the case of scenario 2. For scenario 1 a growth rate of 1.0% is used and would imply adoption of more intensive livestock management practices.

The development of the livestock in Samburu depends on the availability of water, but most probably even more on the availability of pasture. The rangelands in Samburu can only support a limited number of animals, as indicated by the studies for the Rangemanagement Handbook (see paragraph 3.1.4).

As a first approach for scenario 3 it is assumed that livestock numbers do not increase from the numbers present in 1988, because of the poor to fair condition of the major part of the rangeland. Therefore livestock growth rate under scenario 3 is 0%.

The ratio of livestock numbers to rural population has decreased from about 5 in the 1960s to about 4 at present. This indicates that it has been increasingly difficult for the rural population to maintain their living standards. The size of the rural population has not changed much since the 1960's and it may be assumed that the present ratio of 4 livestock units is the minimum necessary for survival.

It was proposed to use the ratio between livestock numbers and rural population to obtain an estimate of livestock numbers. However the relationship between rural population and livestock numbers is dwindling and therefore not clear. The reason is that increasing numbers of livestock are owned by a few rich people who often live in the towns, while the number of rural people with small numbers of animals decreases. Especially during droughts many rural people lose cattle through deaths and are only left with the smaller animals (goats). The experience in other districts (Narok, Kajiado) is that the ratio of livestock versus rural population remains stable, but that the increase in living standards is obtained from other activities, e.g agriculture.

4.6 Projection of Commercial/Institutional Facilities

The projection of the number of institutional and commercial facilities was made by applying a uniform growth rate. The number of pupils of schools was limited to a maximum of 36% of the sub-location population. The projections are described in paragraph 5.2.3.

4.7 Constraints of Scenarios

The assumptions made in the implementation of scenarios 1, 2 and 3 simplify the actual conditions. Therefore when using the results of the demand calculations the following constraints must be realised:

1. The applied population growth rates cannot be related to past population growth, due to the inaccuracies of the census of 1969 and 1979.
2. Growth rates for rural areas have been applied uniformly, without taking into account that the land potential in each Division is different.
3. Growth rates for urban areas have been applied uniformly, without taking into account that these depend on potential of served rural area, quality of infrastructure etc.
4. Growth rates have been assumed constant between 1988 and 2013, although the economic development of the district will not be constant during this period.
5. Growth rates have been assumed to remain constant, and do not therefore show the effect of natural influences e.g recurrent droughts.

6. The projection of the population is calculated from the 1988 estimate which was adopted from the DDP 1989-1993. The household count by CBS in 1988 although not accurate, indicated that this estimate may be too high. Therefore actual population may be lower than what was used in the water demand calculation. In that case the water demand is overestimated, but when planning for water supply it means that the actual demand will surely be covered.
7. It should be realised that the livestock numbers adopted for the plan period, are for purpose of water demand calculation only. Actual livestock numbers can be very different, depending on the natural conditions prevailing during this period.

A DWDP for a rangelands area like Samburu must consider the potential of such an area for livestock development but must also consider the liability of such an area to overgrazing. Especially in periods of droughts a continued availability of water may bring about rangelands damage, which may take a long period to recover. The opinion of the rangelands experts from the MoLD should therefore have a large influence on the contents of the DWDP in rangelands areas.

4.8 Processing of Water Demand Calculations

The 'Design Manual for Water Supply in Kenya' specifies the unit water consumption rates (Appendix 2). The rates are applied whenever a water supply is designed by the MoWD. The same rates are used to calculate the water demand for the District Water Development Plan (paragraph 4.2).

The data required for the calculation of the water demand is described in chapter 5. The processing of data was done by the Documentation Section of the WRAP at Nairobi. The data are entered and processed using a Database Management System programmed in DBase IV on a micro-computer.

The system works with clear menu's on the computer screen and data can be viewed on the screen or printed. The processing yields District Water Demand summaries for the start year (1988) and for the initial (1993), future (2003) and ultimate (2013) year. The summaries show per sub-location the water demand for each category of water user.

The Database Management System was specially developed by WRAP. The features of the Database program for the development planning are:

1. Separate databases for each district in Kenya
2. Data entry, with an automatic check on correctness of some of the data
3. Data editing, to change any data in the data base
4. Screen display, to view the data entry and the demand calculations on the screen
5. Data print, with lay-out suitable for reports
6. Upto three scenarios for water development planning can be calculated
7 Calculation of water demand using unit water consumption rates
8. Summary of sub-location water demand in tables
9. Entry of growth rates (percentages) for each category of water user for projection during plan period.
10. Projection of water demand to respectively 5,15 and 25 years from start year
11. Free choice of start year when initializing a new district data base
12. Passwords to protect database from unauthorized users

13. Possibility to add new sub-locations, locations or divisions to a district.
14. Possibility to add Provinces or Districts

For more information on the Database Management System, reference is made to the System manual (in preparation).

The Samburu District data is stored in separate databases for each Development Plan period (1988, 1993, 2003, and 2013). The updating of the data is easy and recalculation of the water demand can be carried out at any time. This enables to update the water demand estimates whenever new data is received.

Population Demand

The domestic water demand is determined by taking into account:

1. The number of individual connections versus communal connections, which depends on:
2. for urban areas: the class of housing,
3. for rural areas: the land potential.

According to the Design Manual the distribution between individual connections and communal should be assumed to be as shown in table 4.2.

Table 4.2 Service Type (Percentage Connections)

Class Housing	% Individual Conn.			% Non-individual conn.		
	Initial	Future	Ultimate	Initial	Future	Ultimate
Urban Areas:						
High and Medium	100	100	100	0	0	0
Low Class	10	30	50	90	70	50
Rural Areas:						
High Potential	20	40	80	80	60	20
Medium Potential	10	20	40	90	80	60
Low Potential	5	10	20	95	90	80

No data are yet available on the class of housing. Therefore assumptions had to be made for the few urban areas in Samburu:

Maralal : 6% high, 38% medium, 56% low class housing
Suguta Marmar : 100% low
Wamba : 100% low
Baragoi : 11% medium, 89% low
South Horr : 10% medium, 90% low

All other areas in Samburu are considered to be rural.

The distribution of the population according to the land potential is not known. As a first approach it has therefore been assumed that the population is distributed evenly over the areas with different land potential. Thus the same percentages apply for population in the rural areas.

The conditions of housing classes and land potential which currently prevail are

assumed to remain constant in the near future. They are also assumed to be similar for all three scenarios. This must be considered as a simplified first approach. If more information becomes available than more accurate implementation of these conditions may be expected.

Livestock Demand

The water demand from livestock which remains in the dry season may be considered as a constant year round demand. The demand from the animals during the wet season is an additional demand, which exists only during this period. This must be taken into account when planning for water supplies, because no water should be available to supply livestock outside the recommended grazing period.

The potential number of livestock was determined from the recommended stocking rates provided in the Rangemanagement Handbook. These rates represent the potential maximum number of animals, which are permitted only during the grazing period. Outside the grazing period no animals are allowed, because this will have a detrimental effect on the rangeland. However there is no indication where the animals should go and actually it can be expected that many will stay in the area and look for pasture. In fact some areas do have a capacity for grazing in the dry season, but for limited numbers only.

Appendix 8 presents the stocking densities recommended in the Rangemanagement Handbook and also describes the methodology which was followed to determine the numbers of livestock in the dry and in the wet season for which water supply need to be provided.

The determination of the number of required water supplies for livestock in each sub-location was based on the water demand for the potential number of livestock or the actual (1988 estimate) number of livestock, whichever was the lowest. This ensures that water supply development is based on the lowest livestock numbers and cannot cause an increase in livestock numbers, which may cause more damage to the vulnerable rangelands of Samburu District.

The water consumption rate for livestock is specified in the Design Manual at 50 l/LU/day. A LU (Livestock Unit) is equal to 3 indigenous cows or 15 sheep or goats, and corresponds with 450 kg animal body weight. The MoLD uses a different unit (TLU = Tropical Livestock Unit) which corresponds with 250 kg animal body weight, see table 5.3. The water consumption rate for the 250 kg TLU should be about 30 l/TLU/day, because the water requirement is lower for this smaller Livestock Unit.

The above rates are nominal figures, which do not take into account seasonal variations or local conditions. The water intake by the animals during dry, hot periods will be higher than during the wet, cool periods. Also the moisture content of the forage influences the water intake by the animals. The water intake in the lowlands will be higher than in the cooler highlands (e.g Lorroki). Therefore ideally a different water consumption rate must be applied for the different seasons for each sub-location or even part of a sub-location. For simplicity reasons this has not been done.

The rate of 50 l/LU/day covers the water demand during dry and warm conditions. The calculated livestock water demand in cooler areas is therefore an overestimate. This must be taken into account when analyzing the water demand in the "cooler" sub-locations (e.g at Lorroki).

5. WATER DEMAND

5.1 General

The District Water Development Plan will be based on the water demand as presented in this report and covers the planning period 1993-2013. The water demand during this period is determined by projecting the estimate of the present (1988) water demand, according three different scenarios.

The water demand is calculated according the procedures as described in the 'Design Manual for Water Supply in Kenya' of the MoWD. The unit water consumption rates applied are presented in Appendix 2.

The demand of all potential water users in each sub-location of the district was calculated and is summarized in Appendix 3 together with the basic data used. A summary of the calculated demand is presented in paragraph 5.3.

The available baseline data on population, livestock, institutional and commercial facilities etc., are described in paragraph 5.2. Also included in this paragraph are the population projections according the three scenarios and the percentages applied for the projection of the other baseline data. The methodology of estimating and projecting the baseline data was already described in chapter 4.

5.2 Baseline Data

5.2.1 Population

The available population data of Samburu District are:

- Census 1969
- Census 1979
- Household count 1988 (unpublished data)

According to the 1979 population census, the population of Samburu District was 76,908 persons. According to the Samburu District Development Plan 1984-1988, this population figure may be an under-estimate partly due to the nomadic way of life of the Samburu people and partly due to the insecurity situation that existed during this period.

The household count 1988 was made by the Central Bureau of Statistics in preparation for the 1989 Census. The count however is not reliable, because the counting was not carried out accurately as it was only to determine the enumeration areas.

The District Development Plan 1989-1993 estimates the 1988 population at 98,291, which is obtained by projecting the 1979 census population with an estimated growth rate of 2.76% per annum. The DDP suggests a growth rate of 2% per annum for the period 1989-1993.

The 1989 census results will not come in time to be incorporated in the present DWDP and therefore the population of 1988 has to be estimated by projecting the 1979 census data. WRAP has adopted for the present DWDP, the same population estimate as used in the DDP 1989/1993, mainly to stay in line with the planning by the District.

Table 5.1 Population Data Samburu District

DIVISION	CENSUS 1969	CENSUS 1979	HOUSEHOLD COUNT 1988 1)	DDP 1989/1993 PROJECTION 1988
Lorroki	29385	34754	31400	50712
Wamba	19982 2)	18764 2)	16405 2)	17720
Baragoi	19702	23391	19400	25002
Waso	-	-	-	4857
Total	69519	76909	67205	98291

Note: 1) Estimate based on 5 persons/household.
2) Population of Waso Division included in Wamba Division.

For the water demand calculation estimates have to be obtained on the rural and urban population. The DDP 1989/1993 provides an estimate of the 1988 population of the four urban centres (Maralal, Suguta Marmar, Wamba and Baragoi). The population in smaller trading centres is considered part of the rural population. The DDP does not specify the 1988 population of the sub-locations. Therefore WRAP had to estimate the 1988 population of all the sub-locations (Appendix 2).

A summary of the 1988 population estimates of divisions and of urban and rural areas and of the 1993-2013 population projections is presented in table 5.2 for scenario 1,2 and 3.

The estimate of the 1988 population of the four urban centres (Maralal, Suguta Marmar, Wamba and Baragoi) given in the DDP 1989/1993, is based on recent observed growth trends. The centres have grown considerably since 1979 (Suguta Marmar 25%, Wamba 12%, Maralal 9%) due to a high influx caused by the 1984 drought. For the demand calculation it is considered that part of the urban population of the four main centres is actually rural, because these urban sub-locations also contain rural area. Therefore the 1988 estimate of urban population indicated for the main centres in table 5.2 is lower than what is used in the DDP 1989/1993. The difference is added to the rural divisional population. The same reduction of urban population was done for 1979, but only for Maralal.

The 1988 population in the other small trading centres was estimated by assuming an annual growth rate of 2.5% since 1979. The rural population living outside the trading centres in each division was estimated using a growth rate of 0.65% in Lorroki Division and 0.3% in Baragoi, Waso and Wamba Division. The growth rates of the rural population were determined such that the total district population conforms with the 1988 population estimate used in the DDP 1989/1993. The higher growth rate in Lorroki Division reflects the better land potential in this Division compared to the other Divisions.

The above described projection results in an estimate of the total population in each Division, which is different from the estimate used in the DDP. The DDP assumes that the percentage of the total population in each division remains constant. But this is not

Table 5.2 Population Estimates and Projections

SAMBURU DISTRICT	CENSUS 1979	%	DISTR. DEV. PLAN ESTIMATE 1988	%	SCENARIO 1 PROJECTION 1993	%	2013	%	SCENARIO 2 PROJECTION 1993	%	2013	%	SCENARIO 3 PROJECTION 1993	%	2013	%
Lorroki Division	34753	45.2	50712	51.6	58403	52.5	112712	56.4	56429	53.0	99716	59.1	51997	53.1	61771	60.8
Wamba Division	14450	18.8	17720	18.0	19947	17.9	35079	17.5	19167	18.0	30098	17.8	17139	17.5	15088	14.9
Baragoi Division	23391	30.4	25002	25.4	27379	24.6	42347	21.2	26010	24.4	33463	19.8	24017	24.5	20533	20.2
Waso Division	4314	5.6	4857	4.9	5495	5.6	9871	10.0	4945	5.0	5346	5.4	4704	4.8	4163	4.2
DISTRICT TOTAL	76908	100.0	98291	100.0	111224	100.0	200008	100.0	106552	100.0	168622	100.0	97857	100.0	101555	100.0
Urban Areas																
Maralal	8000	10.4	18000	18.3	22973	20.7	60954	30.5	22973	21.6	60954	36.1	20365	20.8	33371	32.9
Suguta Marmar	483	0.6	2250	2.3	2872	2.6	7619	3.8	2872	2.7	7619	4.5	2546	2.6	4171	4.1
Wamba	2256	2.9	5095	5.2	6503	5.8	17253	8.6	6503	6.1	17253	10.2	5095	5.2	5095	5.0
Baragoi	2592	3.4	3365	3.4	4295	3.9	11395	5.7	4295	4.0	11395	6.8	3365	3.4	3365	3.3
Urban Total	13331	17.3	28710	29.2	36642	32.9	97222	48.6	36642	34.4	97222	57.7	31371	32.1	46002	45.3
Rural Areas																
Lorroki Division	24339	31.6	28049	28.5	29480	26.5	35971	18.0	28049	26.3	28049	16.6	26675	27.3	21817	21.5
Wamba Division	11457	14.9	11848	12.1	12453	11.2	15195	7.6	11848	11.1	11848	7.0	11268	11.5	9216	9.1
Baragoi Division	19580	25.5	20115	20.5	21141	19.0	25796	12.9	20115	18.9	20115	11.9	19129	19.5	15646	15.4
Waso Division	3043	4.0	3126	3.2	3286	3.0	4009	2.0	3126	2.9	3126	1.9	2973	3.0	2432	2.4
Small TC's	5158	6.7	6442	8.4	8222	7.4	21815	10.9	6771	6.4	8261	4.9	6442	6.6	6442	6.3
Rural total	63577	82.7	69581	70.8	74581	67.1	102786	51.4	69909	65.6	71400	42.3	66486	67.9	55553	54.7

Notes:

1) Estimate of 1988 rural population based on 0.635% growth for Lorroki Division (excl. Maralal Location) and 0.3% for Wamba Division (excl. Wamba Location) Waso Division and Baragoi Division. Estimate of 1988 population of small Trading Centres is based on 2.5% growth rate.

2) Small TC's include (1979 census population between brackets):
   Baragoi Division: South Horr (668), Tum (200), Lesirikan (215), Marti (136)
   Lorroki Division: Amaiya (140), Loosuk (303), Poro (386), Opiroi (340), Barsaloi (381) Kirimun (190), Kisima (154), Lodokejek (37)
   Wamba Division: Ngilai (212), Lodungokwe (410)
   Waso Division: Serolevi (368), Archer's Post (807), Ongiron (211)

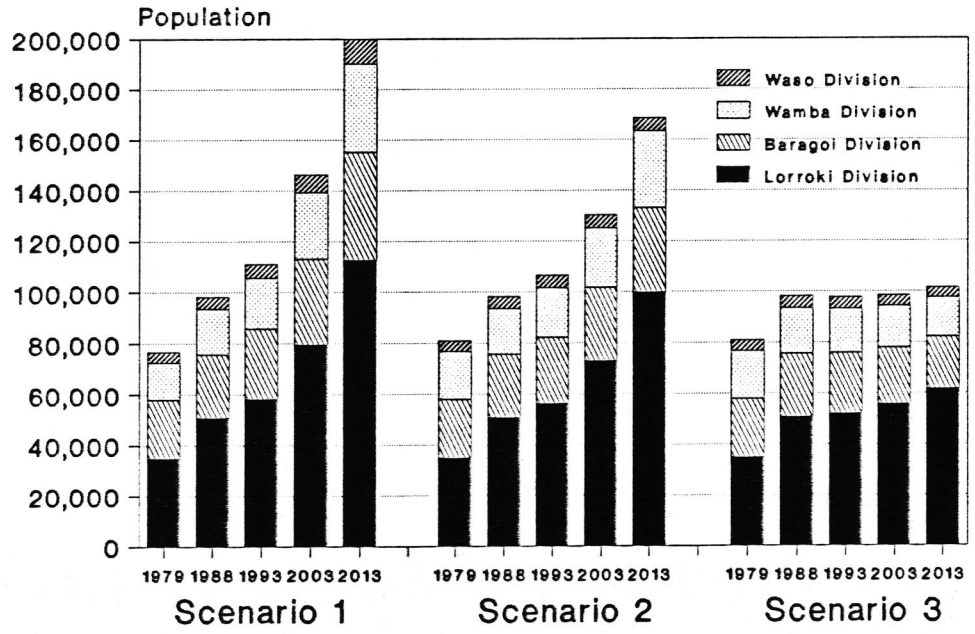


Figure 5.1 Population Projections Samburu District

realistic because the population growth rates depend on the development potential, which is different in each Division.

The population of the sub-locations was determined by subdividing the divisional population according to the ratios obtained from the 1979 census. Because the number of sub-locations has increased since 1979 new estimates had to be made for those sub-locations which had changed or which were established new. This was carried out by using the population distribution as obtained from the household count.

5.2.2 Livestock

Estimates of the livestock population in the district are available from two sources (Table 5.3):

1. From census carried out annually by the MoLD in the District

2. From the "Livestock and Wildlife Data Summary 1987-1988 for Kenya Rangelands" by DRSRS (1989)

Estimates of the livestock population in each sub-location were obtained from both sources (Appendix 8). These estimates were compared with the maximum number of livestock, which may be permitted under the current rangeland conditions to determine the livestock number in each sub-location for which water supplies need to be planned (for donkeys the DRSRS estimate was used, without applying a reduction for rangeland condition). The methodology used is explained in detail in paragraph 4.8 and in Appendix 8.

Table 5.3 Livestock Numbers in Samburu District

CENSUS - 1977

	CATTLE	GOATS & SHEEP	CAMELS	DONKEYS	TOTAL	TLU
DISTRICT	241120	435120	11715	10026	697981	271371

CENSUS - 1983 (Before drought)

DIVISION	CATTLE	GOATS	SHEEP	CAMELS	DONKEYS	TOTAL	TLU
Baragoi	35795	48070	18779	6863	2444	111951	47672
Lorroki	54171	46111	49749	749	1455	152235	57673
Wamba	68708	83286	41014	3670	4328	201006	79236
District	158674	177467	109542	11282	8227	465192	184581

CENSUS - 1985 (Post drought)

DIVISION	CATTLE	GOATS	SHEEP	CAMELS	DONKEYS	TOTAL	TLU
Baragoi	34684	66641	19815	5074	2382	128596	47025
Lorroki	40105	45322	63524	1260	1818	152029	49020
Wamba	22670	37614	12795	1719	1975	76773	28475
District	97459	149577	96134	8053	6175	357398	124520

DRSRS COUNT - 1987

DIVISION	CATTLE	GOATS	SHEEP	CAMELS	DONKEYS	TOTAL	TLU
Baragoi	41025	164816	49232	9000	2000	266073	72420
Lorroki	41400	45424	62728	475	775	150802	47986
Wamba	63900	129976	43320	3500	2900	243596	79899
District	146325	340216	155280	12975	5675	660471	200305

ESTIMATE - 1988

DIVISION	CATTLE	GOATS	SHEEP	CAMELS	DONKEYS	TOTAL	TLU
Baragoi	63926	148550	54468	9506	4509	280959	92435
Lorroki	73137	84256	118092	3383	2347	281215	90210
Wamba	33542	75280	31180	3382	3497	146881	47697
District	170605	308086	203740	16271	10353	709055	230341

Notes: 1) Tropical Livestock Unit (TLU) as used by MoLD
1 TLU = 1.25 CATTLE = 8 GOATS = 8 SHEEP = 0.833 CAMELS = 1 DONKEY
2) Number of donkeys in 1977 assumed to be equal to number in 1978
3) Waso Division included in Wamba Division

The projection of the livestock numbers during the 20 year plan period, was done only for those sub-locations where the current rangeland conditions allow development of water supplies. The method used for projection is described in paragraph 4.5.

Table 5.4 Projection of Livestock Numbers

Livestock Numbers (TLU)	1988	Scenario 1 Projection		Scenario 2 Projection		Scenario 3 Projection	
		1993	2003	1993	2003	1993	2003
District Total	54,808	57,605	63,632	56,193	59,067	54,808	54,808
Division: Baragoi	10,295	10,820	11,952	10,555	11,095	10,295	10,295
Lorroki	36,557	38,422	42,442	37,480	39,397	36,557	36,557
Wamba	2,138	2,247	2,482	2,192	2,304	2,138	2,138
Waso	5,819	6,116	6,756	5,966	6,271	5,819	5,819

5.2.3 Institutional/Commercial Facilities

The information on institutional facilities (schools, hospitals, health centres, dispensaries, administrative offices) and commercial facilities (hotels, shops, bars) is mainly obtained from the concerned governmental departments. Part of the information is published in the DDP, but visits to the departments are necessary to verify and augment the data.

The projection of the number of the institutional/commercial facilities is made by either assuming a constant relation with population numbers or by applying a uniform growth rate. It is described per facility in this paragraph.

The 1988 data on the institutional/commercial facilities is summarized in Appendix 2. The locations of schools and health facilities are presented on Plate 1.

Schools

In 1988 there were 76 primary (14503 students) and 4 secondary schools (678 students) in the district. Of these 19 were boarding and 57 day schools. All day schools were assumed to be without WC.

Not all children of school-going age attend school. The Samburu parents are not convinced of the necessity of school education, especially for girls. The number of students is only rising slowly. The annual growth rate for the last 5 years was: primary schools 5.4%, secondary schools 0.8%.

The DDP does not provide an estimate of the future number of pupils. The growth rate of the number of pupils therefore had to be estimated. Percentages of 8%, 5% and 2.5% were assumed for resp. scenario 1,2 and 3. These percentages are higher than the population growth rates, so it was necessary to introduce a limit. This was determined at 36% of the population in each sub-location, which percentage was derived from the population age structure (the percentage of population of school going age (5-17 years) for the years 1988-1993 is about 36%). In those sub-locations (4) where in 1988 the number of students was already more than 36%, a higher limit was used. In these sub-locations probably many students come from neighbouring sub-locations. With respect to day schools and boarding schools, equal growth was assumed for both.

Some new schools were included in 1993. As the number of students is not known, it was assumed that day schools will have 100 students and boarding schools 240 students.

Health

According to the DDP 1989/1993 there are 21 health facilities in operation in Samburu District. These include 2 hospitals (Maralal and Wamba), 2 health centres (Baragoi and Wamba) and 17 dispensaries. New planned facilities are a health centre at Lodungokwe and 3 dispensaries at Poro, Opiroi and Latakweny.

The increase in number of beds and outpatients is not specified by the DDP. It was therefore assumed for the water demand calculation that both will grow for each of the 3 scenarios with the same annual growth percentage as the urban population.

Other Facilities

Information on number of shops, bars and hotels was obtained from the office of the County Council. The projection of these numbers into the future was done, by using the same growth rate as applied for the urban population.

Industries

There are 3 industrial establishments located at Maralal. Their water requirements are unknown and therefore the standard rate was applied.

Future industries are not specified in the DDP 1989/1993. Therefore it was not possible to project the future industrial demand. Temporarily the industrial demand is assumed to be covered by the projection for the domestic demand. In case more specific plans for industrial development become available, then industrial water demand may be projected separately.

5.2.4 Wildlife and Agriculture

The water demand for wildlife and agriculture is normally not included in the rates as used by the MoWD. Nevertheless the use of water for both purposes needs to be included in a DWDP.

The provision of water for wildlife must be planned for in cooperation with the Ministry of Tourism and Wildlife, to ensure an optimal coverage of the wildlife water demand. Counts of wildlife numbers may be obtained from the DRSRS (1989). The provision of water for wildlife was not included in this study, but it is strongly advised to incorporate wildlife demand for water in the final DWDP. Separate feasibility studies may have to be carried out to investigate the options for water supply to wildlife.

Agricultural demand for water is normally dealt with in separate agricultural studies. The water demand for irrigation will not be calculated in this DWDS. However, the DWDS will indicate the potential for irrigation, if water resources in a sub-location are sufficient. This is described in chapter 7 of this report.

5.3 Water Demand Figures

5.3.1 Overview

The results of the water demand calculations are presented in detail in the appendices:

- Appendix 3 contains the data entry sheets and the 1988 demand sheets for each sublocation in the District
- Appendix 4 contains summaries per Division of the calculated water demand of all sub-locations for the year 1988 and for scenario 1,2 and 3 of the years 1993, 2003 and 2013,

and in summary tables in this paragraph:

- table 5.5 and figure 5.2 present total water demand, both for domestic and non-domestic use

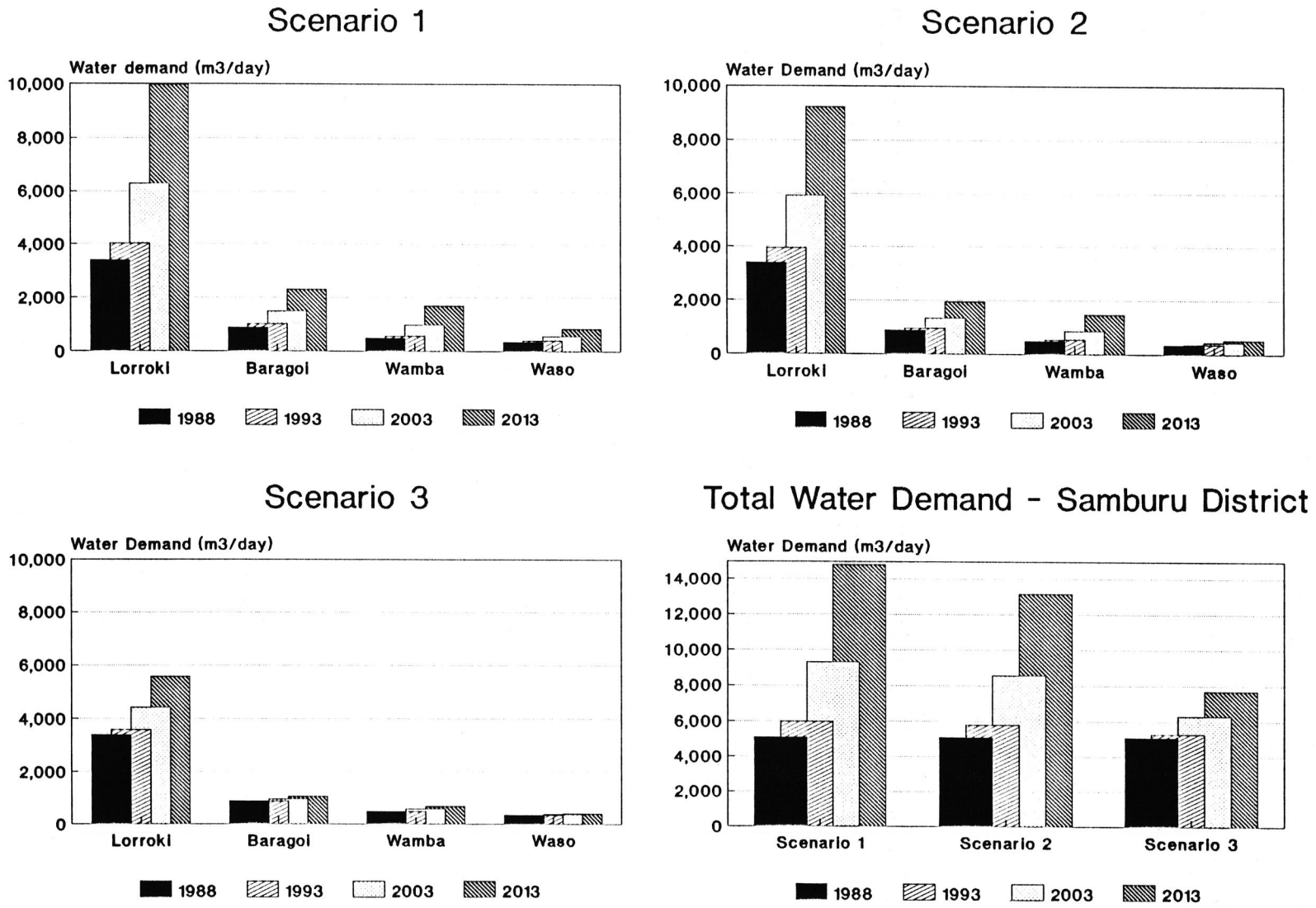


Fig. 5.2 Projected Total Water Demand Samburu District

Table 5.5 Projected Water Demand (m^3/day) in Samburu District

Year		Scenario 1			Scenario 2			Scenario 3		
		Total Water Demand	Total Domestic	Total Non-Domestic	Total Water Demand	Total Domestic	Total Non-Domestic	Total Water Demand	Total Domestic	Total Non-Domestic
1988	Baragoi Division	878	600	278	878	600	278	878	600	278
	Lorroki Division	3396	2536	860	3396	2536	860	3396	2536	860
	Wamba Division	470	403	67	470	403	67	470	403	67
	Waso Division	343	169	174	343	169	174	343	169	174
	Samburu Total	5087	3708	1379	5087	3708	1379	5087	3708	1379
1993	Baragoi Division	1004	711	293	959	674	285	878	600	278
	Lorroki Division	4036	3132	904	3933	3051	882	3599	2739	860
	Wamba Division	554	484	70	530	462	68	473	406	67
	Waso Division	388	206	182	360	182	178	342	168	174
	Samburu Total	5982	4533	1449	5782	4369	1413	5292	3913	1379
2003	Baragoi Division	1497	1174	323	1325	1025	300	953	675	278
	Lorroki Division	6280	5282	998	5920	4993	927	4419	3559	860
	Wamba Division	965	888	77	863	791	72	572	505	67
	Waso Division	557	356	201	433	246	187	367	193	174
	Samburu Total	9299	7700	1599	8541	7055	1486	6311	4932	1379
2013	Baragoi Division	2304	1947	357	1940	1625	315	1051	773	278
	Lorroki Division	9990	8887	1103	9223	8249	974	5572	4712	860
	Wamba Division	1687	1601	86	1465	1389	76	679	612	67
	Waso Division	838	615	223	527	330	197	396	222	174
	Samburu Total	14819	13050	1769	13155	11593	1562	7698	6319	1379
		% Increase Since 1988								
1993	Baragoi Division	14	19	5	9	12	3	0	0	0
	Lorroki Division	19	24	5	16	20	3	6	8	0
	Wamba Division	18	20	4	13	15	1	1	1	0
	Waso Division	13	22	5	5	8	2	0	-1	0
	Samburu Total	18	22	5	14	18	2	4	6	0
2003	Baragoi Division	71	96	16	51	71	8	9	13	0
	Lorroki Division	85	108	16	74	97	8	30	40	0
	Wamba Division	105	120	15	84	96	7	22	25	0
	Waso Division	62	111	16	26	46	7	7	14	0
	Samburu Total	83	108	16	68	90	8	24	33	0
2013	Baragoi Division	162	225	28	121	171	13	20	29	0
	Lorroki Division	194	250	28	172	225	13	64	86	0
	Wamba Division	259	297	28	212	245	13	44	52	0
	Waso Division	144	264	28	54	95	13	15	31	0
	Samburu Total	191	252	28	159	213	13	51	70	0

- table 5.6 and 5.7 present the projected domestic water demand for scenario 2 per supply area and per sub-location type.

Paragraphs 5.3.2 and 5.3.3 discuss separately the calculated domestic demand and non-domestic demand. The domestic demand comprises all demand from population, schools, health and others (including industries, see paragraph 5.2.3). The non-domestic demand comprises demand from livestock only.

5.3.2 Domestic Water Demand

The projected domestic water demand for scenario 2 is presented in table 5.6 per supply area (these are discussed in Part 2): for urban areas, rural institutions, rural centres and rural areas. The largest domestic demand is found in the urban areas of the District. The 1988 demand at Maralal is actually 77% of the total urban demand and 47% of the total domestic demand.

Table 5.6 Projected Domestic Water Demand (m^3/day) per Supply Area

Scenario 2 ("middle growth")

	Area (km2)	1988 Domestic Water Demand	1993 Domestic Water Demand	2003 Domestic Water Demand	2013 Domestic Water Demand
Baragoi Division	7,022	600	675	1,021	1,625
Urban : Baragoi		157	201	398	758
Rural Institutions		97	120	180	285
Rural Centres		79	85	130	169
Rural Area		267	269	313	413
Lorroki Division	4,010	2,535	3,051	4,993	8,249
Urban : Maralal		1,730	2,201	3,819	6,589
Suguta M.		86	110	212	403
Rural Institutions		65	73	91	119
Rural Centres		135	146	243	312
Rural Area		519	521	628	826
Wamba Division	5,162	404	463	792	1,389
Urban : Wamba		199	252	535	1,064
Rural Institutions		26	29	33	40
Rural Centres		25	26	43	75
Rural Area		154	156	181	210
Waso Division	4,608	168	182	245	330
Urban : Archer's P.		61	69	98	137
Rural Institutions		37	39	45	65
Rural Centres		35	38	59	73
Rural Area		35	36	43	55
Samburu District	20,801	3,707	4,371	7,051	11,593
Urban Total		2,233	2,833	5,062	8,951
Rural Total		1,474	1,538	1,989	2,642

The 1988 rural demand is divided between 15% for the rural institutions, 19% for the rural centres and 66% for the rural areas. The daily demand in the rural areas is per 50 km^2 (area with walking distance less than 4 km):

- Lorroki Division: 6.5 m^3/50 km^2
- Baragoi Division: 1.9 m^3/50 km^2

- Wamba Division: 1.5 m^3/50 km^2
- Waso Division: 0.4 m^3/50 km^2

A simple water point with a handpump is expected to supply at least 5-10 m^3/day. Therefore if providing water points for everybody within 4 km distance, in three of the four divisions this would result in many water points to be underutilized. Only in Lorroki Division it will be possible to construct water points economically within the required distance for (most of) the population. In the other Divisions water points should preferably be constructed in areas where concentrations of rural population exist.

The distribution of the domestic water demand per sub-location type (see data entry sheets, appendix 3) is presented in table 5.7. Most sub-locations in Samburu District are rural.

The total domestic demand in many rural sub-locations is on average about 15-30 m^3/day. In some sparsely populated sub-locations demands are even lower. Therefore in many sub-locations 2-3 handpump supplies will suffice to cover the

Table 5.7 Projected Domestic Water Demand per Sub-Location Type

Scenario 2 ("middle growth")

	Area (km^2)	1988		1993		2003		2013	
		Number of Sub-Locat.	Water Demand (m^3/day)	Number of Sub-Locat.	Water Demand (m^3/day)	Number of Sub-Locat.	Water Demand (m^3/day)	Number of Sub-Locat.	Water Demand (m^3/day)
Baragoi Division	7,022	20	600	20	674	20	1,025	20	1,625
Type 1		15	210	15	217	15	258	15	326
Type 2		4	167	4	175	4	246	4	344
Type 3		1	223	1	282	-	-	-	-
Type 4		-	-	-	-	1	521	1	955
Lorroki Division	4,010	29	2,535	29	3,050	29	4,993	29	8,249
Type 1		17	310	17	319	17	388	17	497
Type 2		10	458	10	506	9	502	9	723
Type 3		-	-	-	-	1	261	-	-
Type 4		2	1768	2	2,225	2	3,841	3	7,029
Wamba Division	5,162	12	404	12	462	12	791	12	1,389
Type 1		9	130	9	136	9	157	9	192
Type 2		2	54	2	56	2	78	2	107
Type 3		-	-	-	-	-	-	-	-
Type 4		1	219	1	270	1	556	1	1,090
Waso Division	4,608	8	168	8	182	8	245	8	330
Type 1		5	21	5	21	5	24	5	30
Type 2		3	148	3	161	3	221	3	300
Type 3		-	-	-	-	-	-	-	-
Type 4		-	-	-	-	-	-	-	-
Samburu District	20,801	69	3,707	69	4,368	69	7,055	69	11,593
Total Type 1		46	671	46	693	46	827	46	1,045
Total Type 2		19	827	19	898	18	1,047	18	1,474
Total Type 3		1	223	1	282	1	261	-	-
Total Type 4		3	1,987	3	2,495	4	4,918	5	9,074

Note: Type 1 = Rural Sub-location
Type 2 = Sub-location with Market or Local Centre C2000 population
Type 3 = Sub-location with Rural Centre >2000 population
Type 4 = Sub-location with Urban Centre >5000 population

demand. However, when taking into account the distribution of the rural population, it may be necessary to plan for a larger number of supply points. This may be achieved by combining domestic supplies with supplies for livestock. This is further discussed in Part 3, Investment Packages.

The % increase of the domestic water demand from 1988 is presented in table 5.5. The total domestic demand rises for scenario 3, for scenario 2 and for scenario 1:

from 1988 to 1993: respectively by 6%, 18% and 22%
from 1988 to 2003: respectively by 33%, 90% and 108%,
from 1988 to 2013: respectively by 70% 213% and 252%.

The urban demand increases more than the rural demand, because of the assumed higher growth rates. Under scenario 2 the demand in the main urban areas more than doubles from 1988 to 2003. In the rural areas population growth rates are low, but the demand for water increases, mainly because of increased demand from institutions and commercial activities.

5.3.3 Non-Domestic Water Demand

The projected non-domestic = livestock water demand is presented in table 5.5 for the period 1988-2013 for each of the three scenarios. The livestock demand in each sub-location is presented for 1988 in table A8.4 (Appendix 8) and Appendix 4, and for 1993-2013 in Appendix 4 for each of the three scenarios.

The total livestock demand is lower than the total domestic demand. In many sub-locations the livestock demand is reduced or even zero due to the poor rangeland condition. A separate livestock water supply may not be necessary in such sub-locations, because the livestock demand will be supplied in combination with the domestic demand.

A significant livestock demand, bigger than the domestic demand exists in 30 of the 69 sub-locations. This is in those sub-locations where the current rangeland conditions allow water supply development. The livestock demand (excluding demand from donkeys) is presented in table 5.8 and is also shown on Figure A8.1.

Table 5.8 Livestock Water Demand

Division	Number 1) of Sub-Locations	1988 Water Demand (m^3/day)	Average Demand/ Sub-Loc. (m^3/day)	2003 Water Demand (m^3/day)	Average Demand/ Sub-Loc. (m^3/day)
Baragoi	15	277	18	298	20
Lorroki	17	846	50	911	54
Wamba	4	58	14	62	16
Waso	6	164	27	177	29
District	32	1345	42	1448	45

Notes: 1) Only sub-locations where rangeland conditions allow livestock water supply development
2) Demand from donkeys not included in sub-locations where demand from other livestock = 0

The water demand from livestock is biggest in Lorroki Division. The low average water demand in Wamba and Baragoi Division reflects the poor condition of the rangelands in these Divisions.

6. WATER RESOURCES

6.1 General

The WRAP water resources survey in Samburu was started in 1987. The first results were published in the Progress Report of the Water Resources Assessment Study in Samburu District (October 1988). The draft Final Report on the water resources of the Samburu District was ready in April 1990.

The objective of the water resources study is to provide the district with an assessment of the available surfacewater and groundwater resources. The study covers both aspects of quantity and quality of water resources.

Although the study aims to present a comprehensive picture of the water resources in the whole district, considering the urgent needs for water development in priority areas of the district, it concentrates its investigations in areas where development is most likely. So the water resources assessment exercise takes in account the exigencies of the District Water Development Plan to be elaborated.

The concentration of the investigations applies especially to the geophysical survey and the drilling. Thus in some areas, there is detailed information on the groundwater potential, in contrast to other areas, where only few information is available, because there was no drilling. Only after drilling is undertaken in such areas, more detailed information will be available. The groundwater potential is therefore not known to the same detail in all areas.

The potential of the surfacewater resources is known accurately at sites where a river gauging station (RGS) or a rainfall station is located. If such a station is not present, then estimates on the availability of surface water has been made, using data from the nearest hydrometeorlogical station(s).

Considering the above it has to be concluded that the water resources assessment study in Samburu District has yielded sufficient information to describe the availability of the surfacewater and groundwater resources. But in many areas in the District it has not been possible to provide accurate quantities of the total available water resources.

It may be expected that a better quantification of the water resources will be possible in the future, because of the increasing development of the water resources. Any increase of water use should provide data on the changes of e.g groundwater tables or riverflow. The study of the repercussions of such water use on the water resources will make it possible to project more accurately the potential of the water resources.

Summaries of the water resources data have been made for each sub-location to facilitate the analysis per unit area. The summaries also include a description of the water resources potential (Appendix 5).

The availability and suitability of groundwater and surface water resources in each sub-location is summarized indicatively in paragraph 6.3.

6.2 General Description of the Water Resources in Samburu

6.2.1 Groundwater Resources

The geology of Samburu consists of two major units: the Basement System and the Tertiary Volcanics. Groundwater is found in both units and in the shallow alluvial sediments on top of these units. The Basement System has a local aquifer system, which means that groundwater is found in significant quantities only in small areas within the unit. The Tertiary Volcanics form a regional aquifer system, which means that groundwater may be found in significant quantities over large areas within the unit. Borehole siting is therefore much more critical in the Basement rocks than in the volcanics.

Groundwater availability can be subdivided into five zones with respectively: (a) Medium-to-High, (b) Medium, (c) Low-to-Medium, (d) Low, and (e) Very Low. High potential areas such as defined in Baringo and Laikipia Districts do not occur in Samburu District.

The characteristics of the zones regarding the availability of groundwater are:

(a) Medium-to-High Groundwater Availability (Alluvial Sediments)

- groundwater occurs in significant quantities in sandy lagga sediments,
- groundwater quantities are relatively small, due to generally shallow depths and limited extent of the sediments
- groundwater availability is fluctuating, due to short periods of recharge and long periods of ground water depletion by evaporation or percolation.
- groundwater depths below the surface are generally only a few meters, whilst groundwater tables may remain near the surface if groundwater flow is obstructed by a barrier of shallow rocks across the lagga
- yields from dug wells in the sediments may vary from about 0.5-3 m^3/hr. Groups of dug wells may yield up to 100 m^3/day.
- groundwater quality in lagga sediments is usually good, but bacteriological contamination of the water is common in unprotected dug wells.

(b) Medium Groundwater Availability (Tertiary Volcanics of Leroghi and Marti Plateau)

- groundwater occurs generally over large areas, because aquifers are relatively continuous and hydraulically interconnected by fissures.
- groundwater quantities are relatively large, because of the continuity of the aquifers
- the depth of the aquifers is normally related to old land surfaces within the volcanic rocks, which form the water bearing horizons
- recharge potential is generally good due to a relatively high infiltration capacity at ground surface in the volcanic area.
- borehole yields vary from 0.7 to 12 m^3/hr, with an average of 4 m^3/hr.
- depth at which groundwater is struck varies between 26 and 170 m., rest water levels are generally deep (>100 m) but sometimes shallow (Sirata Oirobi)
- borehole depths are between 100-250 m.

- number of boreholes presently working for water supplies: 3
- groundwater quality in volcanic rocks is mildly saline (TDS 500 mg/l at Longewan) and soft; fluoride levels can be near the acceptable limit of 2 mg/l.

(c) Low-to-Medium Groundwater Availability (Basement System)

- groundwater occurs mainly in fractures and faults or in the weathered zones
- fractures and faults are normally of limited extent, therefore groundwater quantities are generally small
- the siting of boreholes is very critical, because it is important to hit a fracture or other structure, in order to attain the maximum yield
- for optimum recharge of the groundwater, borehole sites should be as near as possible to rivers or laggas
- borehole yields are generally less than 7 m^3/hr, with an average range of 1.4-2.5 m^3/hr
- depth at which groundwater is struck varies between 2.1 and 136 m, with an average range of 40-50 m.
- depth to water rest level is on average between 17-28 m, while about 15% of the boreholes have rest levels greater than 60 m.
- mean borehole depth is 84 m.
- number of boreholes presently working for water supplies: 12
- groundwater quality in Basement is generally mildly saline (TDS 500 mg/l in Amaiya, Wamba and the northern areas) to very saline (TDS 1400-2000 mg/l in Maralal, Kisima, Lodungokwe, Lerata and Serolipi) and hard to very hard (200-700 mg/l), fluoride levels often exceed the standard of 2 mg/l.

(d) Low Groundwater Availability (Tertiary Volcanics between Leroghi Plateau and Lake Turkana, the so called Western Strip)

- no boreholes were drilled in this area
- water struck levels are expected to be very deep
- rainfall is low, therefore recharge is also low
- area is very inaccessible, due to rugged topography
- it is highly questionable whether any groundwater development is justified in this zone.

(e) Very Low Groundwater Availability (Mountain Ranges, Inselbergs, Basalt Caps)

- no boreholes were drilled in this area
- most rocks are massif with poor water bearing properties
- no prospects for groundwater presence.

6.2.2 Surface Water Resources

Dams & Pans

About 40 dams and pans have been constructed in the past, but the effectiveness of a large number has decreased due to siltation. The Dam Construction Unit (DCU5) constructed and rehabilitated 27 dams and pans since 1980.

Table 6.1 List of Dams and Pans

Constructed or Rehabilitated by DCU5	Capacity (m^3)		Year of Construction	Remarks
	Constructed	Present [1]		
Mayai Dam	40,000	29,000	2 - 80	
Logorati Dam	22,000	27,000	4 - 80	
Maralal Prison Dam	48,000	48,000	4 - 81	
Naisunyai Dam	60,000	60,000	6 - 81	Silted, dam partly eroded
Serolevi Pan	16,000	16,350	8 - 81	Silted up
Mitumi Pan	15,000	18,500	11 - 81	Not adjusted to topography
Ngorok Pan	22,000	16,500	2 - 82	Catchment badly eroded. Capacity decreased
Lowarak Pan	12,000	4,500	3 - 82	Solar pump, troughs
Tipaku Pan	13,000	13,000	4 - 82	Inlet partly blocked
Ngilai Dam	8,000	9,000	6 - 82	
Baringiro Dam	28,000	-	9 - 82	
Ngumeni Dam	60,000	43,000	12 - 82	
Lamerok Dam	18,000	24,000	2 - 83	Mainly for livestock; little silt
Bartakwet Dam	70,000	39,000	2 - 84	No real inlet
Ngusita Pan	16,000	-	4 - 84	
Morijo Pan	5,000	4,000	4 - 84	
Malungoi Pan	4,500	4,000	5 - 84	
Bauwa Dam	24,000	30,000	6 - 84	
Sharda Dam	56,000	48,000	7 - 84	Never been full
Muramur Dam	68,000	28,000	9 - 84	Fairly silted; spillway broken
Kiangong Dam	18,000	24,000	8 - 85	Silted, inlet blocked, small catchment
Lesiteti Pan	4,800	5,500	9 - 85	
Namanyarobo Pan	4,000	2,800	10 - 85	Silted, small catchment, seepage
Dalambo Pan	4,000	7,800	12 - 85	Partly silted
Wamba Dam (Sorodo)	10,000	-	4 - 87	
Lbaelotepes Dam	6,000	1,900	6 - 87	Completely silted
Nundoto Maralal Dam	230,000	230,000	12 - 86	With draw-off tower, catchment reforested
Other Dams and Pans				
Lemisigiyo	150,000	-	-	Silted
Lerata Pan	800	-	-	
Lkesin Pan	400	-	-	
Loibor Ngare	6,000	-	-	
Lore Ngiro	29,000	-	-	
Lorok	12,000	-	-	
Lusen Gap	250	-	-	Desilted 1987
Nairimirimo	1,100	-	-	Inlet silted
Ngare Ngiro	27,000	-	-	
Silanga Nanyuki	4,100	-	-	Spillway broken, silted, seepage

Note: (1) Some present capacities are bigger than the constructed capacity. It is not known why.
(2) Constructed capacity from DCU5. Present capacity from Bake (1989)

The chemical status of these dams and pans is mainly satisfactory. However, the water has to be treated for human consumption due to high turbidity and organic pollution. Pollution is mainly from animals as they enter most of the surface water sources. Contamination by pesticides from the wheats farms in Lorroki Division has occurred in Nundoto Dam. A map with the location of all dams and pans is included in Part 2.

Springs

The major springs in Samburu exist in the Basement area, except for Amaiya spring. Spring flows vary during the year, and most springs cease to flow during dry periods. The largest spring in Samburu is at South Horr. The springs number 19 in total:

Nyiro Mounts: 3	Ndoto Mounts: 2	Mathews Range: 2
Karisia Hills: 4	Volcanic Plateau: 5	Other Areas: 3

Water from springs is generally fit for domestic use. Table 6.3 shows some chemical status of samples taken from springs.

Table 6.2 Flow Data of some Springs and Streams

Spring or Stream	Data Period	Mean Flow (m^3/day)	Min. Flow recorded (m^3/day)	96% Flow (m^3/day)
Amaiya	Oct 1987 - March 1989	7690	1200	1200
S. Horr	June 1973 - March 1989	2175	432	500
Kichich	Nov 1988 - June 1989	3000-5000	1728 2)	-
Bauwa	Oct 1970 - May 1989	-	0	-
Tuum	Oct 1987 - June 1988	200-400	43	-
Ewaso Ngiro at Archer's Post	1949 - 1985	1,800,000	8640	96,768

Note: 1) Flows are based on data from the relatively wet years 1987-1989 (Except Ewaso Ngiro)
2) Stream may be dry during prolonged dry periods

Table 6.3 Chemical Data of Springs

Name of Spring	pH	mg/l			Suitability for Domestic use
		TDS	F	Hardness	
Amaiya	7.9	400	1.4	7	Yes
Sukuta Marmar	7.3	480	-	8	Yes
Bauwa	7.5	355	-	188	No
Ngurunit	7.4	123	-	56	Yes
Barsaloi	8.1	351	-	234	Yes
Arsim	7.2	157	-	58	Yes
Tuum	6.9	210	0.2	110	Yes
South Horr	7.3	71	0.2	34	Yes
Kichich	7.2	44	-	18	Yes

Rivers

The only major perennial river is the Ewaso Ngiro, which originates in Laikipia district and which flows along the southern boundary of Samburu. Annual low flows have been decreasing in recent years, due to an increase of water use upstream. The lowest flows until present occurred in 1985 and 1986, when the river was dry upstream of Archer's Post (Table 6.2).

Other small perennial streams fed by springs are at South Horr, Tuum and Amaiya.

Laggas

Laggas flow intermittently during the year, usually only for very short periods. However flows can reach large volumes, due to high rainfall intensities and small storage capacities of the catchments.

Flow duration data of laggas have been collected at some locations (table 6.4). The data pertain to the period 11-1988 until 10-1989, therefore they do not indicate the average situation, but only cover the situation during one year.

Table 6.4 Flow Duration of Laggas and Springs

Lagga	% of Flow Days		% of Flow Days
Wamba at Game Camp	52	Kichich at road crossing	100
Seiya at Lodokojek	53	Bauwa near Primary School	100
Enkare Narok near Kisima	53	Tuum near Primary School	78
Baragoi at Pump House	15		
Seiya at Swari	57	Inflow Nundoto Dam	75
		Outflow Nundoto Dam	52

Water quality data are not available for lagga flow, but these are expected to have good chemical quality.

Lakes

A few areas in Samburu flood after rains and lakes are formed, which slowly dry again during dry periods. The most important lakes apart from Lake Turkana, are Lake Kisima and Loijok swamp.

The Lake Turkana water is highly saline and is not suitable for water supply, although livestock is reported to use this water in drought situations. Lake Kisima has slightly saline water, but it is considered by the Samburu to have a positive influence on the livestock health.

Rainfall

The rainfall in Samburu varies according to altitude and location. The southwestern plains and the Leroghi Plateau receive an annual rainfall of between 500-700 mm. The central basin area and the plains east of the Mathews range are the driest in the district with annual rainfall of between 200 - 500 mm.

Table 6.5 Low and High Monthly Rainfall Distribution

Region	Areas Included	Low Rainfall	High Rainfall
Northern Part	South Horr, Baragoi	June - September January- February	March - May October - December
Eastern	Serolevi	June - October	April, November
South-East	Archers Post Samburu Game Wamba	June - September January - February	March - May October - December
South-West	Maralal, Poro Suguta Marmar	December - February	April - July
South	Lodungokwe	June - September January - February	March - May October - December

The almost continuous mountain belt in the north and east which includes the Nyiro, Ndoto, and Mathews range receives the highest rainfall in Samburu 600-1000 mm p.a.

In most parts of Samburu district, rainfall occurs in two distinct seasons with two peaks in April (long rains) and November (short rains). The two periods contribute about 65-90% of the total annual rainfall except at stations where continental rains are significant.

The continental (middle) rains occur between June to August. These are significant in the southwest of Samburu District where they contribute to about 40% of the total annual rainfall.

The areas around Poro, Maralal and Suguta Marmar receive the highest proportion of rain during the continental rains. The eastern and southeastern areas around Wamba and Archers Post receive both the long and short rains in approximately equal proportions. In the northern parts of the district, the short rains contribute less than the long rains.

Table 6.6 Average Seasonal Rainfall Distribution Expressed as Percentage of Annual Average Rainfall

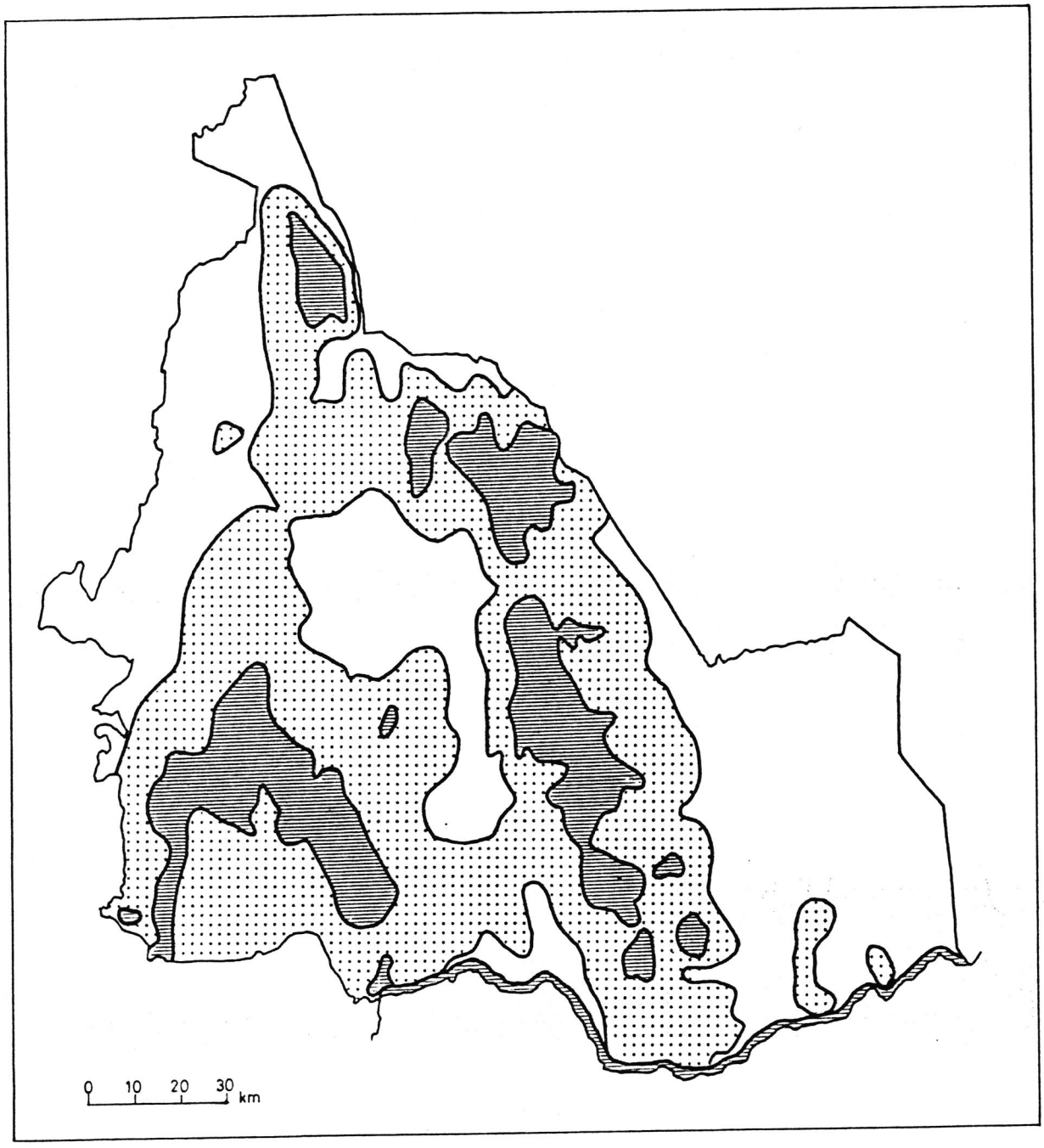
Station Name	Reg. No.	Annual Avg. (mm)	Long Rains (Mar-May)	Conti-nental Rains (Jun-Aug)	Short Rains (Oct-Dec)	Sum of Short & Long Rains
Poro Forest	88 36 03	551	27	41	19	46
Tangulbei	89 36 19	703	35	36	14	50
Sosian	89 36 60	435	48	26	23	70
Sukuta Marmar	89 36 74	627	24	40	23	47
Wamba D.O	89 37 18	714	45	3	44	89
Wamba Game	89 37 69	779	50	4	37	87
Archer's Post	89 37 35	350	45	3	45	90
Samburu Lodge	89 37 63	396	42	2	44	86
Lodungokwe	89 37 93	504	34	13	42	76
Nundoto dam	WD. 656	570	24	30	20	44
Baragoi D.O	88 36 01	532	42	13	31	73
Maralal D.O	88 36 00	605	30	40	19	49
South Horr Mission	87 36 00	443	46	4	35	81

Although annual rainfall is strongly correlated with altitude, the amount of rainfall is influenced by the local conditions. Thus Wamba at an altitude of 1,360 m receives more rainfall (750 mm average), than Maralal (600 mm average) at a higher altitude of 1,950 m. This difference is related to the rainfall distribution during the long, short, and continental rains.

6.2.3 Water Resources Availability

The surface water resources in Samburu District are very limited. Lake Turkana is by far the largest source of water in the District but it contains water of such a poor quality that it should only be used when all other supplies have dried up.

The mean annual flow of the Ewaso Ngiro at Archer's Post amounts to around 660 Mm^3 with a minimum of 163 Mm^3 in 1952 and a maximum of 2780 Mm^3 in 1962. It was perennial, but dried up in 1985 and 1986 in a reach of about 50 km upstream of Archer's Post due to increased abstractions in Laikipia District.



Medium Availability	-	Median annual rainfall over 600 mm, perennial rivers and springs with very low dry season flows. Dams can hold water for a relatively longer time in dry periods.
Low to Medium Availability	-	Medium annual rainfall more than 400 but less than 600 mm; only laggas exist, low rainfall with high evaporation. Dams may not store water for long in prolonged drought.
Low Availability	-	Median annual rainfall less than 400 mm. Only laggas exist - offers very limited reliability of dams due to very low rainfall and very high evaporation.

Fig. 6.1 Surface Water Availability Map

Virtually no data are available from the laggas in Samburu District. But data from rivers in semi-arid areas in Baringo suggest that streamflow could amount to an estimated 3-5% of the rainfall. Unfortunately, the run-off is usually produced in a few days of the month during the rainy season. So, most laggas are dry most of the time, particularly when water is most needed.

A surface water availability map based on median annual rainfalls is presented as Figure 6.1. Note that in Samburu District the median is about 10% lower than the mean annual rainfall.

The area bordering the Ewaso Ngiro cannot be classified as high potential because the river has become non-permanent in recent years. But because water is available most of the time, this stretch is classified as medium potential. The area near Lake Turkana is classified as low availability because of the poor water quality.

Surface water quality of the streams in Samburu District is generally good.

Groundwater is the only permanent source of water in most of the district, and the safest source by far. So, even where abundant surface water supplies are available, groundwater from boreholes and shallow wells should be considered, particularly for domestic supplies. Groundwater can be found at depths of less than 2 metres below the surface in the alluvial deposits of most laggas. Furthermore, groundwater occurs in weathered or fractured volcanic and Basement rocks, and in sediments and cinder layers interbedded between volcanic flows.

Groundwater availability in Samburu District (Figure 6.2) depends on the aerial distribution of water-bearing zones and upon water quality. The highest rating is medium-to-high.

6.3 Analysis of the Water Resources Availability

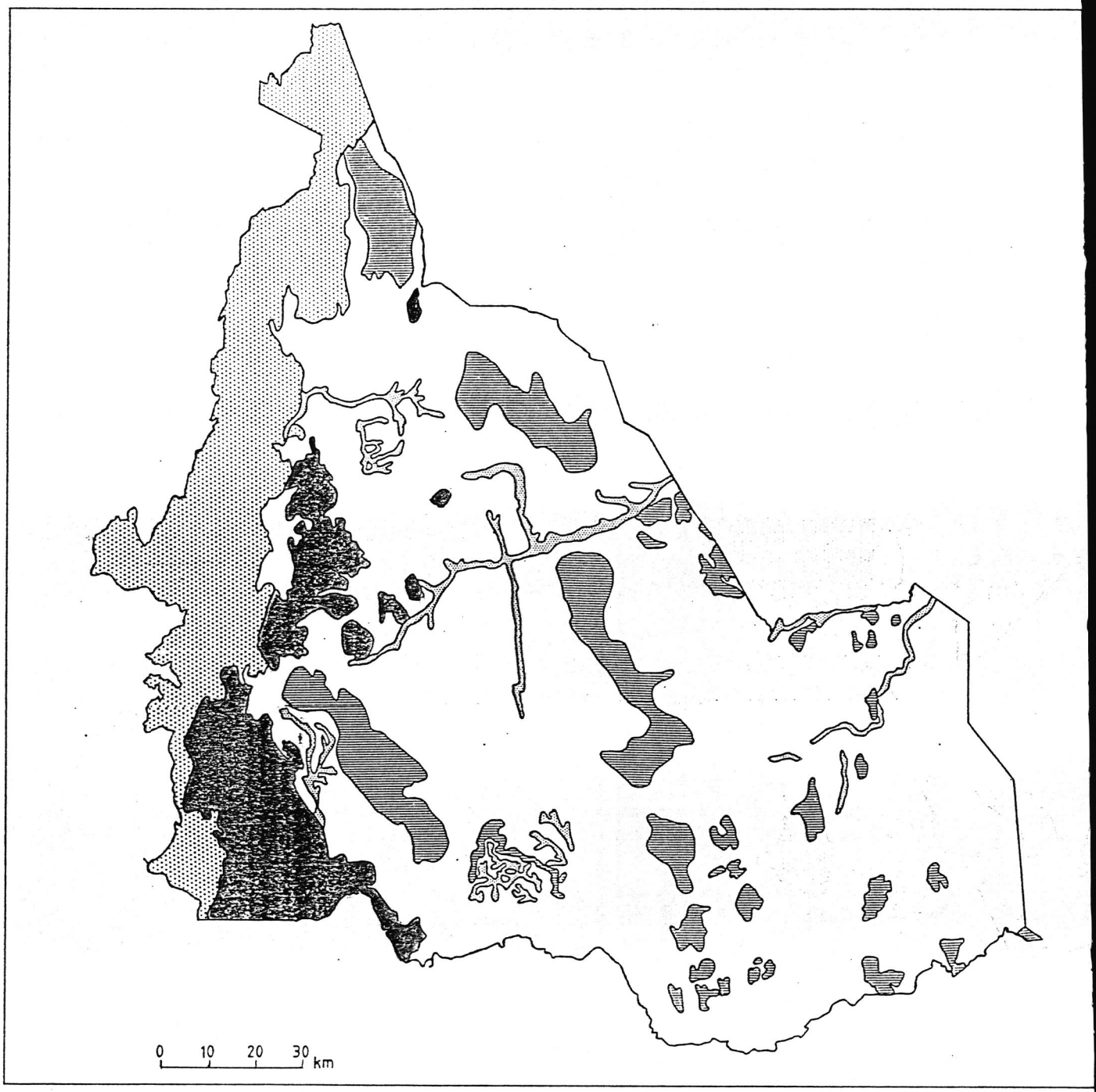
The surface water and groundwater resources availability, is described in appendix 5 for each sub-location and summarized in tables 6.7 and 6.8.

As explained in paragraph 6.1 it is not possible to provide accurate quantities of the total available water resources in each sub-location of the district. The resources availability is therefore expressed in a descriptive manner, by ranking on a scale from very low availability to very high availability:

vh	=	very high (not present in Samburu District)
h	=	high (not present in Samburu District)
mh	=	medium to high
m	=	medium
lm	=	low to medium
l	=	low
vl	=	very low

This classification is the same as shown in figures 6.1 and 6.2.

The groundwater availability in a sub-location is generally determined by the geological unit. Sub-locations in the Basement area generally have a low to medium groundwater availability. Sub-locations in the volcanics area generally have a medium groundwater availability, except for those sub-locations along the Rift Valley escarpment.



Groundwater Availability

Medium to High

Low to Medium

Medium

Low

Very Low

Fig. 6.2 Groundwater Availability Map

The in this summary indicated areas with alluvial sediments do not comprise all areas with sediments in Samburu District, but include only the major ones. Shallow alluvial deposits (usually confined to the laggas) are found in most sub-locations (especially in the Basement area), but their extent is often small. However such small areas may still be significant for small water supplies (e.g with handpump) and therefore also these small areas of sediments need to be included, when doing the feasibility studies for water supplies.

The groundwater availability is normally not the same in the whole sub-location, because different geological units are present. The availabilities are therefore indicated in table 6.8 in the form of a range. The summary in table 6.7 does not show this range, but shows the total number of sub-locations where a given availability may be found. The indicated numbers are therefore cumulative.

The chemical quality of the water resources is also indicated in tables 6.7 and 6.8. A similar classification was used as for availability:

h = high quality
m = medium quality
lm = low to medium quality, etc.

The water quality is indicated as high, if the water is chemically suitable for domestic use according the recommended quality standards, and medium, if some components exceed the recommended limits, without rendering the water harmful for human consumption. A low water quality indicates that the water is unfit for human consumption.

The quality classification represents an average for the sub-location and therefore water qualities may locally deviate from what is indicated. The water quality for livestock watering is not indicated separately, but suitability of the water for livestock watering may be assumed for medium quality and above.

In case water quality data is not available in a sub-location, then the quality was estimated using information from other sub-locations, where similar geological and/or hydrological conditions exist. In table 6.8 this is indicated by putting the quality between brackets (....).

The summary in table 6.7 allows the following conclusions:

1. Groundwater availability is best in Lorroki Division regarding both quantity and quality, because this Division has the largest number of sub-locations in the volcanics area.

2. Groundwater availability in Wamba and Waso Division is poor, because these Divisions are almost exclusively in the Basement area; however the sandy sediments in the numerous laggas may prove to be a reliable and good quality groundwater source at many places.

3. Surfacewater availability is best in Lorroki Division, because this Division has on average the highest rainfall.

4. Perennial surface water sources are found in only 23 (33%) of the 69 sub-locations.

Table 6.7 Water Resources Availability Summary

	Number of Sub-locations									
	Water Quantity					Chemical Water Quality				
	Lorroki Div.	Baragoi Div.	Wamba Div.	Waso Div.	Samburu Distr.	Lorroki Div.	Baragoi Div.	Wamba Div.	Waso Div.	Samburu Distr.
GROUNDWATER										
Geology: Basement	8	9	12	8	37					
Volcanics	14	2	-	-	16					
Basement/Volcanics	7	9	-	-	16					
Alluvial Sediments	4	11	6	2	23					
Availability: h	-	-	-	-	-	19	15	6	2	42
mh	4	11	6	2	23	19	15	6	2	42
m	23	14	6	2	45	29	20	12	8	69
lm	28	18	12	8	66	-	-	-	-	-
l	29	20	-	-	69	-	-	-	-	-
vl	-	-	-	-	-	-	-	-	-	-
SURFACE WATER										
Source: Perennial	11	4	4	4	23					
Temporary	18	15	8	4	45					
None	-	1	-	-	1					
Availability: h	-	-	-	-	-	19	20	12	8	59
mh	-	-	-	-	-	19	-	-	-	59
m	18	8	8	5	39	29	-	-	-	69
lm	29	17	12	7	65	-	-	-	-	-
l	-	20	-	8	69	-	-	-	-	-
vl	-	-	-	-	-	-	-	-	-	-

Note: 1) Alluvial sediments are included only for sub-locations where sediments cover a significant area.
2) The indicated number for availability: h represents the number of sub-locations where groundwater /surface water of at least high availability is present;
for availability: mh where groundwater/surfacewater, of at least medium to high availability is present;
for availability: m where groundwater/surfacewater of at least medium availability is present;
etc.

5. Chemical water quality of surfacewater is generally better than groundwater; however surfacewater is often contaminated bacteriologically.

The groundwater availability may be determined in detail at a specific place with a map showing the geological structures. Especially in the Basement area groundwater availability depends on the structures and the degree of weathering. This means that good potential exists in case of high density of structures and low potential in case of low density of structures. Such information is available for 29 sites in Samburu District from geophysical surveys. At these sites also boreholes locations were indicated (see Water Resources Assessment Study).

The groundwater resources availability is also depending on the recharge potential. Recharge occurs mainly where surfacewater streams cross or follow structures, therefore good borehole locations are often near laggas or other surfacewater features.

There are still many sub-locations for which not enough data is available. However this should not hamper plans for the development of water supply in these areas. The resources availability indicated in this chapter only gives a general description of an area, and therefore detailed site investigations will still be needed in most areas, when final plans for water supply implementation are being made.

During these investigations and also during the implementation and exploitation of the water supplies more data will become available on the water resources availability. It would be useful to update regularly the presentation of the water resources availability with these new data, e.g. each time when a revision of the District Water Development Plan is being made.

Table 6.8 Water Resources Availability

Baragoi Division — **Samburu District**

Location	Sub-location	Resources Availability					
		Groundwater			Surface Water		
		Geology	Quantity	Quality	Source	Quantity	Quality
Nyiro	South Horr	B/V	lm	(m)	P	l-m	h
Nyiro	Tuum	B/V	l-lm	(m)	P	l-m	h
Nyiro	Parkati	V	l	(h)	N	l	(h)
Nyiro	Uaso Rongai	B/A	lm-mh	(m-h)	T	l-m	(h)
Kawop	Losurukoi	B/V	l-lm	(m-h)	T	l-lm	(h)
Kawop	Lonyangaten	B/V/A	l-mh	(m-h)	T	l-lm	(h)
Ndoto	Latakweny	B/A	lm-mh	(m-h)	T	l-m	(h)
Ndoto	Lesirikan	B/A	lm-mh	m-h	T	l-m	(h)
Arsim	Illaut	B/A	lm-mh	(m-h)	P	lm-m	h
Arsim	Arsim	B	lm	(m)	T	l-m	(h)
Arsim	Nguronit	B/A	lm-mh	(m-h)	P	lm-m	h
Nachola	Nachola	B/V/A	lm-mh	(m-h)	T	l-lm	(h)
Nachola	Terter	V/A	l-mh	(m-h)	T	l	(h)
Baragoi	Baragoi	B/A	lm-mh	m	T	lm	(h)
Marti	Kalele	V/B	l-m	(m-h)	T	l-lm	(h)
Marti	Lokorkor	V/B	l-m	(h)	T	l-lm	(h)
Marti	Moru-Akiring	V/B	l	(h)	T	l-lm	(h)
Elbarta	Marti	V/B	lm-m	(m)	T	l-lm	(h)
Elbarta	Ngilai	B/A	lm-mh	(m-h)	T	lm	(h)
Elbarta	Masikita	B/A	lm-mh	(m-h)	T	l	(h)

Wamba Division — **Samburu District**

Location	Sub-location	Resources Availability					
		Groundwater			Surface Water		
		Geology	Quantity	Quality	Source	Quantity	Quality
Ngilai	Swari	B/A	lm-mh	l-h	T	l-lm	(h)
Ngilai	Ngare Narok	B	lm	(m)	T	l-m	(h)
Ngilai	Ngilai	B/A	lm-mh	(m-h)	T	l-m	(h)
Ngilai	Lkisin	B	lm	(m)	T	l-lm	(h)
Ngilai	Ngogolt	B	lm	(m)	P	lm-m	h
Lodungokwe	Nkaroni	B/A	lm-mh	(m-h)	T	lm	(h)
Lodungokwe	Lpus	B/A	lm-mh	mh-h	T	lm	(h)
Lodungokwe	Litrimin	B/A	lm-mh	m-h	P	lm-m	h
Lodungokwe	Sesia	B/A	lm-mh	m-h	P	l-m	h
Wamba	Matakwen	B	lm	(m)	T	lm-m	(h)
Wamba	Kolting	B	lm	(m)	T	lm-m	(h)
	Wamba	B	lm	m	P	lm-m	h

Table 6.8 (Cont.) Water Resources Availability

Waso Division — **Samburu District**

Location	Sub-location	Resources Availability					
		Groundwater			Surface Water		
		Geology	Quantity	Quality	Source	Quantity	Quality
Waso	Lerata	B	lm	m	P	lm-m	(h)
Waso	Lengusaka	B	lm	m	T	l-lm	(h)
Waso	Remote	B	lm	(m)	P	lm-m	h
Waso	Ngutuk Ongiron	B	lm	(m)	P	lm-m	h
Waso	Archers Post	B	lm	(m)	P	l-m	h
Waso	Losesia	B	lm	(m)	T	l-m	h
Serolipi	Donyo Uasin	B/A	lm-mh	(m-h)	T	l-lm	(h)
	Serolipi	B/A	lm-mh	m-h	T	l	(h)

Lorroki Division — **Samburu District**

Location	Sub-location	Resources Availability					
		Groundwater			Surface Water		
		Geology	Quantity	Quality	Source	Quantity	Quality
Poro	Siambu	V	l-m	(h)	T	l-lm	(m)
Poro	Seketet	V	m	(h)	P	m	m
Poro	Sirata Oirobi	V	m	h	T	lm	(m)
Poro	Nkejemueny	V	m	(h)	T	lm	(m)
Angata	Angata Nanyuki	B/V	lm-m	(m)	T	m	h
Nanyukie	Loibashai	B/V	lm-mh	(m)	T	lm-m	(h)
	Barsaloi	B/A	lm-mh	m-h	P	lm-m	h
Opiroi	Opiroi	B/A	vl-mh	(m-h)	P	lm-m	m
Opiroi	Mabati	B	lm	(m)	T	lm	(m)
Opiroi	Mbukoi	B	lm	(m)	T	lm	(m)
Loosuk	Malaso	V	m	(h)	T	lm-m	(h)
Loosuk	Tinga	V	m	(h)	T	lm-m	(h)
Loosuk	Loosuk	V	m	(h)	P	lm-m	h
Maralal	Ledero	B/A	lm-mh	h	T	lm	(h)
	Township	B/V/A	lm-mh	(h)	P	m	h
	Lpartuk	V	m	(h)	P	m	m
Sukuta	Lolmolok	V	m	(h)	T	lm-m	(h)
Marmar	Amaiya	V	l	(h)	P	lm-m	m
	Longewan	V	m	h	P	lm-m	h
	Logorate	V	m	(h)	T	lm	(h)
	Sukuta Marmar	V	m	(h)	P	lm	h
Kisima	Nauneri	V/B	lm-m	(m-h)	T	lm	(h)
Kisima	Lmisigiyoi	V	m	(h)	T	lm	h
Kisima	Lkilorit	B	lm	(m)	T	lm-m	h
Kisima	Mbaringon	B/V	lm-m	(m)	P	lm-m	m
Lodokojek	Moru	B	lm	(m)	T	lm	(h)
Lodokojek	Nonkeek	B	lm	(m)	T	lm-m	(h)
Lodokojek	Lodokojek	B/V	lm-m	(m)	T	lm-m	(h)
Lodokojek	Kirimun	B/V	lm-m	(m)	P	lm-m	h

h = High availability/quality
mh = Medium to high availability/quality
m = Medium availability/quality
lm = Low to medium availability/quality
l = Low availability/quality
vl = Very low availability/quality
() = Quality estimated

B = Basement
V = Volcanics
A = Alluvial Sediments

P = Perennial Source
T = Temporary Source
N = No Surface Water Source

7. WATER RESOURCES VERSUS WATER DEMAND

The compatibility of water resources and water demand was analysed for:

- 1988, current demand
- 1993, scenario 2, projected demand first year of supply
- 2003, scenario 2, projected demand after 10 years of supply

The compatibility for scenario 3 is not presented here separately, because in scenario 3, water development quantities from 1988 increase only for domestic use, which increase is smaller than for scenario 2. Special attention would be necessary only for those sub-locations where demand exceeds resources under scenario 2. But this situation does not occur.

The compatibility for scenario 1, the high growth scenario, was not analysed, because the probability for this scenario to occur is very low at present (see paragraph 4.3).

The water development required for the year 2013 is also not analyzed. It is considered that this may be done better at a later stage, after the development of water resources has been started for the first ten years of the plan period. Then probably more information on the resources will have become available, and also the direction of development will be more clear.

The proposed domestic water supply development is presented for four different supply areas: Urban Centre (population >2000), Rural Centre (population <2000), Rural Institution (school, health centre, etc.) and Rural Area (dispersed population in Manyatta's or other small settlements). These four supply categories are described in Part 2 and Part 3.

The water demand and the proposed water development is summarized per Division in table 7.1 and per sub-location in tables 7.2, 7.3 and 7.4.

The proposed development of the water resources was determined according the following assumptions:

1. The development of groundwater (and springs) is preferred to the development of surfacewater for reasons of water quality and of supply reliability during drought situations. The increase of the domestic demand until 2003 is therefore expected to be supplied from groundwater resources.

2. Rural domestic demand is supplied from springs (if present), groundwater (boreholes or wells) or rainwater (roof catchments). The use of these sources ensures the best possible water quality, with no or little treatment required.

3. Urban domestic demand is supplied from springs (e.g Wamba, Archer's Post, Sukuta Marmar, South Horr, Tuum), surface water (Maralal) or groundwater (e.g Baragoi, almost all other small centres). Water supply is required in greater quantities than for rural domestic supplies, therefore surface water is also an option. Treatment is required for surface water sources.

4. Rural non-domestic demand is supplied from springs, surface water or groundwater. If possible surfacewater and groundwater are used in combination on a 50-50% basis. In some areas sources are naturally available from rivers, streams, springs, lakes or depressions. These will supply part of the water demand, for which therefore no development is required. The methodology for the determination of the non-domestic (livestock) water supply development is described in detail in Appendix 8 and the results for each sub-location is presented in Table A8.4.

5. Urban non-domestic demand is not catered for, separately. Livestock demand in urban areas is assumed to use sources allocated to the non-domestic demand in nearby rural areas. Industrial demand only exists at Maralal, which supply was included with the domestic demand.

Table 7.1 Proposed Water Development (m^3/day)

		Water Demand (Scenario 2)			Proposed Development						Existing Supply	
					Domestic			Non-Domestic			Non-Domestic	Domestic
		Domestic	Non-Domestic	Total	Gw	Rw/Sw	Sp	Gw	Rw/Sw	Sp	Sw	Sw
1988	Baragoi Division	600	280	880	508	0	0	151	109	0	20	92
	Lorroki Division	2,532	861	3,393	1,267	0	10	177	160	0	524	1,255
	Wamba Division	404	67	471	284	0	10	48	19	0	0	110
	Waso Division	169	174	343	71	0	0	64	47	0	63	98
	District Total	3,704	1,382	5,086	2,220	0	20	440	335	0	607	1,555
1993	Baragoi Division	675	287	962	583	0	0	151	116	0	20	92
	Lorroki Division	3,052	883	3,935	1,786	0	10	192	165	0	526	1,255
	Wamba Division	463	69	532	343	0	10	49	20	0	0	110
	Waso Division	182	179	361	74	0	0	66	48	0	65	108
	District Total	4,372	1,418	5,790	2,786	0	20	458	349	0	611	1,565
2003	Baragoi Division	1,022	301	1,323	910	0	0	158	122	0	21	112
	Lorroki Division	4,993	926	5,919	3,718	0	10	214	181	0	531	1,265
	Wamba Division	792	73	865	682	0	10	52	21	0	0	110
	Waso Division	245	187	432	94	0	0	68	52	0	67	151
	District Total	7,052	1,487	8,539	5,394	0	20	492	376	0	619	1,638

Gw = Groundwater
Rw = Rain Water
Sw = Surface Water
Sp = Spring

The water demand in scenario 2 increases considerably (by 85%) for domestic use, but increases only slightly (by 9%) for non-domestic use. The rise of the domestic demand will be supplied from groundwater resources, which requires an increase in the groundwater development by 151% from 1988 to 2003.

The required water development in terms of number of new boreholes or of new dams or pans is presented in Part 3 of the DWDS. But some general conclusions on the possible water development can already be made:

1. Domestic demand in rural areas is low. This demand can be easily supplied from groundwater. Yields of boreholes are sufficient, although sometimes small (especially in Basement areas). Water quality can be a constraint in some areas.

2. The demand of the small rural centres is not very high and can usually be met from resources near the centre. The demand of the few large urban centres is more difficult to supply and detailed surveys are needed near these centres to determine the available water quantities.

3. The non-domestic (livestock) demand is determined by the permissible number of livestock and not by the current number, which is much higher. Water supplies planned and implemented on the basis of this reduced demand, will be overstretched, when used by the current livestock numbers and thus may not be able to provide water all year around. A solution for this dilemma will have to be found in combination with a District Livestock Development Plan.

The 1988 population data is a projection, but unfortunately this cannot be improved, in spite of the census of August 1989, because the data from this census were not ready in time for this study.

As explained in paragraph 5.2.4 the water demand of wildlife is not included in the DWDS. In general it can be stated that wildlife is expected to use the perennial surfacewater sources and temporary sources such as pans or natural waterbodies.

For agriculture there is little potential for irrigation in Samburu District. Excess surfacewater is available in small quantities at South Horr, Amaiya, Kichich and along the Ewaso Ngiro. The reliability of the water availability is not clear however, because the flow records are still very short. More detailed information on these flows is included in the Water Resources Assessment Study.

Table 7.2 Proposed Water Development for 1988 Water Demand

BARAGOI DIVISION

Location	Sub Location	WATER DEMAND 1988 (m3/day)			PROPOSED DEVELOPMENT (m3/day)						NO DEVELOPMENT
		DOMESTIC	NON DOMESTIC	TOTAL	DOMESTIC			NON-DOMESTIC			NON-DOMESTIC
					Gw	Rw/Sw	Sp	Gw	Rw/Sw	Sp	Sw
Nyiro	South Horr	55	11	66	12	43	-	-	0	-	11
Nyiro	Tuum	17	0	17	5	12	-	-	0	-	0
Nyiro	Parkati	7	0	7	7	-	-	-	0	-	0
Nyiro	Uaso Rongai	9	27	36	9	-	-	14	13	-	0
Kawop	Losurukoi	13	39	52	13	-	-	20	19	-	0
Kawop	Lonyangaten	33	7	40	33	-	-	7	0	-	0
Ndoto	Latakweny	27	1	28	27	-	-	1	0	-	0
Ndoto	Lesirikan	71	43	114	71	-	-	22	21	-	0
Arsim	Illaut	14	3	17	14	-	-	3	0	-	0
Arsim	Arsim	6	8	14	6	-	-	8	0	-	0
Arsim	Nguronit	9	9	18	0	-	9	-	0	-	9
Nachola	Nachola	23	29	52	23	-	-	15	14	-	0
Nachola	Terter	11	6	17	11	-	-	6	0	-	0
Baragoi	Baragoi	223	1	224	223	-	-	1	0	-	0
Marti	Kalele	23	30	53	23	-	-	15	15	-	0
Marti	Lokorkor	10	25	35	10	-	-	13	12	-	0
Marti	Moru-Akiring	10	0	10	10	-	-	-	0	-	0
Elbarta	Marti	23	31	54	23	-	-	16	15	-	0
Elbarta	Ngilai	5	5	10	5	-	-	5	0	-	0
Elbarta	Masikita	11	5	16	11	-	-	5	0	-	0
	Total	600	280	880	536	55	9	151	109	0	20

LORROKI DIVISION

Location	Sub Location	WATER DEMAND 1988 (m3/day)			PROPOSED DEVELOPMENT (m3/day)						NO DEVELOPMENT
		DOMESTIC	NON DOMESTIC	TOTAL	DOMESTIC			NON-DOMESTIC			NON-DOMESTIC
					Gw	Rw/Sw	Sp	Gw	Rw/Sw	Sp	Sw
Poro	Siambu	26	0	26	5	21	-	-	0	-	0
Poro	Seketet	10	30	40	10	-	-	-	0	-	30
Poro	Sirata Oirobi	36	23	59	36	-	-	-	0	-	23
Poro	Nkejemueny	6	19	25	6	-	-	-	0	-	19
Angata	Angata Nanyukie	29	3	32	29	-	-	-	0	-	3
Nanyukie	Loibashai	5	9	14	5	-	-	-	0	-	9
	Barsaloi	21	5	26	21	-	-	-	0	-	5
Opiroi	Opiroi	50	0	50	40	-	10	-	0	-	0
Opiroi	Mabati	6	0	6	6	-	-	-	0	-	0
Opiroi	Mbukoi	11	1	12	11	-	-	-	1	-	0
Loosuk	Malaso	11	53	64	11	-	-	14	14	-	25
Loosuk	Tinga	17	44	61	17	-	-	10	9	-	25
Loosuk	Loosuk	46	55	101	46	-	-	5	0	-	50
Maralal	Ledero	650	0	650	250	400	-	-	0	-	0
Maralal	Township	1117	0	1117	317	800	-	-	0	-	0
Maralal	Lpartuk	68	0	68	68	-	-	-	0	-	0
Sukuta	Lolmolok	27	79	106	27	-	-	27	27	-	25
Marmar	Amaiya	18	0	18	8	10	-	-	0	-	0
	Longewan	19	66	85	19	-	-	20	21	-	25
	Logorate	19	61	80	19	-	-	18	18	-	25
	Sukuta Marmar	125	87	212	75	-	50	24	23	-	40
Kisima	Nauneri	22	62	84	22	-	-	18	19	-	25
Kisima	Lmisigiyoi	13	24	37	13	-	-	0	0	-	24
Kisima	Lkilorit	42	45	87	42	-	-	5	0	-	40
Kisima	Mbaringon	31	85	116	31	-	-	23	22	-	40
Lodokejek	Moru	18	7	25	18	-	-	7	0	-	0
Lodokejek	Nonkeek	17	0	17	17	-	-	-	0	-	0
Lodokejek	Lodokejek	36	52	88	36	-	-	6	6	-	40
Lodokejek	Kirimun	36	51	87	16	-	20	0	0	-	51
	Total	2532	861	3393	1221	1231	80	177	160	0	524

Table 7.2 (Cont.) Proposed Water Development for 1988 Water Demand

WAMBA DIVISION

Location	Sub Location	WATER DEMAND 1988 (m3/day)			PROPOSED DEVELOPMENT (m3/day)						NO DEVELOPMENT
		DOMESTIC	NON DOMESTIC	TOTAL	DOMESTIC			NON-DOMESTIC			NON-DOMESTIC
					Gw	Rw/Sw	Sp	Gw	Rw/Sw	Sp	Sw
Ngilai	Swari	38	3	41	38	-	-	3	0	-	0
Ngilai	Ngare Narok	19	39	58	19	-	-	20	19	-	0
Ngilai	Ngilai	28	7	35	18	-	10	7	0	-	0
Ngilai	Lkisin	11	0	11	11	-	-	-	0	-	0
Ngilai	Ngogoltin	14	9	23	14	-	-	9	0	-	0
Lodungokwe	Nkaroni	6	0	6	6	-	-	-	0	-	0
Lodungokwe	Lpus	26	0	26	26	-	-	-	0	-	0
Lodungokwe	Litrimin	17	0	17	17	-	-	-	0	-	0
Lodungokwe	Sesia	10	2	12	10	-	-	2	0	-	0
Wamba	Matakwen	4	7	11	4	-	-	7	0	-	0
Wamba	Kolting	12	0	12	12	-	-	-	0	-	0
Wamba	Wamba	219	0	219	169	-	50	-	0	-	0
	Total	404	67	471	344	0	60	48	19	0	0

WASO DIVISION

Location	Sub Location	WATER DEMAND 1988 (m3/day)			PROPOSED DEVELOPMENT (m3/day)						NO DEVELOPMENT
		DOMESTIC	NON DOMESTIC	TOTAL	DOMESTIC			NON-DOMESTIC			NON-DOMESTIC
					Gw	Rw/Sw	Sp	Gw	Rw/Sw	Sp	Sw
Waso	Lerata	5	0	5	5	-	-	-	0	-	0
Waso	Lengusaka	6	10	16	6	-	-	10	0	-	0
Waso	Remote	4	4	8	4	-	-	-	0	-	4
Waso	Ngutuk Ongiron	17	21	38	17	-	-	-	0	-	21
Waso	Archer's Post	98	29	127	6	-	92	6	0	-	23
Waso	Losesia	4	29	33	4	-	-	7	7	-	15
Serolipi	Donyo Uasin	2	21	23	2	-	-	11	10	-	0
Serolipi	Serolipi	32	60	92	32	-	-	30	30	-	0
	Total	169	174	343	77	0	92	64	47	0	63

Summary of Areas

DIVISION	WATER DEMAND 1988 (m3/day)			PROPOSED DEVELOPMENT (m3/day)						NO DEVELOPMENT
	DOMESTIC	NON DOMESTIC	TOTAL	DOMESTIC			NON-DOMESTIC			NON-DOMESTIC
				Gw	Rw/Sw	Sp	Gw	Rw/Sw	Sp	Sw
Baragoi	600	280	880	536	55	9	151	109	0	20
Lorroki	2532	861	3393	1221	1231	80	177	160	0	524
Wamba	404	67	471	344	0	60	48	19	0	0
Waso	169	174	343	77	0	92	64	47	0	63
DISTRICT TOTAL	3704	1382	5086	2178	1286	241	440	335	0	607

Notes: Domestic Supply: Proposed Development includes both already existing and new (to be constructed) supply capacity

Non-Domestic Supply: Proposed Development includes new supplies only; already existing supply capacity (incl. from natural sources) is indicated under No Development

Supply Technologies are specified in the Appendices in Part 3.

Table 7.3 Proposed Water Development for 1993 Water Demand

BARAGOI DIVISION SCENARIO - 2

Location	Sub Location	WATER DEMAND 1993 (m3/day)			PROPOSED DEVELOPMENT (m3/day)						NO DEVELOPMENT
		DOMESTIC	NON DOMESTIC	TOTAL	DOMESTIC			NON-DOMESTIC			NON-DOMESTIC
					Gw	Rw/Sw	Sp	Gw	Rw/Sw	Sp	Sw
Nyiro	South Horr	57	11	68	12	45	-	-	0	-	11
Nyiro	Tuum	18	0	18	5	13	-	-	0	-	0
Nyiro	Parkati	7	0	7	7	-	-	-	0	-	0
Nyiro	Uaso Rongai	9	28	37	9	-	-	14	14	-	0
Kawop	Losurukoi	13	40	53	13	-	-	20	20	-	0
Kawop	Lonyangaten	33	7	40	33	-	-	7	0	-	0
Ndoto	Latakweny	28	1	29	28	-	-	1	0	-	0
Ndoto	Lesirikan	76	44	120	76	-	-	22	22	-	0
Arsim	Illaut	14	3	17	14	-	-	3	0	-	0
Arsim	Arsim	6	8	14	6	-	-	8	0	-	0
Arsim	Nguronit	9	9	18	0	-	9	-	0	-	9
Nachola	Nachola	25	30	55	25	-	-	15	15	-	0
Nachola	Terter	11	6	17	11	-	-	6	0	-	0
Baragoi	Baragoi	282	1	283	282	-	-	1	0	-	0
Marti	Kalele	26	31	57	26	-	-	15	16	-	0
Marti	Lokorkor	10	26	36	10	-	-	13	13	-	0
Marti	Moru-Akiring	10	0	10	10	-	-	-	0	-	0
Elbarta	Marti	24	32	56	24	-	-	16	16	-	0
Elbarta	Ngilai	5	5	10	5	-	-	5	0	-	0
Elbarta	Masikita	12	5	17	12	-	-	5	0	-	0
	Total	675	287	962	608	58	9	151	116	0	20

LORROKI DIVISION SCENARIO - 2

Location	Sub Location	WATER DEMAND 1993 (m3/day)			PROPOSED DEVELOPMENT (m3/day)						NO DEVELOPMENT
		DOMESTIC	NON DOMESTIC	TOTAL	DOMESTIC			NON-DOMESTIC			NON-DOMESTIC
					Gw	Rw/Sw	Sp	Gw	Rw/Sw	Sp	Sw
Poro	Siambu	28	0	28	5	23	-	-	0	-	0
Poro	Seketet	10	31	41	10	-	-	-	0	-	31
Poro	Sirata Oirobi	36	24	60	36	-	-	-	0	-	24
Poro	Nkejemueny	6	19	25	6	-	-	-	0	-	19
Angata	Angata Nanyukie	31	3	34	31	-	-	-	0	-	3
Nanyukie	Loibashai	6	10	16	6	-	-	-	0	-	10
	Barsaloi	22	5	27	22	-	-	-	0	-	5
Opiroi	Opiroi	52	0	52	42	-	10	-	0	-	0
Opiroi	Mabati	6	0	6	6	-	-	-	0	-	0
Opiroi	Mbukoi	11	1	12	11	-	-	-	1	-	0
Loosuk	Malaso	12	54	66	12	-	-	15	14	-	25
Loosuk	Tinga	17	45	62	17	-	-	10	10	-	25
Loosuk	Loosuk	49	56	105	49	-	-	6	0	-	50
Maralal	Ledero	817	0	817	417	400	-	-	0	-	0
Maralal	Township	1409	0	1409	609	800	-	-	0	-	0
Maralal	Lpartuk	76	0	76	76	-	-	-	0	-	0
Sukuta	Lolmolok	28	81	109	28	-	-	28	28	-	25
Marmar	Amaiya	21	0	21	11	10	-	-	0	-	0
	Longewan	19	67	86	19	-	-	21	21	-	25
	Logorate	20	63	83	20	-	-	19	19	-	25
	Sukuta Marmar	151	89	240	101	-	50	25	24	-	40
Kisima	Nauneri	25	64	89	25	-	-	20	19	-	25
Kisima	Lmisigiyoi	13	25	38	13	-	-	0	0	-	25
Kisima	Lkilorit	46	47	93	46	-	-	8	0	-	39
Kisima	Mbaringon	31	87	118	31	-	-	24	23	-	40
Lodokejek	Moru	18	7	25	18	-	-	7	0	-	0
Lodokejek	Nonkeek	17	0	17	17	-	-	-	0	-	0
Lodokejek	Lodokejek	37	53	90	37	-	-	7	6	-	40
Lodokejek	Kirimun	38	52	90	18	-	20	2	0	-	50
	Total	3052	883	3935	1739	1233	80	192	165	0	526

Table 7.3 (Cont.) Proposed Water Development for 1993 Water Demand

WAMBA DIVISION **SCENARIO - 2**

Location	Sub Location	WATER DEMAND 1993 (m3/day)			PROPOSED DEVELOPMENT (m3/day)						NO DEVELOPMENT
		DOMESTIC	NON DOMESTIC	TOTAL	DOMESTIC			NON-DOMESTIC			NON-DOMESTIC
					Gw	Rw/Sw	Sp	Gw	Rw/Sw	Sp	Sw
Ngilai	Swari	43	3	46	43	-	-	3	0	-	0
Ngilai	Ngare Narok	19	40	59	19	-	-	20	20	-	0
Ngilai	Ngilai	29	7	36	19	-	10	7	0	-	0
Ngilai	Lkisin	11	0	11	11	-	-	-	0	-	0
Ngilai	Ngogoltin	14	9	23	14	-	-	9	0	-	0
Lodungokwe	Nkaroni	6	0	6	6	-	-	-	0	-	0
Lodungokwe	Lpus	27	0	27	27	-	-	-	0	-	0
Lodungokwe	Litrimin	17	0	17	17	-	-	-	0	-	0
Lodungokwe	Sesia	11	2	13	11	-	-	2	0	-	0
Wamba	Matakwen	4	8	12	4	-	-	8	0	-	0
Wamba	Kolting	12	0	12	12	-	-	-	0	-	0
Wamba	Wamba	270	0	270	220	-	50	-	0	-	0
	Total	463	69	532	403	0	60	49	20	0	0

WASO DIVISION **SCENARIO - 2**

Location	Sub Location	WATER DEMAND 1993 (m3/day)			PROPOSED DEVELOPMENT (m3/day)						NO DEVELOPMENT
		DOMESTIC	NON DOMESTIC	TOTAL	DOMESTIC			NON-DOMESTIC			NON-DOMESTIC
					Gw	Rw/Sw	Sp	Gw	Rw/Sw	Sp	Sw
Waso	Lerata	5	0	5	5	-	-	-	0	-	0
Waso	Lengusaka	6	10	16	6	-	-	10	0	-	0
Waso	Remote	4	4	8	4	-	-	-	0	-	4
Waso	Ngutuk Ongiron	18	22	40	18	-	-	-	0	-	22
Waso	Archer's Post	108	30	138	6	-	102	6	0	-	24
Waso	Losesia	4	30	34	4	-	-	8	7	-	15
Serolipi	Donyo Uasin	2	21	23	2	-	-	11	10	-	0
Serolipi	Serolipi	35	62	97	35	-	-	31	31	-	0
	Total	182	179	361	80	0	102	66	48	0	65

Summary of Areas

DIVISION	WATER DEMAND 1993 (m3/day)			PROPOSED DEVELOPMENT (m3/day)						NO DEVELOPMENT
	DOMESTIC	NON DOMESTIC	TOTAL	DOMESTIC			NON-DOMESTIC			NON-DOMESTIC
				Gw	Rw/Sw	Sp	Gw	Rw/Sw	Sp	Sw
Baragoi Division	675	287	962	608	58	9	151	116	0	20
Lorroki Division	3052	883	3935	1739	1233	80	192	165	0	526
Wamba Division	463	69	532	403	0	60	49	20	0	0
Waso Division	182	179	361	80	0	102	66	48	0	65
DISTRICT TOTAL	4372	1418	5790	2830	1291	251	458	349	0	611

Notes: Domestic Supply: Proposed Development includes both already existing and new (to be constructed) supply capacity

Non-Domestic Supply: Proposed Development includes new supplies only; already existing supply capacity (incl. from natural sources) is indicated under No Development

Supply Technologies are specified in the Appendices in Part 3.

Table 7.4 Proposed Water Development for 2003 Water Demand

BARAGOI DIVISION **SCENARIO - 2**

Location	Sub Location	WATER DEMAND 2003 (m3/day)			PROPOSED DEVELOPMENT (m3/day)						NO DEVELOPMENT
		DOMESTIC	NON DOMESTIC	TOTAL	DOMESTIC			NON-DOMESTIC			NON-DOMESTIC
					Gw	Rw/Sw	Sp	Gw	Rw/Sw	Sp	Sw
Nyiro	South Horr	78	12	90	18	60	-	-	0	-	12
Nyiro	Tuum	28	0	28	12	16	-	-	0	-	0
Nyiro	Parkati	8	0	8	8	-	-	-	0	-	0
Nyiro	Uaso Rongai	10	29	39	10	-	-	14	15	-	0
Kawop	Losurukoi	15	42	57	15	-	-	21	21	-	0
Kawop	Lonyangaten	37	8	45	37	-	-	8	0	-	0
Ndoto	Latakweny	33	1	34	33	-	-	1	0	-	0
Ndoto	Lesirikan	105	46	151	105	-	-	23	23	-	0
Arsim	Illaut	20	3	23	20	-	-	3	0	-	0
Arsim	Arsim	7	9	16	7	-	-	9	0	-	0
Arsim	Nguronit	11	9	20	0	-	11	-	0	-	9
Nachola	Nachola	33	31	64	33	-	-	15	16	-	0
Nachola	Terter	12	7	19	12	-	-	7	0	-	0
Baragoi	Baragoi	521	1	522	521	-	-	1	0	-	0
Marti	Kalele	28	32	60	28	-	-	16	16	-	0
Marti	Lokorkor	11	27	38	11	-	-	13	14	-	0
Marti	Moru-Akiring	11	0	11	11	-	-	-	0	-	0
Elbarta	Marti	34	34	68	34	-	-	17	17	-	0
Elbarta	Ngilai	6	5	11	6	-	-	5	0	-	0
Elbarta	Masikita	14	5	19	14	-	-	5	0	-	0
	Total	1022	301	1323	935	76	11	158	122	0	21

LORROKI DIVISION **SCENARIO - 2**

Location	Sub Location	WATER DEMAND 2003 (m3/day)			PROPOSED DEVELOPMENT (m3/day)						NO DEVELOPMENT
		DOMESTIC	NON DOMESTIC	TOTAL	DOMESTIC			NON-DOMESTIC			NON-DOMESTIC
					Gw	Rw/Sw	Sp	Gw	Rw/Sw	Sp	Sw
Poro	Siambu	41	0	41	8	33	-	-	0	-	0
Poro	Seketet	12	32	44	12	-	-	-	0	-	32
Poro	Sirata Oirobi	44	25	69	44	-	-	-	0	-	25
Poro	Nkejemueny	7	20	27	7	-	-	-	0	-	20
Angata	Angata Nanyukie	37	3	40	37	-	-	-	0	-	3
Nanyukie	Loibashai	7	10	17	7	-	-	-	0	-	10
	Barsaloi	35	5	40	35	-	-	-	0	-	5
Opiroi	Opiroi	74	0	74	64	-	10	-	0	-	0
Opiroi	Mabati	7	0	7	7	-	-	-	0	-	0
Opiroi	Mbukoi	13	1	14	13	-	-	-	1	-	0
Loosuk	Malaso	14	57	71	14	-	-	16	16	-	25
Loosuk	Tinga	20	48	68	20	-	-	12	11	-	25
Loosuk	Loosuk	67	59	126	67	-	-	9	0	-	50
Maralal	Ledero	1427	0	1427	1027	400	-	-	0	-	0
Maralal	Township	2415	0	2415	1615	800	-	-	0	-	0
Maralal	Lpartuk	113	0	113	113	-	-	-	0	-	0
Sukuta	Lolmolok	33	85	118	33	-	-	30	30	-	25
Marmar	Amaiya	26	0	26	16	10	-	-	0	-	0
	Longewan	21	70	91	21	-	-	23	22	-	25
	Logorate	23	66	89	23	-	-	21	20	-	25
	Sukuta Marmar	261	94	355	211	-	50	27	27	-	40
Kisima	Nauneri	33	67	100	33	-	-	21	21	-	25
Kisima	Lmisigiyoi	15	26	41	15	-	-	0	0	-	26
Kisima	Lkilorit	62	49	111	62	-	-	9	0	-	40
Kisima	Mbaringon	42	92	134	42	-	-	26	26	-	40
Lodokejek	Moru	21	7	28	21	-	-	7	0	-	0
Lodokejek	Nonkeek	20	0	20	20	-	-	-	0	-	0
Lodokejek	Lodokejek	47	55	102	47	-	-	8	7	-	40
Lodokejek	Kirimun	56	55	111	36	-	20	5	0	-	50
	Total	4993	926	5919	3671	1243	80	214	181	0	531

Table 7.4 (Cont.) Proposed Water Development for 2003 Water Demand

WAMBA DIVISION **SCENARIO - 2**

Location	Sub Location	WATER DEMAND 2003 (m3/day)			PROPOSED DEVELOPMENT (m3/day)						NO DEVELOPMENT
		DOMESTIC	NON DOMESTIC	TOTAL	DOMESTIC			NON-DOMESTIC			NON-DOMESTIC
					Gw	Rw/Sw	Sp	Gw	Rw/Sw	Sp	Sw
Ngilai	Swari	49	3	52	49	-	-	3	0	-	0
Ngilai	Ngare Narok	22	42	64	22	-	-	21	21	-	0
Ngilai	Ngilai	39	8	47	29	-	10	8	0	-	0
Ngilai	Lkisin	13	0	13	13	-	-	-	0	-	0
Ngilai	Ngogoltin	16	10	26	16	-	-	10	0	-	0
Lodungokwe	Nkaroni	7	0	7	7	-	-	-	0	-	0
Lodungokwe	Lpus	39	0	39	39	-	-	-	0	-	0
Lodungokwe	Litrimin	20	0	20	20	-	-	-	0	-	0
Lodungokwe	Sesia	12	2	14	12	-	-	2	0	-	0
Wamba	Matakwen	4	8	12	4	-	-	8	0	-	0
Wamba	Kolting	14	0	14	14	-	-	-	0	-	0
Wamba	Wamba	557	0	557	507	-	50	-	0	-	0
	Total	792	73	865	732	0	60	52	21	0	0

WASO DIVISION **SCENARIO - 2**

Location	Sub Location	WATER DEMAND 2003 (m3/day)			PROPOSED DEVELOPMENT (m3/day)						NO DEVELOPMENT
		DOMESTIC	NON DOMESTIC	TOTAL	DOMESTIC			NON-DOMESTIC			NON-DOMESTIC
					Gw	Rw/Sw	Sp	Gw	Rw/Sw	Sp	Sw
Waso	Lerata	6	0	6	6	-	-	-	0	-	0
Waso	Lengusaka	7	10	17	7	-	-	10	0	-	0
Waso	Remote	5	4	9	5	-	-	-	0	-	4
Waso	Ngutuk Ongiron	27	23	50	27	-	-	-	0	-	23
Waso	Archer's Post	141	31	172	10	-	131	6	0	-	25
Waso	Losesia	4	31	35	4	-	-	8	8	-	15
Serolipi	Donyo Uasin	2	23	25	2	-	-	11	12	-	0
Serolipi	Serolipi	53	65	118	53	-	-	33	32	-	0
	Total	245	187	432	114	0	131	68	52	0	67

Summary of Areas

DIVISION	WATER DEMAND 2003 (m3/day)			PROPOSED DEVELOPMENT (m3/day)						NO DEVELOPMENT
	DOMESTIC	NON DOMESTIC	TOTAL	DOMESTIC			NON-DOMESTIC			NON-DOMESTIC
				Gw	Rw/Sw	Sp	Gw	Rw/Sw	Sp	Sw
Baragoi Division	1022	301	1323	935	76	11	158	122	0	21
Lorroki Division	4993	926	5919	3671	1243	80	214	181	0	531
Wamba Division	792	73	865	732	0	60	52	21	0	0
Waso Division	245	187	432	114	0	131	68	52	0	67
DISTRICT TOTAL	7052	1487	8539	5452	1319	282	492	376	0	619

Notes: Domestic Supply: Proposed Development includes both already existing and new (to be constructed) supply capacity

Non-Domestic Supply: Proposed Development includes new supplies only; already existing supply capacity (incl. from natural sources) is indicated under No Development

Supply Technologies are specified in the Appendices in Part 3.

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APPENDIX 1

DISTRICT FOCUS POLICY

APPENDIX 1

DISTRICT FOCUS POLICY

Main Aspects Related to Preparation of

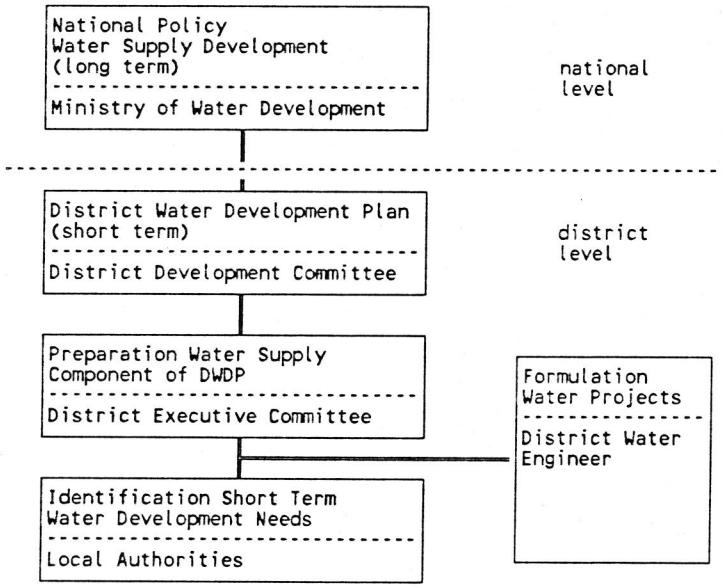
a District Water Development Plan

APPENDIX 1 DISTRICT FOCUS POLICY

The Water Resources Assessment and Planning Project (WRAP) complies with the policy on District Focus for Rural Development. The water resources assessment presents the District authorities with an overall view of the water availability within their District. The study of the water development potential and options enables the District to select it's priorities and to plan for the development of the district water resources.

The district focus policy forms the background for the preparation of the District Water Development Plan and therefore the main aspects are summarized here (District Focus for Rural Development, Office of the President, 1987). The summary also contains information on the institutional set-up for planning in the District, which will be referred to in Part 3.

A schematic reproduction of the District Focus structure for the Water Sector is given below.



The responsibility for planning and implementing rural developments has been shifted from the headquarters of ministries to the districts. This strategy, known as the 'District Focus for Rural Development', is based on the principle of a complementary relationship between the ministries with their sectoral approach to development and the districts with their integrated approach to addressing local needs. Responsibility for the operational aspects of district-specific rural development projects has been delegated to the districts. Responsibility for general policy and the planning of multi-district and national programmes remains with the ministries.

The ministries and districts are co-operating on rural development through local projects and through multi-district and national programmes. Projects (or local components of larger programmes) that are primarily intended to serve one district or part of a district are referred to as 'district-specific' and are to be identified, selected, planned, and implemented at the district level.

Ministries also guide the districts in the implementation of the Budget Rationalization Programme. Districts must recognize that due to limited resources it is not possible for ministries to incorporate into their budgets and to implement all the projects being proposed at the same time. There is need, therefore, to concentrate the available resources on fewer projects so as to complete them sooner and bring them into productive service faster.

Operational consequences are, e.g.:

- limitation of proposals for GoK funding to two per sector per division;
- no drastic changes in the annual GoK budget for the District (10% plus or minus);
- identification of private resources to be put to use in support of an organised development programme.

District planning and co-ordination are carried out through a process which includes regular meetings of the development committees at each level of the district administrative structure and through the preparation of two basic planning documents: the 5 year District Development Plan and the annual Annex to that Plan. As has been mentioned before, the district responsibility for planning and co-ordination covers district-specific projects sponsored by the Government (ministries will provide policy guidelines), including those supported by foreign donors and those supported through the local authorities and through Harambee efforts. The district also reviews and endorses projects in the district sponsored by parastatal organizations, and by non-governmental organizations (NGOs), including local self-help organizations. Large national projects, which might have a great impact on the district's economic development, are meant to be included in the DDP, although they are planned on national level.

The District Development Committee is the foundation of the decentralised rural development strategy. The functions of the DDC are to:

1. review ongoing progress to ensure that current projects are rapidly implemented and that completed projects and existing infrastructure are effectively operated and maintained;
2. consider new proposals submitted by the Divisional Development Committees;
3. establish priorities for future projects in the five year District Development Plan;
4. endorse the district's annual submission of project proposals to the ministries in the annual Annex to the District Development Plan; and
5. review and endorse all project proposals of local authorities, parastatals, regional development authorities, and NGOs operating in the district.

In undertaking its planning responsibilities the DDC must take a broad perspective on ensuring the full and productive utilization of the resources available within the district, including manpower, natural resources and financial resources. In this respect the DDC should view the district as an economic unit, identifying economic potentials and the infrastructure and other conditions required for realizing these potentials. This will require also that the DDC develop and maintain a comprehensive Infrastructure Inventory of the existing and newly completed facilities in each sector of the economy (roads, schools, water systems, health facilities, etc.). A major planning function of the DDC will be to ensure that adequate resources are available for operation and maintenance of the existing infrastructure and facilities.

The District Executive Committee provides technical support for the DDC activities, including preparation of plans and management and implementation of projects. The DEC also serves to promote the inter-ministerial coordination of development activities in the district.

The principal functions of the DEC are to:

1. make operational decisions within the guiding directives of the DDC,
2. co-ordinate and monitor implementation of all projects and activities in the district,
3. prepare the draft District Development Plans and the annual Annexes for submission to the DDC, and
4. prepare briefing notes on all proposals and reports to be submitted to the DDC.

The office of the District Development Officer, who is the secretary of the DDC and the DEC, is being strengthened by the establishment of a District Planning Unit. The unit's objectives are to serve as a secretariat to the District Executive Committee for day-to-day coordination of planning and implementation work. However the DPU's are currently not yet fully operational.

The identification of projects is a continuous process. The initial idea for a project usually comes from the area that will benefit from its implementation (the location or sub-location). After being discussed and agreed upon locally, the project suggestion is forwarded to the Divisional Development Committee. Divisional Development Committees expand these suggestions into project proposals which are properly formulated and ranked according to the priorities of the division. These proposals are then submitted to the DDC.

Project proposals submitted by the DvDC to the DDC are first screened by the District Executive Committee on technical grounds and then prioritised by the DDC for inclusion in the five year District Development Plan and subsequently into the annual Annexes to that Plan.

The District Officer, District Development Officer and divisional technical officers in the DvDCs are charged with the responsibility of preparing the required documentation to support the DvDC project proposals. Local involvement in project identification and formulation is an essential element in the planning process, since it is this process which ensures that the feelings and wishes of the beneficiaries are included in the design and selection of all development projects and programmes.

The Locational Development Committees (LDCs) and Sub-locational Development Committees (SLDCs) represent the grass-roots level community and are responsible for discussion of community needs and the initial identification of projects and activities to address those needs. They are to forward initial project ideas to the Divisional Development Committee for review and appraisal and play an important role in the co-ordination and monitoring of project implementation.

These community level development committees are an essential element in promoting increased local level participation in the development process. However, while DvDCs have been active in all districts, LDCs and SLDCs have not been sufficiently active in all districts. Locational and sub-locational personnel have also not been equipped with basic skills in project planning and monitoring. It is necessary that these personnel be given training in handling these functions and in preparing detailed minutes of meetings

in order to ensure effective communication with the DvDCs and DDCs. All DDCs must take steps to ensure that these committees meet regularly to carry out the above functions and that they receive the training required to improve their capabilities for carrying out these functions.

The planning and siting of all projects should be fully discussed and approved by the local development committees so that the projects are seen as community projects. All communications with the communities and the local development committees on technical issues should also be phrased in a language that can be fully understood by them. This will promote full community participation in project implementation.

(From: District Focus for Rural Development, Office of the President, March 1987).

APPENDIX 2

BASIC DATA FOR WATER DEMAND CALCULATIONS

APPENDIX 2

BASIC DATA FOR WATER DEMAND CALCULATIONS

1. Unit Water Consumption Rates
2. Population Data
3. Livestock Numbers
4. Areas and Land Potential
5. List of Primary and Secondary Schools
6. Health
7. Commercial Facilities

APPENDIX 2 UNIT WATER CONSUMPTION RATES

CONSUMER	UNIT	RURAL AREAS			URBAN AREAS		
		HIGH POTENTIAL	MEDIUM POTENTIAL	LOW POTENTIAL	HIGH CLASS HOUSING	MEDIUM CLASS HOUSING	LOW CLASS HOUSING
People with Individual Connections	l/head/day	60	50	40	250	150	75
People without Individual Connections	l/head/day	20	15	10	-		20
Livestock Unit	l/head/day	50			-		
Boarding Schools	l/head/day	50					
Day Schools: with WC without WC	l/head/day	25 5					
Hospitals: Regional District Other	l/bed/day	400} 200} +20 l per outpatient per day 100} (total minimum 5000 l/day)					
Dispensary and Health Centre	l/day	5000					
Hotels: High Class Medium Class Low Class	l/bed/day	600 300 50					
Administrative Offices	l/head/day	25					
Bars	l/day	500					
Shops	l/day	100					
Unspecified Industry	l/ha/day			20,000			
Coffee Pulping Factories	l/kg coffee	25 (when recirculation of water is used)					

(Source: Design Manual for Water Supply in Kenya, MoWD, 1986)

Remark: Many health centres have beds, therefore it is better to estimate the demand similar as for hospitals at 100 l/bed/day.

Population Data per Sub-Location, Samburu District

BARAGOI DIVISION

LOCATION	SUB-LOCATION	1979 CENSUS SUB-LOC.	1979 CENSUS LOC.	Adjusted 1979 CENSUS SUB-LOC.	Adjusted 1979 CENSUS LOC.	Projection 1988 SUB-LOC.	Projection 1988 LOC.	1988 Household Count SUB-LOC.	1988 Household Count LOC.
Nyiro	South Horr	986	3330	986	3330	1013	3613	1145	3460
	South Horr T.C.	668		668		834			
	Tuum	884		290		298		470	
	Tuum T.C.	200		200		250			
	Parkati			594		610		570	
	Uaso Rongai	592		592		608		1275	
Kawop	Losurukoi	1054	3835	1054	3835	1083	3940	305	715
	Lonyangaten	2781		2781		2857		410	
Ndoto	Latakweny	1649	4599	1649	4599	1694	4772	1160	5010
	Lesirikan	2735		2735		2810		3850	
	Lesirikan T.C.	215		215		269			
Arsim	Illaut	582	1135	224	1135	230	1166	390	1535
	Arsim			358		368		625	
	Nguronit	553		553		568		520	
Nachola	Nachola	2180	2180	1247	2180	1281	2240	1210	2115
	Terter			933		958		905	
Baragoi	Baragoi	945	3537	945	3537	971	4336		2940
	Baragoi T.C.	2592		2592		3365		2940	
Marti	Kalele	2563	2563	868	2563	892	2633	535	1580
	Lokorkor			844		867		520	
	Moru-Akiring			851		874		525	
Elbarta	Marti	868	2212	868	2212	892	2303	525	2045
	Marti T.C.	136		136		170			
	Ngilai	49		393		404		495	
	Masikita	1159		815		837		1025	
	BARAGOI DIVISION TOTAL		23391		23391		25002		19400

Notes: 1) Adjusted 1979 census contains estimates for sub-locations which did not exist in 1979.

2) Projection of 1988 population of major urban areas (Maralal, Suguta Marmar, Baragoi, Wamba) according data from DDP 1989/1993.

3) Projection of 1988 population of minor urban areas based on 2.5% growth rate.

4) Projection of 1988 population of rural areas based on 0.3% growth rate.

Population Data per Sub-location, Samburu District

LORROKI DIVISION

LOCATION	SUB-LOCATION	1979 CENSUS SUB-LOC.	1979 CENSUS LOC.	Adjusted 1979 CENSUS SUB-LOC.	Adjusted 1979 CENSUS LOC.	Projection 1988 SUB-LOC.	Projection 1988 LOC.	1988 Household Count SUB-LOC.	1988 Household Count LOC.
Poro	Siambu	533	2493	533	2493	564	2713	1165	3065
	Poro T.C.	386		386		482			
	Seketet	432		432		457		760	
	Sirata Oirobi	864		864		915		700	
	Nkejemueny	278		278		294		440	
Angata Nanyukie	Angata Nanyukie	1622	2003	1106	2003	1171	2193	2000	2935
	Loibashai			287		304		520	
	Barsaloi			229		242		415	
	Barsaloi T.C.	381		381		476			
Opiroi	Opiroi	1677	3264	1677	3264	1775	3520	835	1215
	Opiroi T.C.	340		340		425			
	Mabati			410		434		125	
	Mbukoi	1247		837		886		255	
Loosuk	Malaso		2471	677	2471	717	2674	845	3085
	Tinga			1033		1094		1290	
	Loosuk	2168		458		485		950	
	Loosuk T.C.	303		303		378			
Maralal	Ledero		10230	3698	10230	8197	22677	3830	10595
	Lpartuk			1120		2483		n.a.	
	Township			5412		11997		n.a.	
Sukuta Marmar	Lolmolok	1406	5232	1406	5232	1488	7272	1375	6190
	Amaiya			350		370		825	
	Amaiya T.C.	140		140		175			
	Longewan	833		483		512		1140	
	Logorate	923		923		977		1220	
	Sukuta Marmar	1448		1448		1500		1630	
	Sukuta Marmar T.C.	482		482		2250			
Kisima	Nauneri	790	4210	790	4210	836	4486	535	2155
	Lmisigiyoi	608		608		644		175	
	Lkilorit	1515		1515		1604		550	
	Mbaringon	1143		1143		1210		895	
	Kisima T.C.	154		154		192			
Lodokojek	Moru		4850	1009	4850	1068	5178	435	2160
	Nonkeek	1925		916		970		395	
	Lodokojek	1676		1676		1774		585	
	Lodokojek T.C.	37		37		46			
	Kirimun	1022		1022		1082		745	
	Kirimun T.C.	190		190		237			
	LORROKI DIVISION TOTAL		34753		34753		50712		31400

Notes: 1) Adjusted 1979 census contains estimates for sub-locations which did not exist in 1979.

2) Projection of 1988 population of major urban areas (Maralal, Suguta Marmar, Baragoi, Wamba) according data from DDP 1989/1993.

3) Projection of 1988 population of minor urban areas based on 2.5% growth rate.

4) Projection of 1988 population of rural areas based on 0.6% growth rate.

Population Data per Sub-location, Samburu District

WAMBA DIVISION

LOCATION	SUB-LOCATION	1979 CENSUS		Adjusted 1979 CENSUS		Projection 1988		1988 Household Count	
		SUB-LOC.	LOC.	SUB-LOC.	LOC.	SUB-LOC.	LOC.	SUB-LOC.	LOC.
Ngilai	Swari	1535	6130	1535	6015	1577	6226	2205	6090
	Ngare Narok	1437		1437		1476		515	
	Ngilai	1307		1307		1343		1800	
	Ngilai T.C.	212		212		265			
	Lkisin	681		681		700		655	
	Ngogoltin	958		843		866		915	
Lodungokwe	Nkaroni	479	3753	479	3753	492	3946	1400	4200
	Lpus	767		767		788		850	
	Lodungokwe T.C.	410		410		512			
	Ltirimin	1298		1298		1333		800	
	Sesia	799		799		821		1150	
Wamba	Matakwen	316	4567	316	4567	325	7547	140	3695
	Kolting	830		830		853		1055	
	Wamba	1165		1165		1275			
	Wamba T.C.	2256		2256		5095		2500	
	WAMBA DIVISION TOTAL		14450		14335		17720		13985

WASO DIVISION

LOCATION	SUB-LOCATION	1979 CENSUS		Adjusted 1979 CENSUS		Projection 1988		1988 Household Count	
		SUB-LOC.	LOC.	SUB-LOC.	LOC.	SUB-LOC.	LOC.	SUB-LOC.	LOC.
Waso	Lerata	359	3621	359	3621	369	3945	360	2570
	Lengusaka	485		485		498		335	
	Remote	311		311		319		425	
	Ngutuk Ongiron	452		452		464		380	
	Ngutuk Ongiron T.C.	211		211		264			
	Archers Post	996		661		679		710	
	Archers Post T.C.	807		807		1008			
	Losesia			335		344		360	
Serolipi	Donyo Uasin		693	115	808	118	912	125	350
	Serolipi	325		325		334		225	
	Serolipi T.C.	368		368		460			
	WASO DIVISION TOTAL		4314		4429		4857		2920

Notes: 1) Adjusted 1979 census contains estimates for sub-locations which did not exist in 1979.

2) Projection of 1988 population of major urban areas (Maralal, Suguta Marmar, Baragoi, Wamba) according data from DDP 1989/1993.

3) Projection of 1988 population of minor urban areas based on 2.5% growth rate.

4) Projection of 1988 population of rural areas based on 0.3% growth rate.

LIVESTOCK NUMBERS PER SUB-LOCATION, SAMBURU DISTRICT, 1988

Lorroki Division

LOCATION	S/LOCATION	CATTLE	SHOATS	CAMELS	DONKEYS	TOTAL L.U
PORO	Siambu	2,224	6,153	103	71	2,743
	Seketet	1,451	4,014	67	47	1,790
	Sirata Oirobi	1,337	3,697	62	43	1,649
	Nkejemueny	840	2,324	39	30	1,039
ANGATA NANYUKIE	Ang. Nanyukie	5,980	16,547	276	192	7,377
	Loibashai	1,555	4,302	72	50	1,918
	Barsaloi	1,241	3,433	57	40	1,532
OPIROI	Opiroi	5,026	13,906	233	161	6,201
	Mabati	752	2,082	35	24	928
	Mbukoi	1,535	4,247	71	49	1,893
LOOSUK	Malaso	3,365	9,311	155	108	4,151
	Tinga	5,137	14,214	237	164	6,336
	Loosuk	3,783	10,468	175	121	4,667
MARALAL	Ledero	1,862	5,154	86	60	2,297
	Township	748	2,069	35	24	924
	Lpartuk	1,778	4,919	82	57	2,193
SUKUTA MARMAR	Lolmolok	2,924	8,091	136	94	3,608
	Amaiya	1,755	4,854	81	56	2,164
	Longewan	2,425	6,708	112	78	2,991
	Logorate	2,595	7,178	120	83	3,201
	Sukuta Marmar	3,467	9,591	161	111	4,277
KISIMA	Nauneri	2,760	7,636	128	88	3,405
	Lmisigiyoi	903	2,498	42	29	1,114
	Lkilorit	2,837	7,850	132	91	3,501
	Mbaringon	4,617	12,774	214	148	5,695
LODOKOJEK	Moru	2,062	5,705	95	66	2,543
	Nonkeek	1,873	5,180	86	60	2,310
	Lodokojek	2,773	7,672	128	89	3,422
	Kirimun	3,532	9,771	163	113	4,356
TOTAL		73,137	202,348	3,383	2,347	90,226

Waso Division

LOCATION	S/LOCATION	CATTLE	SHOATS	CAMELS	DONKEYS	TOTAL L.U
WASO	Lerata	661	2,126	75	68	953
	Lengusaka	616	1,978	70	63	887
	Remote	781	2,509	88	80	1,124
	Ngutuk Ong.	698	2,247	79	72	1,006
	Archer's Post	1,305	4,192	148	134	1,880
	Losesia	661	2,126	75	68	953
SEREOLIPI	Donyo Uasin	746	2,542	68	49	1,045
	Sereolipi	1,968	6,706	180	129	2,759
TOTAL		7,436	24,426	783	663	10,608

Note: 1 L.U. = 1.25 Cattle = 8 Shoats = 0.83 Camels = 1 Donkey

(The L.U. used for calculation of livestock water demand is different:
1 LU = 3 Indig. cows = 15 shoats)

LIVESTOCK NUMBERS PER SUB-LOCATION, SAMBURU DISTRICT, 1988

Baragoi Division

LOCATION	S/LOCATION	CATTLE	SHOATS	CAMELS	DONKEYS	TOTAL L.U
ARSIM	Ngurunoit	4,177	8,197	0	135	4,501
	Illaut	3,842	9,563	381	338	5,066
	Arsim	3,436	7,732	27	113	3,861
NYIRO	South Horr	5,280	11,339	838	149	6,800
	Parkate	1,970	16,087	508	169	4,368
	Tum	3,940	9,988	212	282	4,938
	Uaso Rongai	2,798	9,727	229	182	3,912
NACHOLA	Nachola	2,837	10,424	1,151	90	5,049
	Terter	4,078	10,967	1,523	451	6,919
MARTI	Moru-Akiring	1,379	9,017	355	101	2,759
	Kalele	1,163	6,284	254	124	2,146
	Lokorkor	1,301	6,831	296	142	2,393
ELBARTA	Ngilai	4,532	2,186	846	113	5,031
	Masikita	2,364	9,563	1,270	646	5,263
	Marti	2,955	6,148	76	66	3,290
NDOTO	Lesirkan	4,926	23,225	85	360	7,306
	Latakweny	4,729	19,354	592	451	7,367
KAWOP	Lonyangatan	4,137	12,903	474	315	5,809
	Losirikoi	4,082	13,483	389	282	5,702
TOTAL		63,926	203,018	9,506	4,509	92,480

Wamba Division

LOCATION	S/LOCATION	CATTLE	SHOATS	CAMELS	DONKEYS	TOTAL L.U
NGILAI	Swari	6,347	17,812	740	587	8,783
	Ngare Narok	1,482	4,160	173	137	2,052
	Ngilai	5,181	14,540	604	479	7,169
	Lkisin	1,885	5,291	220	174	2,608
	Ngogoltin	2,634	7,391	307	243	3,644
LODUNGOKWE	Nkaroni	2,023	6,553	110	288	2,858
	Lpus	1,228	3,979	67	175	1,735
	Ltirimin	1,156	3,745	63	165	1,634
	Sesia	1,661	5,383	90	237	2,347
WAMBA	Matakwen	1,010	5,309	91	140	1,722
	Kolting	1,350	7,096	121	188	2,301
	Wamba	149	780	13	21	253
TOTAL		26,106	82,039	2,599	2,834	37,105

Note: 1 L.U. = 1.25 Cattle = 8 Shoats = 0.83 Camels = 1 Donkey

(The L.U. used for calculation of livestock water demand is different:
1 LU = 3 Indig. cows = 15 shoats)

AREAS AND LAND POTENTIAL (o/o area)

Summary of Areas

Samburu District	Area (km²)	% of Total
Baragoi	7,022	33.8
Lorroki	4,010	19.3
Wamba	5,162	24.8
Waso	4,608	22.2
Total	20,801	100.0

Baragoi Division

Location	Sub-Location	Area km²		High %	Medium %	Low %
		Sub-Loc.	Loc			
Nyiro	South Horr	407		0	30	70
	Tuum	377		0	30	70
	Parkati	151		0	0	100
	Uaso Rongai	325	1260	0	30	70
Kawop	Losurukoi	477		0	0	100
	Lonyangaten	360	837	0	0	100
Ndoto	Latakweny	735		0	50	50
	Lesirikan	728	1463	0	55	45
Arsim	Illaut	125		0	80	20
	Arsim	119		0	70	30
	Nguronit	273	518	0	60	40
Nachola	Nachola	254		0	0	100
	Terter	311	565	0	0	100
Baragoi	Baragoi	14	14	0	0	100
Marti	Kalele	359		0	10	90
	Lokorkor	173		0	0	100
	Moru-Akiring	691	1223	0	0	100
Elbarta	Marti	301		0	30	70
	Ngilai	200		0	0	100
	Masikita	642	1142	0	0	100

Wamba Division

Location	Sub-Location	Area km²		High %	Medium %	Low %
		Sub-Loc.	Loc			
Ngilai	Swari	803		0	5	95
	Ngare Narok	911		0	20	80
	Ngilai	1002		0	40	60
	Lkisin	177		0	30	70
	Ngogoltin	468	3361	0	50	50
Lodungokwe	Nkaroni	325		0	0	100
	Lpus	130		0	0	100
	Ltirimin	167		0	20	80
	Sesia	420	1042	0	10	90
Wamba	Matakwen	306		0	5	95
	Kolting	409		0	20	80
	Wamba	45	759	0	50	50

AREAS AND LAND POTENTIAL (o/o area)

Lorroki Division

Location	Sub-Location	Area km²		High %	Medium %	Low %
		Sub-Loc.	Loc			
Poro	Siambu	421		0	30	70
	Seketet	60		0	100	0
	Sirata Oirobi	48		0	100	0
	Nkejemueny	20	548	0	100	0
Angata Nanyukie	Angata Nanyukie	185		0	100	0
	Loibashai	168		0	60	40
	Barsaloi	237	589	0	75	25
Opiroi	Opiroi	323		0	65	35
	Mabati	129		0	40	60
	Mbukoi	119	571	0	20	80
Loosuk	Malaso	205		0	50	50
	Tinga	147		0	50	50
	Loosuk	133	485	0	70	30
Maralal	Ledero	66		0	100	0
	Township	53		0	100	0
	Lpartuk	63	183	0	100	0
Sukuta Marmar	Lolmolok	214		0	80	20
	Amaiya	100		0	70	30
	Longewan	90		0	100	0
	Logerate	67		0	100	0
	Sukuta Marmar	103	575	0	100	0
Kisima	Nauneri	90		0	100	0
	Lmisigiyoi	45		0	100	0
	Lkilorit	143		0	100	0
	Mbaringon	150	428	0	100	0
Lodokojek	Moru	243		0	70	30
	Nonkeek	110		0	80	20
	Lodokojek	153		0	90	10
	Kirimun	124	630	0	90	10

Waso Division

Location	Sub-Location	Area km²		High %	Medium %	Low %
		Sub-Loc.	Loc			
Waso	Lerata	319		0	20	80
	Lengusaka	98		0	0	100
	Remote	76		0	0	100
	Ngutuk Ongiron	239		0	0	100
	Archers Post	325		0	0	100
	Losesia	1463	2520	0	0	100
Serolipi	Donyo Uasin	574		0	0	100
	Serolipi	1514	2088	0	0	100

SAMBURU - LIST OF PRIMARY SCHOOLS

Lorroki Division

LOCATION	SUB-LOCATION	SCHOOL	NO. OF PUPILS 1987		IMPROVED WATER SUPPLY NEEDED
ANGATA NANYUKIE	Angata Nanyukie	Ngarika	72	D	+
ANGATA NANYUKIE	Angata Nanyukie	Angata Nanyukie	84	D	+
ANGATA NANYUKIE	Angata Nanyukie	Moridjo	127	B	+
ANGATA NANYUKIE	Loibashae	Lonkutukie	25	D	+
ANGATA NANYUKIE	Loibashae	Lorroki Lolmongo	47	D	+
KISIMA	Lkilorit	Baawa	249	B	+
KISIMA	Lmisigiyoi	Lmisigiyoi	195	D	+
KISIMA	Mbaringon	Kisima	252	D	+
KISIMA	Mbaringon	Naiborkeju	78	D	+
KISIMA	Nauneri	Nontoto	74	D	+
KISIMA	Nauneri	Lohoro-Lelerai	116	D	+
LODOKOJEK	Kirimun	Kirimun	251	D	-
LODOKOJEK	Kirimun	Sura Adoru	39	D	+
LODOKOJEK	Lodokojek	Lodokejek	172	D	-
LODOKOJEK	Lodokojek	Loltulelei	50	D	+
LODOKOJEK	Nonkeek	Nonkeek	52	D	+
LOOSUK	Loosuk	Lolkunono	296	D	+
LOOSUK	Loosuk	Loosuk	299	B	+
LOOSUK	Loosuk	Nkopelian	75	D	+
LOOSUK	Malaso/Tinga	Loibor Ngare	46	D	+
MARALAL	Ledero	St. Mary's	372	D	-
MARALAL	Ledero	St. Paul's	492	D	-
MARALAL	Ledero	Maralal DEB	759	B	-
MARALAL	Ledero	Ledero	225	D	+
MARALAL	Ledero	Loikas	422	D	-
MARALAL	Lpartuk	Lkuroto	106	D	+
MARALAL	Lpartuk	Nomotio	172	D	+
MARALAL	Lpartuk	Lpartuk	187	D	+
MARALAL	Township	Muslim	74	D	-
MARALAL	Township	Milimani	235	D	-
OPIROI	Opiroi	Opiroi	150	B	+
OPIROI	Opiroi	Nomboroi	82	D	+
PORO	Nkejemueny	Nkejuemuny	136	D	+
PORO	Seketet	Seketet	157	D	+
PORO	Seketet	Lorroki	198	D	+
PORO	Sirata Oirobi	Sirata Oirobi	276	B	-
PORO	Sirata Oirobi	Lemisigiyo	57	D	+
SUGUTA MARMAR	Amayia	Amayia	151	B	-
SUGUTA MARMAR	Logorate	Logorate	233	D	+
SUGUTA MARMAR	Lolmolok	Kitabor	56	D	+
SUGUTA MARMAR	Lolmolok	Lolmolok	307	D	+
SUGUTA MARMAR	Longewan	Longewan	173	B	+
SUGUTA MARMAR	Suguta Marmar	Suguta Marmar	541	B	-
SUGUTA MARMAR	Suguta Marmar	Angata Rongai	88	D	+
Total			8248		

B = Boarding Schools D = Day Schools

New day schools in 1993: Siambu, Mbukoi, Tinga, Sukuta Marmar, Moru (estimate for demand calculation 100 pupils)

New boarding schools in 1993: Mbaringon, Barsaloi (estimate for demand calculation 240 pupils)

SAMBURU - LIST OF PRIMARY SCHOOLS

Wamba Division

LOCATION	SUB-LOCATION	SCHOOL	NO. OF PUPILS 1987		IMPROVED WATER SUPPLY NEEDED
WAMBA	Wamba	Wamba DEB	579	B	-
WAMBA	Wamba	Wamba CCM	743	D	-
WAMBA	Koiting	Sionta	56	D	+
LODUNGOKWE	Lpus	Lodungokwe	160	D	-
LODUNGOKWE	Sesia	Ngutuk Elmuget	23	D	+
LODUNGOKWE	Nkaroni	Nagor-Oworu	59	D	+
NGILAI	Swari	Barsaloi	210	B	+
NGILAI	Ngilai	Engilai	158	D	+
NGILAI	Ngogolt	Golgoltim	108	D	+
NGILAI	Lkisin	Lkisin	136	D	+
NGILAI	Swari	Nairimirimo	39	D	+
NGILAI	Ngilai	Ormodei	37	D	+
NGILAI	Swari	Raraiti	32	D	+
NGILAI	Swari	Swari	126	B	+
	Total		2466		

Waso Division

LOCATION	SUB-LOCATION	SCHOOL	NO. OF PUPILS 1987		IMPROVED WATER SUPPLY NEEDED
SEROLIPI	Serolipi	Sere-Olipi	85	B	+
SEROLIPI	Donyo Uasin	Ndonyo Wasin	61	D	+
WASO	Archers Post	Girgir	590	B	-
WASO	Lerata	Lerata	135	D	-
WASO	Ngutuk Ongiron	Lpus-Leluai	54	D	+
WASO	Ngutok Ongiron	Ngutuk Ongiron	23	D	+
	Total		948		

Baragoi Division

LOCATION	SUB-LOCATION	SCHOOL	NO. OF PUPILS 1987		IMPROVED WATER SUPPLY NEEDED
NYIRO	Uaso Rongai	Uaso Rongai	47	D	+
NYIRO	Tum	Tuum	120	D	-
NYIRO	South Horr	South Horr	331	D	-
NYIRO	Parkati	Parkati	25	D	+
NDOTO	Lesirikan	Lesirikan	276	B	+
NDOTO	Latakweny	Latakweny	71	D	+
NACHOLA	Nachola	Nachola	153	B	+
MARTI	Kalele	Marti	232	B	+
ELBARTA	Ngilai	Ngilai	105	D	+
ELBARTA	Masikita	Masikita	109	D	+
BARAGOI	Baragoi	Nalingangor	127	D	+
BARAGOI	Baragoi	Baragoi	1062	B	-
ARSIM	Illaut	Illaut	91	B	+
	Total		2730		

B = Boarding Schools D = Day Schools

New day schools in 1993: Losurukoi, Latakweny, lesitikan, Arsim, Ngurunit, Nachola, Marti, Matakwa, lengusaka.

SAMBURU - SCHOOLS

Primary Schools:

	Number of Schools			No. of pupils		
	Total	Boarding	Day	Total	Boarding	Day
WAMBA DIVISION	14	3	11	2466	915	1551
BARAGOI DIVISION	13	5	8	2730	1814	916
LORROKI DIVISION	44	9	35	8248	2725	5523
WASO DIVISION	6	2	4	948	675	273
Total	77	19	58	14392	6129	8263

Secondary Schools

Location	Sub-Location	Schools	No. of Pupils	
MARALAL	Lpartuk	Maralal High	373	B
MARALAL		Kirissia (?)		
KISIMA	Mbaringon (?)	Kisima Girls		
WAMBA	Wamba	St. Theresa Girls	134	B
BARAGOI	Baragoi	Baragoi	171	B
WAMBA	Wamba	Boys Sec. School		B
Total			678	

Source: DDP Samburu 1989-1993
updated with information from the Education Department

HEALTH

			Sub-Location
Hospital:	Maralal District Hospital	- 68 beds	Township
	Wamba Catholic Hospital	- 178 beds	Wamba
Health Centre:	Baragoi	- 28 beds	Baragoi
	Wamba	- 24 beds	Wamba
1. Government		**Outpatients/Year**	
Hospital:	Maralal District Hospital	24886	Township
Health Centres:	Baragoi	12152	Baragoi
	Wamba	4885	Wamba
Dispensaries:	Loosuk	11475	Loosuk
	Sirata Oirobi	3564	Sirata Oirobi
	Barsaloi	-	Barsaloi
	Suguta Marmar	8071	Suguta Marmar
	G.K. Prisons	6122	Township
	Serolipi	3543	Serolipi
	Marti	8515	Marti
	Kirimun	9400	Kirimun
	West Gate	743	Ngutuk Ongiron
2. NGO			
Hospital:	Wamba Catholic Hospital	56860	Wamba
Dispensaries:	Archer's Post	11020	Archer's Post
	Suguta Marmar	3241	Suguta Marmar
	Maralal	21937	Township
	South Horr	6500	South Horr
	Samburu Game Lodge	950	Archer's Post
	Baragoi	-	Baragoi
	Lesirikan	3008	Lesirikan
	Arsim	2169	Illaut
	Tum (not yet in operation)	-	Tum
Proposed Health Facilities:			
Health Centre:	Lodungokwe		Lpus
Dispensaries:	Suguta Marmar (upgrading of Dispensary)		Suguta Marmar
	Poro		Siambu
	Latakweny		Latakweny
	Opiroi		Opiroi

Commercial Facilities

DIVISION	LOCATION	SUBLOCATION	CENTRE	SHOPS	BARS	HOTELS	INDUSTRIES
LORROKI	Maralal	Township	Maralal	216	5	25	3
	Kisima	Nauneri	Kisima	29	1	5	-
	Kisima	Lkilorit	Baawa	2	-	-	-
	Lodokojek	Lodokojek	Lodokojek	5	1	1	-
	Lodokojek	Kirimun	Kirimun	11	2	2	-
	Sukuta Marmar	Suguta Marmar	Suguta Marmar	44	4	4	-
	Sukuta Marmar	Longewan	Longewan	3	-	1	-
	Sukuta Marmar	Lolmolok	Lolmolog	2	-	-	-
	Loosuk	Loosuk	Loosuk	27	1	3	-
	Loosuk	Tinga	Lukunono	2	-	-	-
	Loosuk	Malaso	Pura	3	-	-	-
	Poro	Siambu	Poro	28	2	3	-
	A/Nanyukie	A/Nanyukie	A/Nanyukie	1	-	-	-
	Sukuta Marmar	Amaiya	Amaiya	2	-	-	-
	Opiroi	Opiroi	Opiroi	2	-	-	-
	Opiroi	Opiroi	Nomboroi	3	-	-	-
BARAGOI	Elbarta	Marti	Marti	8	-	1	-
	Baragoi	Baragoi	Baragoi	5	3	8	-
	Kawap	Lasurukoi	Losurukoi	2	-	-	-
	Nyiro	Tuum	Tuum	5	2	-	-
	Nyiro	Uaso Rongai	Naiseecho	1	-	-	-
	Nyiro	South Horr	South Horr	12	1	2	-
	Arsim	Illaut	Illaut	3	-	-	-
	Arsim	Ngoronot	Nkuronit	2	-	-	-
	Arsim	Illaut	Arsim	2	-	-	-
	Ndoto	Lesirikan	Lesirikan	11	-	2	-
	Ndoto	Latakweny	Latakweny	6	-	2	-
	Ndoto	Latakweny	Latakweny	6	-	2	-
	Elbarta	Masikita	Masikita	6	-	1	-
WAMBA	Lodungokwe	Lpus	Londungokwe	15	-	3	-
	Lodungokwe	Sesia	Ngutuk Olmuget	2	-	-	-
	Wamba	Wamba	Wamba	35	1	7	-
	Ngilai	Swari	Swari	4	-	-	-
	Ngilai	Ngilai	Erigilai	5	-	-	-
	Wamba	Kolting	Lprata	3	-	1	-
	Ngilai	Swari	Rairait	1	-	-	-
WASO	Waso	Lengusaka	Lekusaka	4	-	-	-
	Waso	Remote	Ngutuk Ongiron	2	-	-	-
	Serolipi	Serolipi	Serolipi	13	1	1	-
	Waso	Archers Post	Archers Post	22	2	1	-

APPENDIX 3

DATA ENTRY SHEETS

DEMAND SHEETS

APPENDIX 3

DATA ENTRY SHEETS

DEMAND SHEETS

DIVISION	LOCATION	SUB-LOCATION	PAGE
BARAGOI	Arsim	Arsim	3-1
		Illaut	3-2
		Nguronit	3-3
	Baragoi	Baragoi	3-4
	Elbarta	Marti	3-5
		Masikita	3-6
		Ngilai	3-7
	Kawop	Lonyangatan	3-8
		Losurukoi	3-9
	Marti	Kalele	3-10
		Lokorkor	3-11
		Moru-Akiring	3-12
	Nachoła	Nachola	3-13
		Terter	3-14
	Ndoto	Latakweny	3-15
		Lesirikan	3-16
	Nyiro	Parkati	3-17
		South Horr	3-18
		Tuum	3-19
		Uaso Rongai	3-20
LORROKI	Angata Nanyukie	Angata Nanyukie	3-21
		Barsaloi	3-22
		Loibashai	3-23
	Kisima	Lkilorit	3-24
		Lmisigiyoi	3-25
		Mbaringon	3-26
		Nauneri	3-27
	Lodokojek	Kirimun	3-28
		Lodokojek	3-29
		Moru	3-30
		Nonkeek	3-31
	Loosuk	Loosuk	3-32
		Malaso	3-33
		Tinga	3-34
	Maralal	Ledero	3-35
		Lpartuk	3-36
		Township	3-37

DIVISION	LOCATION	SUB-LOCATION	PAGE
LORROKI	Opiroi	Mabati	3-38
		Mbukoi	3-39
		Opiroi	3-40
	Poro	Nkejemueny	3-41
		Seketet	3-42
		Siambu	3-43
		Sirata Oirobi	3-44
	Sukuta Marmar	Amaiya	3-45
		Logorate	3-46
		Lolmolok	3-47
		Longewan	3-48
		Sukuta Marmar	3-49
WAMBA	Lodungokwe	Lpus	3-50
		Ltirimin	3-51
		Nkaroni	3-52
		Sesia	3-53
	Ngilai	Lkisin	3-54
		Ngare Narok	3-55
		Ngilai	3-56
		Ngogoltin	3-57
		Swari	3-58
	Wamba	Kolting	3-59
		Matakwen	3-60
		Wamba	3-61
WASO	Serolipi	Donyo Uasin	3-62
		Serolipi	3-63
	Waso	Archers Post	3-64
		Lengusaka	3-65
		Lerata	3-66
		Losesia	3-67
		Ngutuk Ongiron	3-68
		Remote	3-69

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Arsim

LOCATION : Arsim
DIVISION : Baragoi

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 196700 mN Long. = 300200 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 119 (km²)		
CLASSIFICATION	Rural Area : High Potential	=	0 % population
	Medium Potential	=	70 % population
	Low Potential	=	30 % population
	Urban Area : High Class Housing	=	0 % population
	Medium Class Housing	=	0 % population
	Low Class Housing	=	0 % population
POPULATION	: 1979 (census)	=	358 No.
	1988 (estimated)	=	368 No.
LIVESTOCK	: Grade cow	=	0 No.
	Indigenous cow	=	171 No.
	Sheep/goats	=	1386 No.
	Donkey	=	0 No.
	Camel	=	27 No.
SCHOOLS	0 Day Schools with WC ->		0 Pupils
	0 Day Schools no WC ->		0 Pupils
	0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES		=	0 No.
HOSPITALS	0 Regional Hospitals ->		0 Beds
	0 District Hospitals ->		0 Beds
	0 Other Hospitals ->		0 Beds
	Outpatients/day =		0 No.
HOTELS	0 High Class Hotels ->		0 Beds
	0 Medium Class Hotels ->		0 Beds
	0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES	: Staff	=	1 No.
BARS	:	=	0 No.
SHOPS	:	=	0 No.
INDUSTRIES	No		

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Arsim DIVISION : Baragoi
LOCATION : Arsim DISTRICT : Samburu

POPULATION : 368 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 70 % population
Low Potential = 30 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 9 % Urban Area = 0 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC, High :	0 % =	0	No.		60	0
	Medium :	7 % =	25	No.		50	1250
	Low :	2 % =	7	No.		40	280
	with NC, High :	0 % =	0	No.		20	0
	Medium :	63 % =	231	No.		15	3465
	Low :	28 % =	103	No.		10	1030
	Total Demand for RURAL population						6025
URBAN POPULATION	with IC, High :	0 % =	0	No.		250	0
	Medium :	0 % =	0	No.		150	0
	Low :	0 % =	0	No.		75	0
	with NC, Low :	0 % =	0	No.		20	0
	Total Demand for URBAN population						0
LIVESTOCK	(L.U.) =		162	No.		50	8100
SCHOOLS	Day Schools with WC -> Pupils =		0	No.		25	0
	Day Schools no WC -> Pupils =		0	No.		5	0
	Boarding Schools -> Pupils =		0	No.		50	0
HEALTH	Health Centres\Dispensaries =		0	No.		5000	0
	Regional Hospitals -> Beds =		0	No.		400	0
	District Hospitals -> Beds =		0	No.		200	0
	Other Hospitals -> Beds =		0	No.		100	0
	All Hospitals Outpatients =		0	No.		20	0
HOTELS	High Class Hotels -> Beds =		0	No.		600	0
	Medium Class Hotels -> Beds =		0	No.		300	0
	Low Class Hotels -> Beds =		0	No.		50	0
ADMINISTRATIVE OFFICES	Staff =		1	No.		25	25
BARS	=		0	No.		500	0
SHOPS	=		0	No.		100	0
	TOTAL DEMAND (l/day)						14150

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Illaut

LOCATION : Arsim
DIVISION : Baragoi

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 206600 mN Long. = 305000 mE

TYPE = 1

1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 125 (km²)			
CLASSIFICATION	Rural Area	: High Potential	=	0 % population
		Medium Potential	=	80 % population
		Low Potential	=	20 % population
	Urban Area	: High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	0 % population
POPULATION		: 1979 (census)	=	224 No.
		1988 (estimated)	=	230 No.
LIVESTOCK		: Grade cow	=	0 No.
		Indigenous cow	=	45 No.
		Sheep/goats	=	364 No.
		Donkey	=	0 No.
		Camel	=	24 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		0 Day Schools no WC ->		0 Pupils
		1 Boarding Schools ->		91 Pupils
HEALTH CENTRES/DISPENSARIES			=	1 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day	=	6 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES		: Staff	=	0 No.
BARS		:	=	0 No.
SHOPS		:	=	5 No.
INDUSTRIES		No		

Printed : 13-07-1990

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Illaut DIVISION : Baragoi
LOCATION : Arsim DISTRICT : Samburu

POPULATION : 230 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 80 % population
Low Potential = 20 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 9 % Urban Area = 0 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.	60	0
		Medium :	8 % =	18	No.	50	900
		Low :	1 % =	2	No.	40	80
	with NC,	High :	0 % =	0	No.	20	0
		Medium :	72 % =	165	No.	15	2475
		Low :	19 % =	43	No.	10	430
	Total Demand for RURAL population						3885
URBAN POPULATION	with IC,	High :	0 % =	0	No.	250	0
		Medium :	0 % =	0	No.	150	0
		Low :	0 % =	0	No.	75	0
	with NC,	Low :	0 % =	0	No.	20	0
	Total Demand for URBAN population						0
LIVESTOCK			(L.U.) =	51	No.	50	2550
SCHOOLS	Day Schools with WC -> Pupils =			0	No.	25	0
	Day Schools no WC -> Pupils =			0	No.	5	0
	Boarding Schools -> Pupils =			91	No.	50	4550
HEALTH	Health Centres\Dispensaries =			1	No.	5000	5000
	Regional Hospitals -> Beds =			0	No.	400	0
	District Hospitals -> Beds =			0	No.	200	0
	Other Hospitals -> Beds =			0	No.	100	0
	All Hospitals Outpatients =			6	No.	20	120
HOTELS	High Class Hotels -> Beds =			0	No.	600	0
	Medium Class Hotels -> Beds =			0	No.	300	0
	Low Class Hotels -> Beds =			0	No.	50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.	25	0
BARS			=	0	No.	500	0
SHOPS			=	5	No.	100	500
	TOTAL DEMAND (l/day)						16605

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Ngurunoit

LOCATION : Arsim
DIVISION : Baragoi

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 195500 mN Long. = 311000 mE

TYPE = 1

1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA Total = 273 (km²)

CLASSIFICATION	Rural Area :	High Potential	=	0 % population
		Medium Potential	=	60 % population
		Low Potential	=	40 % population
	Urban Area :	High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	0 % population
POPULATION	:	1979 (census)	=	553 No.
		1988 (estimated)	=	568 No.
LIVESTOCK	:	Grade cow	=	0 No.
		Indigenous cow	=	97 No.
		Sheep/goats	=	750 No.
		Donkey	=	225 No.
		Camel	=	0 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		0 Day Schools no WC ->		0 Pupils
		0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day =		0 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES	:	Staff	=	0 No.
BARS	:		=	0 No.
SHOPS	:		=	2 No.
INDUSTRIES	No			

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Ngurunoit DIVISION : Baragoi
LOCATION : Arsim DISTRICT : Samburu

POPULATION : 568 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION :

High	Potential	=	0 % population
Medium	Potential	=	60 % population
Low	Potential	=	40 % population
High	Class Housing	=	0 % population
Medium	Class Housing	=	0 % population
Low	Class Housing	=	0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 8 % Urban Area = 0 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.	60	0
		Medium :	6 % =	34	No.	50	1700
		Low :	2 % =	11	No.	40	440
	with NC,	High :	0 % =	0	No.	20	0
		Medium :	54 % =	306	No.	15	4590
		Low :	38 % =	215	No.	10	2150
	Total Demand for RURAL population						8880
URBAN POPULATION	with IC,	High :	0 % =	0	No.	250	0
		Medium :	0 % =	0	No.	150	0
		Low :	0 % =	0	No.	75	0
	with NC,	Low :	0 % =	0	No.	20	0
	Total Demand for URBAN population						0
LIVESTOCK			(L.U.) =	172	No.	50	8600
SCHOOLS	Day Schools with WC -> Pupils =			0	No.	25	0
	Day Schools no WC -> Pupils =			0	No.	5	0
	Boarding Schools -> Pupils =			0	No.	50	0
HEALTH	Health Centres\Dispensaries =			0	No.	5000	0
	Regional Hospitals -> Beds =			0	No.	400	0
	District Hospitals -> Beds =			0	No.	200	0
	Other Hospitals -> Beds =			0	No.	100	0
	All Hospitals Outpatients =			0	No.	20	0
HOTELS	High Class Hotels -> Beds =			0	No.	600	0
	Medium Class Hotels -> Beds =			0	No.	300	0
	Low Class Hotels -> Beds =			0	No.	50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.	25	0
BARS			=	0	No.	500	0
SHOPS			=	2	No.	100	200
			TOTAL DEMAND (l/day)				17680

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Baragoi

LOCATION : Baragoi
DIVISION : Baragoi

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 197600 mN Long. = 253800 mE

TYPE = 3
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA Total = 14 (km²)

CLASSIFICATION	Rural Area	: High Potential	=	0 % population
		Medium Potential	=	0 % population
		Low Potential	=	25 % population
	Urban Area	: High Class Housing	=	0 % population
		Medium Class Housing	=	10 % population
		Low Class Housing	=	65 % population
POPULATION		: 1979 (census)	=	3537 No.
		1988 (estimated)	=	4336 No.
LIVESTOCK		: Grade cow	=	0 No.
		Indigenous cow	=	0 No.
		Sheep/goats	=	0 No.
		Donkey	=	25 No.
		Camel	=	0 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		1 Day Schools no WC ->		127 Pupils
		1 Boarding Schools ->		1062 Pupils
HEALTH CENTRES/DISPENSARIES			=	1 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		1 Other Hospitals ->		28 Beds
		Outpatients/day =		33 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		8 Low Class Hotels ->		64 Beds
ADMINISTRATION OFFICES		: Staff	=	50 No.
BARS		:	=	3 No.
SHOPS		:	=	50 No.
INDUSTRIES		No		

Printed : 13-07-1990

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Baragoi DIVISION : Baragoi
LOCATION : Baragoi DISTRICT : Samburu

POPULATION : 4336 Rural Pop. = 25 % Urban Pop. = 75 %

CLASSIFICATION :
High Potential = 0 % population
Medium Potential = 0 % population
Low Potential = 25 % population
High Class Housing = 0 % population
Medium Class Housing = 10 % population
Low Class Housing = 65 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 1 % Urban Area = 17 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	0 % =	0	No.		50	0
		Low :	1 % =	43	No.		40	1720
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	0 % =	0	No.		15	0
		Low :	24 % =	1040	No.		10	10400
	Total Demand for RURAL population							12120
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	10 % =	433	No.		150	64950
		Low :	7 % =	303	No.		75	22725
	with NC,	Low :	58 % =	2514	No.		20	50280
	Total Demand for URBAN population							137955
LIVESTOCK			(L.U.) =	10	No.		50	500
SCHOOLS	Day Schools with WC ->		Pupils =	0	No.		25	0
	Day Schools no WC ->		Pupils =	127	No.		5	635
	Boarding Schools ->		Pupils =	1062	No.		50	53100
HEALTH	Health Centres\Dispensaries		=	1	No.		5000	5000
	Regional Hospitals ->		Beds =	0	No.		400	0
	District Hospitals ->		Beds =	0	No.		200	0
	Other Hospitals ->		Beds =	28	No.		100	2800
	All Hospitals Outpatients		=	33	No.		20	660
HOTELS	High Class Hotels ->		Beds =	0	No.		600	0
	Medium Class Hotels ->		Beds =	0	No.		300	0
	Low Class Hotels ->		Beds =	64	No.		50	3200
ADMINISTRATIVE OFFICES			Staff =	50	No.		25	1250
BARS			=	3	No.		500	1500
SHOPS			=	50	No.		100	5000
TOTAL DEMAND (l/day)								223720

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Marti

LOCATION : Elbarta
DIVISION : Baragoi

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 163500 mN Long. = 246500 mE

TYPE = 2
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 301 (km²)		
CLASSIFICATION	Rural Area : High Potential	=	0 % population
	Medium Potential	=	25 % population
	Low Potential	=	60 % population
	Urban Area : High Class Housing	=	0 % population
	Medium Class Housing	=	0 % population
	Low Class Housing	=	15 % population
POPULATION	: 1979 (census)	=	1004 No.
	1988 (estimated)	=	1062 No.
LIVESTOCK	: Grade cow	=	0 No.
	Indigenous cow	=	914 No.
	Sheep/goats	=	3557 No.
	Donkey	=	125 No.
	Camel	=	76 No.
SCHOOLS	0 Day Schools with WC ->		0 Pupils
	0 Day Schools no WC ->		0 Pupils
	0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES		=	1 No.
HOSPITALS	0 Regional Hospitals ->		0 Beds
	0 District Hospitals ->		0 Beds
	0 Other Hospitals ->		0 Beds
	Outpatients/day	=	23 No.
HOTELS	0 High Class Hotels ->		0 Beds
	0 Medium Class Hotels ->		0 Beds
	2 Low Class Hotels ->		8 Beds
ADMINISTRATION OFFICES	: Staff	=	2 No.
BARS	:	=	0 No.
SHOPS	:	=	8 No.
INDUSTRIES	No		

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Marti DIVISION : Baragoi
LOCATION : Elbarta DISTRICT : Samburu

POPULATION : 1062 Rural Pop. = 85 % Urban Pop. = 15 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 25 % population
Low Potential = 60 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 15 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 6 % Urban Area = 2 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.	60	0
		Medium :	3 % =	31	No.	50	1550
		Low :	3 % =	31	No.	40	1240
	with NC,	High :	0 % =	0	No.	20	0
		Medium :	22 % =	233	No.	15	3495
		Low :	57 % =	605	No.	10	6050
	Total Demand for RURAL population						12335
URBAN POPULATION	with IC,	High :	0 % =	0	No.	250	0
		Medium :	0 % =	0	No.	150	0
		Low :	2 % =	21	No.	75	1575
	with NC,	Low :	13 % =	138	No.	20	2760
	Total Demand for URBAN population						4335
LIVESTOCK			(L.U.) =	629	No.	50	31450
SCHOOLS	Day Schools with WC -> Pupils =			0	No.	25	0
	Day Schools no WC -> Pupils =			0	No.	5	0
	Boarding Schools -> Pupils =			0	No.	50	0
HEALTH	Health Centres\Dispensaries =			1	No.	5000	5000
	Regional Hospitals -> Beds =			0	No.	400	0
	District Hospitals -> Beds =			0	No.	200	0
	Other Hospitals -> Beds =			0	No.	100	0
	All Hospitals Outpatients =			23	No.	20	460
HOTELS	High Class Hotels -> Beds =			0	No.	600	0
	Medium Class Hotels -> Beds =			0	No.	300	0
	Low Class Hotels -> Beds =			8	No.	50	400
ADMINISTRATIVE OFFICES			Staff =	2	No.	25	50
BARS			=	0	No.	500	0
SHOPS			=	8	No.	100	800
	TOTAL DEMAND (l/day)						54830

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Masikita

LOCATION : Elbarta
DIVISION : Baragoi

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 178400 mN Long. = 271500 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 642 (km²)			
CLASSIFICATION	Rural Area :	High Potential =	0	% population
		Medium Potential =	0	% population
		Low Potential =	100	% population
	Urban Area :	High Class Housing =	0	% population
		Medium Class Housing =	0	% population
		Low Class Housing =	0	% population
POPULATION	: 1979 (census) =		815	No.
	1988 (estimated) =		837	No.
LIVESTOCK	: Grade cow =		0	No.
	Indigenous cow =		0	No.
	Sheep/goats =		0	No.
	Donkey =		225	No.
	Camel =		0	No.
SCHOOLS	0 Day Schools with WC ->		0	Pupils
	1 Day Schools no WC ->		109	Pupils
	0 Boarding Schools ->		0	Pupils
HEALTH CENTRES/DISPENSARIES	=		0	No.
HOSPITALS	0 Regional Hospitals ->		0	Beds
	0 District Hospitals ->		0	Beds
	0 Other Hospitals ->		0	Beds
	Outpatients/day =		0	No.
HOTELS	0 High Class Hotels ->		0	Beds
	0 Medium Class Hotels ->		0	Beds
	1 Low Class Hotels ->		8	Beds
ADMINISTRATION OFFICES	: Staff =		0	No.
BARS	: =		0	No.
SHOPS	: =		6	No.
INDUSTRIES	No			

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Masikita DIVISION : Baragoi
LOCATION : Elbarta DISTRICT : Samburu

POPULATION : 837 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 0 % population
Low Potential = 100 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 5 % Urban Area = 0 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.	60	0
		Medium :	0 % =	0	No.	50	0
		Low :	5 % =	41	No.	40	1640
	with NC,	High :	0 % =	0	No.	20	0
		Medium :	0 % =	0	No.	15	0
		Low :	95 % =	795	No.	10	7950
	Total Demand for RURAL population						9590
URBAN POPULATION	with IC,	High :	0 % =	0	No.	250	0
		Medium :	0 % =	0	No.	150	0
		Low :	0 % =	0	No.	75	0
	with NC,	Low :	0 % =	0	No.	20	0
	Total Demand for URBAN population						0
LIVESTOCK		(L.U.) =		90	No.	50	4500
SCHOOLS	Day Schools with WC -> Pupils =			0	No.	25	0
	Day Schools no WC -> Pupils =			109	No.	5	545
	Boarding Schools -> Pupils =			0	No.	50	0
HEALTH	Health Centres\Dispensaries =			0	No.	5000	0
	Regional Hospitals -> Beds =			0	No.	400	0
	District Hospitals -> Beds =			0	No.	200	0
	Other Hospitals -> Beds =			0	No.	100	0
	All Hospitals Outpatients =			0	No.	20	0
HOTELS	High Class Hotels -> Beds =			0	No.	600	0
	Medium Class Hotels -> Beds =			0	No.	300	0
	Low Class Hotels -> Beds =			8	No.	50	400
ADMINISTRATIVE OFFICES	Staff =			0	No.	25	0
BARS	=			0	No.	500	0
SHOPS	=			6	No.	100	600
	TOTAL DEMAND (l/day)						15635

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Ngilai

LOCATION : Elbarta
DIVISION : Baragoi

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 127800 mN Long. = 306500 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA Total = 200 (km²)

CLASSIFICATION	Rural Area	: High Potential	= 0 % population
		Medium Potential	= 0 % population
		Low Potential	= 100 % population
	Urban Area	: High Class Housing	= 0 % population
		Medium Class Housing	= 0 % population
		Low Class Housing	= 0 % population
POPULATION		: 1979 (census)	= 393 No.
		1988 (estimated)	= 404 No.
LIVESTOCK		: Grade cow	= 0 No.
		Indigenous cow	= 0 No.
		Sheep/goats	= 0 No.
		Donkey	= 250 No.
		Camel	= 0 No.
SCHOOLS		0 Day Schools with WC ->	0 Pupils
		1 Day Schools no WC ->	105 Pupils
		0 Boarding Schools ->	0 Pupils
HEALTH CENTRES/DISPENSARIES			= 0 No.
HOSPITALS		0 Regional Hospitals ->	0 Beds
		0 District Hospitals ->	0 Beds
		0 Other Hospitals ->	0 Beds
		Outpatients/day =	0 No.
HOTELS		0 High Class Hotels ->	0 Beds
		0 Medium Class Hotels ->	0 Beds
		0 Low Class Hotels ->	0 Beds
ADMINISTRATION OFFICES		: Staff =	0 No.
BARS		: =	0 No.
SHOPS		: =	0 No.
INDUSTRIES		No	

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Ngilai DIVISION : Baragoi
LOCATION : Elbarta DISTRICT : Samburu

POPULATION : 404 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 0 % population
Low Potential = 100 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 5 % Urban Area = 0 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.	60	0
		Medium :	0 % =	0	No.	50	0
		Low :	5 % =	20	No.	40	800
	with NC,	High :	0 % =	0	No.	20	0
		Medium :	0 % =	0	No.	15	0
		Low :	95 % =	383	No.	10	3830
	Total Demand for RURAL population						4630
URBAN POPULATION	with IC,	High :	0 % =	0	No.	250	0
		Medium :	0 % =	0	No.	150	0
		Low :	0 % =	0	No.	75	0
	with NC,	Low :	0 % =	0	No.	20	0
	Total Demand for URBAN population						0
LIVESTOCK			(L.U.) =	100	No.	50	5000
SCHOOLS	Day Schools with WC -> Pupils =			0	No.	25	0
	Day Schools no WC -> Pupils =			105	No.	5	525
	Boarding Schools -> Pupils =			0	No.	50	0
HEALTH	Health Centres\Dispensaries =			0	No.	5000	0
	Regional Hospitals -> Beds =			0	No.	400	0
	District Hospitals -> Beds =			0	No.	200	0
	Other Hospitals -> Beds =			0	No.	100	0
	All Hospitals Outpatients =			0	No.	20	0
HOTELS	High Class Hotels -> Beds =			0	No.	600	0
	Medium Class Hotels -> Beds =			0	No.	300	0
	Low Class Hotels -> Beds =			0	No.	50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.	25	0
BARS			=	0	No.	500	0
SHOPS			=	0	No.	100	0
TOTAL DEMAND (l/day)							10155

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Lonyangatan

LOCATION : Kawop
DIVISION : Baragoi

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 218000 mN Long. = 239100 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 360 (km²)		
CLASSIFICATION	Rural Area : High Potential	=	0 % population
	Medium Potential	=	0 % population
	Low Potential	=	100 % population
	Urban Area : High Class Housing	=	0 % population
	Medium Class Housing	=	0 % population
	Low Class Housing	=	0 % population
POPULATION	: 1979 (census)	=	2781 No.
	1988 (estimated)	=	2857 No.
LIVESTOCK	: Grade cow	=	0 No.
	Indigenous cow	=	128 No.
	Sheep/goats	=	1011 No.
	Donkey	=	0 No.
	Camel	=	63 No.
SCHOOLS	0 Day Schools with WC ->		0 Pupils
	0 Day Schools no WC ->		0 Pupils
	0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES		=	0 No.
HOSPITALS	0 Regional Hospitals ->		0 Beds
	0 District Hospitals ->		0 Beds
	0 Other Hospitals ->		0 Beds
	Outpatients/day	=	0 No.
HOTELS	0 High Class Hotels ->		0 Beds
	0 Medium Class Hotels ->		0 Beds
	0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES	: Staff	=	0 No.
BARS	:	=	0 No.
SHOPS	:	=	0 No.
INDUSTRIES	No		

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Lonyangatan DIVISION : Baragoi
LOCATION : Kawop DISTRICT : Samburu

POPULATION : 2857 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 0 % population
Low Potential = 100 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 5 % Urban Area = 0 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC, High :	0 % =	0	No.		60	0
	Medium :	0 % =	0	No.		50	0
	Low :	5 % =	142	No.		40	5680
	with NC, High :	0 % =	0	No.		20	0
	Medium :	0 % =	0	No.		15	0
	Low :	95 % =	2714	No.		10	27140
	Total Demand for RURAL population						32820
URBAN POPULATION	with IC, High :	0 % =	0	No.		250	0
	Medium :	0 % =	0	No.		150	0
	Low :	0 % =	0	No.		75	0
	with NC, Low :	0 % =	0	No.		20	0
	Total Demand for URBAN population						0
LIVESTOCK		(L.U.) =	141	No.		50	7050
SCHOOLS	Day Schools with WC -> Pupils =		0	No.		25	0
	Day Schools no WC -> Pupils =		0	No.		5	0
	Boarding Schools -> Pupils =		0	No.		50	0
HEALTH	Health Centres\Dispensaries =		0	No.		5000	0
	Regional Hospitals -> Beds =		0	No.		400	0
	District Hospitals -> Beds =		0	No.		200	0
	Other Hospitals -> Beds =		0	No.		100	0
	All Hospitals Outpatients =		0	No.		20	0
HOTELS	High Class Hotels -> Beds =		0	No.		600	0
	Medium Class Hotels -> Beds =		0	No.		300	0
	Low Class Hotels -> Beds =		0	No.		50	0
ADMINISTRATIVE OFFICES	Staff =		0	No.		25	0
BARS	=		0	No.		500	0
SHOPS	=		0	No.		100	0
	TOTAL DEMAND (l/day)						39870

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Losurukoi

LOCATION : Kawop
DIVISION : Baragoi

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 219800 mN Long. = 252000 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA Total = 477 (km²)

CLASSIFICATION Rural Area : High Potential = 0 % population
Medium Potential = 0 % population
Low Potential = 100 % population

Urban Area : High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

POPULATION : 1979 (census) = 1054 No.
1988 (estimated) = 1083 No.

LIVESTOCK : Grade cow = 0 No.
Indigenous cow = 682 No.
Sheep/goats = 4920 No.
Donkey = 125 No.
Camel = 337 No.

SCHOOLS 0 Day Schools with WC -> 0 Pupils
0 Day Schools no WC -> 0 Pupils
0 Boarding Schools -> 0 Pupils

HEALTH CENTRES/DISPENSARIES = 0 No.
HOSPITALS 0 Regional Hospitals -> 0 Beds
0 District Hospitals -> 0 Beds
0 Other Hospitals -> 0 Beds
Outpatients/day = 0 No.

HOTELS 0 High Class Hotels -> 0 Beds
0 Medium Class Hotels -> 0 Beds
0 Low Class Hotels -> 0 Beds

ADMINISTRATION OFFICES : Staff = 1 No.
BARS : = 0 No.
SHOPS : = 2 No.
INDUSTRIES No

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Losurukoi DIVISION : Baragoi
LOCATION : Kawop DISTRICT : Samburu

POPULATION : 1083 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 0 % population
Low Potential = 100 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 5 % Urban Area = 0 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.	60	0
		Medium :	0 % =	0	No.	50	0
		Low :	5 % =	54	No.	40	2160
	with NC,	High :	0 % =	0	No.	20	0
		Medium :	0 % =	0	No.	15	0
		Low :	95 % =	1028	No.	10	10280
	Total Demand for RURAL population						12440
URBAN POPULATION	with IC,	High :	0 % =	0	No.	250	0
		Medium :	0 % =	0	No.	150	0
		Low :	0 % =	0	No.	75	0
	with NC,	Low :	0 % =	0	No.	20	0
	Total Demand for URBAN population						0
LIVESTOCK			(L.U.) =	773	No.	50	38650
SCHOOLS	Day Schools with WC -> Pupils =			0	No.	25	0
	Day Schools no WC -> Pupils =			0	No.	5	0
	Boarding Schools -> Pupils =			0	No.	50	0
HEALTH	Health Centres\Dispensaries =			0	No.	5000	0
	Regional Hospitals -> Beds =			0	No.	400	0
	District Hospitals -> Beds =			0	No.	200	0
	Other Hospitals -> Beds =			0	No.	100	0
	All Hospitals Outpatients =			0	No.	20	0
HOTELS	High Class Hotels -> Beds =			0	No.	600	0
	Medium Class Hotels -> Beds =			0	No.	300	0
	Low Class Hotels -> Beds =			0	No.	50	0
ADMINISTRATIVE OFFICES			Staff =	1	No.	25	25
BARS			=	0	No.	500	0
SHOPS			=	2	No.	100	200
TOTAL DEMAND (l/day)							51315

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Kalele

LOCATION : Marti
DIVISION : Baragoi

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 173400 mN Long. = 246600 mE

TYPE = 1

1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA Total = 359 (km²)

CLASSIFICATION	Rural Area	: High Potential	=	0 % population
		Medium Potential	=	10 % population
		Low Potential	=	90 % population
	Urban Area	: High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	0 % population
POPULATION		: 1979 (census)	=	868 No.
		1988 (estimated)	=	892 No.
LIVESTOCK		: Grade cow	=	0 No.
		Indigenous cow	=	561 No.
		Sheep/goats	=	3072 No.
		Donkey	=	200 No.
		Camel	=	254 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		0 Day Schools no WC ->		0 Pupils
		1 Boarding Schools ->		232 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day	=	0 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES		: Staff	=	0 No.
BARS		:	=	0 No.
SHOPS		:	=	0 No.
INDUSTRIES		No		

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Kalele DIVISION : Baragoi
LOCATION : Marti DISTRICT : Samburu

POPULATION : 892 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION :
High Potential = 0 % population
Medium Potential = 10 % population
Low Potential = 90 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 6 % Urban Area = 0 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	1 % =	8	No.		50	400
		Low :	5 % =	44	No.		40	1760
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	9 % =	80	No.		15	1200
		Low :	85 % =	758	No.		10	7580
	Total Demand for RURAL population							10940
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	0 % =	0	No.		150	0
		Low :	0 % =	0	No.		75	0
	with NC,	Low :	0 % =	0	No.		20	0
	Total Demand for URBAN population							0
LIVESTOCK			(L.U.) =	598	No.		50	29900
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			0	No.		5	0
	Boarding Schools -> Pupils =			232	No.		50	11600
HEALTH	Health Centres\Dispensaries =			0	No.		5000	0
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			0	No.		20	0
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			0	No.		50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.		25	0
BARS			=	0	No.		500	0
SHOPS			=	0	No.		100	0
	TOTAL DEMAND (l/day)							52440

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Lokorkor

LOCATION : Marti
DIVISION : Baragoi

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 183510 mN Long. = 246700 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 173 (km²)			
CLASSIFICATION	Rural Area :	High Potential	= 0	% population
		Medium Potential	= 0	% population
		Low Potential	= 100	% population
	Urban Area :	High Class Housing	= 0	% population
		Medium Class Housing	= 0	% population
		Low Class Housing	= 0	% population
POPULATION	: 1979 (census)		= 844	No.
	1988 (estimated)		= 867	No.
LIVESTOCK	: Grade cow		= 0	No.
	Indigenous cow		= 449	No.
	Sheep/goats		= 2873	No.
	Donkey		= 100	No.
	Camel		= 239	No.
SCHOOLS	0 Day Schools with WC ->		0	Pupils
	0 Day Schools no WC ->		0	Pupils
	0 Boarding Schools ->		0	Pupils
HEALTH CENTRES/DISPENSARIES			= 0	No.
HOSPITALS	0 Regional Hospitals ->		0	Beds
	0 District Hospitals ->		0	Beds
	0 Other Hospitals ->		0	Beds
	Outpatients/day =		0	No.
HOTELS	0 High Class Hotels ->		0	Beds
	0 Medium Class Hotels ->		0	Beds
	0 Low Class Hotels ->		0	Beds
ADMINISTRATION OFFICES	:	Staff =	0	No.
BARS	:	=	0	No.
SHOPS	:	=	0	No.
INDUSTRIES	No			

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Lokorkor DIVISION : Baragoi
LOCATION : Marti DISTRICT : Samburu

POPULATION : 867 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 0 % population
Low Potential = 100 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 5 % Urban Area = 0 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.	60	0
		Medium :	0 % =	0	No.	50	0
		Low :	5 % =	43	No.	40	1720
	with NC,	High :	0 % =	0	No.	20	0
		Medium :	0 % =	0	No.	15	0
		Low :	95 % =	823	No.	10	8230
	Total Demand for RURAL population						9950
URBAN POPULATION	with IC,	High :	0 % =	0	No.	250	0
		Medium :	0 % =	0	No.	150	0
		Low :	0 % =	0	No.	75	0
	with NC,	Low :	0 % =	0	No.	20	0
	Total Demand for URBAN population						0
LIVESTOCK			(L.U.) =	500	No.	50	25000
SCHOOLS	Day Schools with WC -> Pupils =			0	No.	25	0
	Day Schools no WC -> Pupils =			0	No.	5	0
	Boarding Schools -> Pupils =			0	No.	50	0
HEALTH	Health Centres\Dispensaries =			0	No.	5000	0
	Regional Hospitals -> Beds =			0	No.	400	0
	District Hospitals -> Beds =			0	No.	200	0
	Other Hospitals -> Beds =			0	No.	100	0
	All Hospitals Outpatients =			0	No.	20	0
HOTELS	High Class Hotels -> Beds =			0	No.	600	0
	Medium Class Hotels -> Beds =			0	No.	300	0
	Low Class Hotels -> Beds =			0	No.	50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.	25	0
BARS			=	0	No.	500	0
SHOPS			=	0	No.	100	0
			TOTAL DEMAND (l/day)				34950

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Moru-Akiring

LOCATION : Marti
DIVISION : Baragoi

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 163520 mN Long. = 216800 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 691 (km²)			
CLASSIFICATION	Rural Area :	High Potential	=	0 % population
		Medium Potential	=	0 % population
		Low Potential	=	100 % population
	Urban Area :	High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	0 % population
POPULATION	:	1979 (census)	=	851 No.
		1988 (estimated)	=	874 No.
LIVESTOCK	:	Grade cow	=	0 No.
		Indigenous cow	=	0 No.
		Sheep/goats	=	0 No.
		Donkey	=	0 No.
		Camel	=	0 No.
SCHOOLS	0	Day Schools with WC ->		0 Pupils
	0	Day Schools no WC ->		0 Pupils
	0	Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS	0	Regional Hospitals ->		0 Beds
	0	District Hospitals ->		0 Beds
	0	Other Hospitals ->		0 Beds
		Outpatients/day	=	0 No.
HOTELS	0	High Class Hotels ->		0 Beds
	0	Medium Class Hotels ->		0 Beds
	0	Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES	:	Staff	=	0 No.
BARS	:		=	0 No.
SHOPS	:		=	0 No.
INDUSTRIES	No			

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Moru-Akiring DIVISION : Baragoi
LOCATION : Marti DISTRICT : Samburu

POPULATION : 874 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION :
High Potential = 0 % population
Medium Potential = 0 % population
Low Potential = 100 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 5 % Urban Area = 0 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.	60	0
		Medium :	0 % =	0	No.	50	0
		Low :	5 % =	43	No.	40	1720
	with NC,	High :	0 % =	0	No.	20	0
		Medium :	0 % =	0	No.	15	0
		Low :	95 % =	830	No.	10	8300
	Total Demand for RURAL population						10020
URBAN POPULATION	with IC,	High :	0 % =	0	No.	250	0
		Medium :	0 % =	0	No.	150	0
		Low :	0 % =	0	No.	75	0
	with NC,	Low :	0 % =	0	No.	20	0
	Total Demand for URBAN population						0
LIVESTOCK			(L.U.) =	0	No.	50	0
SCHOOLS	Day Schools with WC -> Pupils =			0	No.	25	0
	Day Schools no WC -> Pupils =			0	No.	5	0
	Boarding Schools -> Pupils =			0	No.	50	0
HEALTH	Health Centres\Dispensaries =			0	No.	5000	0
	Regional Hospitals -> Beds =			0	No.	400	0
	District Hospitals -> Beds =			0	No.	200	0
	Other Hospitals -> Beds =			0	No.	100	0
	All Hospitals Outpatients =			0	No.	20	0
HOTELS	High Class Hotels -> Beds =			0	No.	600	0
	Medium Class Hotels -> Beds =			0	No.	300	0
	Low Class Hotels -> Beds =			0	No.	50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.	25	0
BARS			=	0	No.	500	0
SHOPS			=	0	No.	100	0
TOTAL DEMAND (l/day)							10020

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Nachola

LOCATION : Nachola
DIVISION : Baragoi

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 199500 mN Long. = 243500 mE

TYPE = 1

1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 254 (km²)			
CLASSIFICATION	Rural Area :	High Potential	=	0 % population
		Medium Potential	=	0 % population
		Low Potential	=	100 % population
	Urban Area :	High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	0 % population
POPULATION	:	1979 (census)	=	1247 No.
		1988 (estimated)	=	1281 No.
LIVESTOCK	:	Grade cow	=	0 No.
		Indigenous cow	=	545 No.
		Sheep/goats	=	3606 No.
		Donkey	=	125 No.
		Camel	=	220 No.
SCHOOLS	0	Day Schools with WC ->		0 Pupils
	0	Day Schools no WC ->		0 Pupils
	1	Boarding Schools ->		153 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS	0	Regional Hospitals ->		0 Beds
	0	District Hospitals ->		0 Beds
	0	Other Hospitals ->		0 Beds
		Outpatients/day	=	0 No.
HOTELS	0	High Class Hotels ->		0 Beds
	0	Medium Class Hotels ->		0 Beds
	0	Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES	:	Staff	=	0 No.
BARS	:		=	0 No.
SHOPS	:		=	2 No.
INDUSTRIES	No			

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Nachola DIVISION : Baragoi
LOCATION : Nachola DISTRICT : Samburu

POPULATION : 1281 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 0 % population
Low Potential = 100 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 5 % Urban Area = 0 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.	60	0
		Medium :	0 % =	0	No.	50	0
		Low :	5 % =	64	No.	40	2560
	with NC,	High :	0 % =	0	No.	20	0
		Medium :	0 % =	0	No.	15	0
		Low :	95 % =	1216	No.	10	12160
	Total Demand for RURAL population						14720
URBAN POPULATION	with IC,	High :	0 % =	0	No.	250	0
		Medium :	0 % =	0	No.	150	0
		Low :	0 % =	0	No.	75	0
	with NC,	Low :	0 % =	0	No.	20	0
	Total Demand for URBAN population						0
LIVESTOCK			(L.U.) =	582	No.	50	29100
SCHOOLS	Day Schools with WC -> Pupils =			0	No.	25	0
	Day Schools no WC -> Pupils =			0	No.	5	0
	Boarding Schools -> Pupils =			153	No.	50	7650
HEALTH	Health Centres\Dispensaries =			0	No.	5000	0
	Regional Hospitals -> Beds =			0	No.	400	0
	District Hospitals -> Beds =			0	No.	200	0
	Other Hospitals -> Beds =			0	No.	100	0
	All Hospitals Outpatients =			0	No.	20	0
HOTELS	High Class Hotels -> Beds =			0	No.	600	0
	Medium Class Hotels -> Beds =			0	No.	300	0
	Low Class Hotels -> Beds =			0	No.	50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.	25	0
BARS			=	0	No.	500	0
SHOPS			=	2	No.	100	200
TOTAL DEMAND (l/day)							51670

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Terter

LOCATION : Nachola
DIVISION : Baragoi

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 199400 mN Long. = 243600 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 311 (km²)			
CLASSIFICATION	Rural Area	: High Potential	=	0 % population
		Medium Potential	=	0 % population
		Low Potential	=	100 % population
	Urban Area	: High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	0 % population
POPULATION		: 1979 (census)	=	933 No.
		1988 (estimated)	=	958 No.
LIVESTOCK		: Grade cow	=	0 No.
		Indigenous cow	=	92 No.
		Sheep/goats	=	672 No.
		Donkey	=	75 No.
		Camel	=	39 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		0 Day Schools no WC ->		0 Pupils
		0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day	=	0 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES		: Staff	=	0 No.
BARS		:	=	0 No.
SHOPS		:	=	0 No.
INDUSTRIES		No		

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Terter DIVISION : Baragoi
LOCATION : Nachola DISTRICT : Samburu

POPULATION : 958 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION :
High Potential = 0 % population
Medium Potential = 0 % population
Low Potential = 100 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 5 % Urban Area = 0 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	0 % =	0	No.		50	0
		Low :	5 % =	47	No.		40	1880
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	0 % =	0	No.		15	0
		Low :	95 % =	910	No.		10	9100
	Total Demand for RURAL population							10980
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	0 % =	0	No.		150	0
		Low :	0 % =	0	No.		75	0
	with NC,	Low :	0 % =	0	No.		20	0
	Total Demand for URBAN population							0
LIVESTOCK			(L.U.) =	124	No.		50	6200
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			0	No.		5	0
	Boarding Schools -> Pupils =			0	No.		50	0
HEALTH	Health Centres\Dispensaries =			0	No.		5000	0
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			0	No.		20	0
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			0	No.		50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.		25	0
BARS			=	0	No.		500	0
SHOPS			=	0	No.		100	0
			TOTAL DEMAND (l/day)					17180

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Latakweny

LOCATION : Ndoto
DIVISION : Baragoi

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 171300 mN Long. = 289000 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 735 (km²)			
CLASSIFICATION	Rural Area :	High Potential	=	0 % population
		Medium Potential	=	50 % population
		Low Potential	=	50 % population
	Urban Area :	High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	0 % population
POPULATION	: 1979 (census)		=	1649 No.
	1988 (estimated)		=	1694 No.
LIVESTOCK	: Grade cow		=	0 No.
	Indigenous cow		=	0 No.
	Sheep/goats		=	0 No.
	Donkey		=	50 No.
	Camel		=	0 No.
SCHOOLS	0 Day Schools with WC ->			0 Pupils
	1 Day Schools no WC ->			71 Pupils
	0 Boarding Schools ->			0 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS	0 Regional Hospitals ->			0 Beds
	0 District Hospitals ->			0 Beds
	0 Other Hospitals ->			0 Beds
	Outpatients/day =			0 No.
HOTELS	0 High Class Hotels ->			0 Beds
	0 Medium Class Hotels ->			0 Beds
	2 Low Class Hotels ->			16 Beds
ADMINISTRATION OFFICES	:	Staff	=	2 No.
BARS	:		=	0 No.
SHOPS	:		=	6 No.
INDUSTRIES	No			

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Latakweny DIVISION : Baragoi
LOCATION : Ndoto DISTRICT : Samburu

POPULATION : 1694 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 50 % population
Low Potential = 50 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 8 % Urban Area = 0 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.	60	0
		Medium :	5 % =	84	No.	50	4200
		Low :	3 % =	50	No.	40	2000
	with NC,	High :	0 % =	0	No.	20	0
		Medium :	45 % =	762	No.	15	11430
		Low :	47 % =	796	No.	10	7960
	Total Demand for RURAL population						25590
URBAN POPULATION	with IC,	High :	0 % =	0	No.	250	0
		Medium :	0 % =	0	No.	150	0
		Low :	0 % =	0	No.	75	0
	with NC,	Low :	0 % =	0	No.	20	0
	Total Demand for URBAN population						0
LIVESTOCK			(L.U.) =	20	No.	50	1000
SCHOOLS	Day Schools with WC -> Pupils =			0	No.	25	0
	Day Schools no WC -> Pupils =			71	No.	5	355
	Boarding Schools -> Pupils =			0	No.	50	0
HEALTH	Health Centres\Dispensaries =			0	No.	5000	0
	Regional Hospitals -> Beds =			0	No.	400	0
	District Hospitals -> Beds =			0	No.	200	0
	Other Hospitals -> Beds =			0	No.	100	0
	All Hospitals Outpatients =			0	No.	20	0
HOTELS	High Class Hotels -> Beds =			0	No.	600	0
	Medium Class Hotels -> Beds =			0	No.	300	0
	Low Class Hotels -> Beds =			16	No.	50	800
ADMINISTRATIVE OFFICES			Staff =	2	No.	25	50
BARS			=	0	No.	500	0
SHOPS			=	6	No.	100	600
	TOTAL DEMAND (l/day)						28395

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Lesirikan

LOCATION : Ndoto
DIVISION : Baragoi

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 197700 mN Long. = 273800 mE

TYPE = 2
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 728 (km²)			
CLASSIFICATION	Rural Area	: High Potential	= 0	% population
		Medium Potential	= 50	% population
		Low Potential	= 40	% population
	Urban Area	: High Class Housing	= 0	% population
		Medium Class Housing	= 0	% population
		Low Class Housing	= 10	% population
POPULATION		: 1979 (census)	= 2950	No.
		1988 (estimated)	= 3079	No.
LIVESTOCK		: Grade cow	= 0	No.
		Indigenous cow	= 794	No.
		Sheep/goats	= 6521	No.
		Donkey	= 275	No.
		Camel	= 85	No.
SCHOOLS		0 Day Schools with WC ->	0	Pupils
		0 Day Schools no WC ->	0	Pupils
		1 Boarding Schools ->	276	Pupils
HEALTH CENTRES/DISPENSARIES			= 1	No.
HOSPITALS		0 Regional Hospitals ->	0	Beds
		0 District Hospitals ->	0	Beds
		0 Other Hospitals ->	0	Beds
		Outpatients/day =	8	No.
HOTELS		0 High Class Hotels ->	0	Beds
		0 Medium Class Hotels ->	0	Beds
		1 Low Class Hotels ->	16	Beds
ADMINISTRATION OFFICES		: Staff =	2	No.
BARS		: =	0	No.
SHOPS		: =	11	No.
INDUSTRIES		No		

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Lesirikan DIVISION : Baragoi
LOCATION : Ndoto DISTRICT : Samburu

POPULATION : 3079 Rural Pop. = 90 % Urban Pop. = 10 %

CLASSIFICATION :
High Potential = 0 % population
Medium Potential = 50 % population
Low Potential = 40 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 10 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 7 % Urban Area = 1 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	5 % =	153	No.		50	7650
		Low :	2 % =	61	No.		40	2440
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	45 % =	1385	No.		15	20775
		Low :	38 % =	1170	No.		10	11700
	Total Demand for RURAL population							42565
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	0 % =	0	No.		150	0
		Low :	1 % =	30	No.		75	2250
	with NC,	Low :	9 % =	277	No.		20	5540
	Total Demand for URBAN population							7790
LIVESTOCK			(L.U.) =	851	No.		50	42550
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			0	No.		5	0
	Boarding Schools -> Pupils =			276	No.		50	13800
HEALTH	Health Centres\Dispensaries =			1	No.		5000	5000
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			8	No.		20	160
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			16	No.		50	800
ADMINISTRATIVE OFFICES			Staff =	2	No.		25	50
BARS			=	0	No.		500	0
SHOPS			=	11	No.		100	1100
	TOTAL DEMAND (l/day)							113815

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Parkate

LOCATION : Nyiro
DIVISION : Baragoi

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 219700 mN Long. = 252100 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA Total = 151 (km²)

CLASSIFICATION Rural Area : High Potential = 0 % population
Medium Potential = 0 % population
Low Potential = 100 % population

Urban Area : High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

POPULATION : 1979 (census) = 594 No.
1988 (estimated) = 610 No.

LIVESTOCK : Grade cow = 0 No.
Indigenous cow = 0 No.
Sheep/goats = 0 No.
Donkey = 0 No.
Camel = 0 No.

SCHOOLS 0 Day Schools with WC -> 0 Pupils
1 Day Schools no WC -> 25 Pupils
0 Boarding Schools -> 0 Pupils

HEALTH CENTRES/DISPENSARIES = 0 No.
HOSPITALS 0 Regional Hospitals -> 0 Beds
0 District Hospitals -> 0 Beds
0 Other Hospitals -> 0 Beds
Outpatients/day = 0 No.

HOTELS 0 High Class Hotels -> 0 Beds
0 Medium Class Hotels -> 0 Beds
0 Low Class Hotels -> 0 Beds

ADMINISTRATION OFFICES : Staff = 0 No.
BARS : = 0 No.
SHOPS : = 0 No.
INDUSTRIES No

Printed : 13-07-1990

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Parkate DIVISION : Baragoi
LOCATION : Nyiro DISTRICT : Samburu

POPULATION : 610 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 0 % population
Low Potential = 100 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 5 % Urban Area = 0 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.	60	0
		Medium :	0 % =	0	No.	50	0
		Low :	5 % =	30	No.	40	1200
	with NC,	High :	0 % =	0	No.	20	0
		Medium :	0 % =	0	No.	15	0
		Low :	95 % =	579	No.	10	5790
	Total Demand for RURAL population						6990
URBAN POPULATION	with IC,	High :	0 % =	0	No.	250	0
		Medium :	0 % =	0	No.	150	0
		Low :	0 % =	0	No.	75	0
	with NC,	Low :	0 % =	0	No.	20	0
	Total Demand for URBAN population						0
LIVESTOCK			(L.U.) =	0	No.	50	0
SCHOOLS	Day Schools with WC -> Pupils =			0	No.	25	0
	Day Schools no WC -> Pupils =			25	No.	5	125
	Boarding Schools -> Pupils =			0	No.	50	0
HEALTH	Health Centres\Dispensaries =			0	No.	5000	0
	Regional Hospitals -> Beds =			0	No.	400	0
	District Hospitals -> Beds =			0	No.	200	0
	Other Hospitals -> Beds =			0	No.	100	0
	All Hospitals Outpatients =			0	No.	20	0
HOTELS	High Class Hotels -> Beds =			0	No.	600	0
	Medium Class Hotels -> Beds =			0	No.	300	0
	Low Class Hotels -> Beds =			0	No.	50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.	25	0
BARS			=	0	No.	500	0
SHOPS			=	0	No.	100	0
TOTAL DEMAND (l/day)							7115

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : South Horr

LOCATION : Nyiro
DIVISION : Baragoi

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 473200 mN Long. = 335000 mE

TYPE = 2
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 407 (km²)			
CLASSIFICATION	Rural Area :	High Potential	=	0 % population
		Medium Potential	=	20 % population
		Low Potential	=	40 % population
	Urban Area :	High Class Housing	=	0 % population
		Medium Class Housing	=	5 % population
		Low Class Housing	=	35 % population
POPULATION	:	1979 (census)	=	1654 No.
		1988 (estimated)	=	1847 No.
LIVESTOCK	:	Grade cow	=	0 No.
		Indigenous cow	=	221 No.
		Sheep/goats	=	1280 No.
		Donkey	=	100 No.
		Camel	=	48 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		1 Day Schools no WC ->		331 Pupils
		0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES			=	1 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day	=	18 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		2 Low Class Hotels ->		16 Beds
ADMINISTRATION OFFICES	:	Staff	=	2 No.
BARS	:		=	0 No.
SHOPS	:		=	12 No.
INDUSTRIES	No			

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : South Horr DIVISION : Baragoi
LOCATION : Nyiro DISTRICT : Samburu

POPULATION : 1847 Rural Pop. = 60 % Urban Pop. = 40 %

CLASSIFICATION :
High Potential = 0 % population
Medium Potential = 20 % population
Low Potential = 40 % population
High Class Housing = 0 % population
Medium Class Housing = 5 % population
Low Class Housing = 35 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 4 % Urban Area = 9 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	2 % =	36	No.		50	1800
		Low :	2 % =	36	No.		40	1440
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	18 % =	332	No.		15	4980
		Low :	38 % =	701	No.		10	7010
	Total Demand for RURAL population							15230
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	5 % =	92	No.		150	13800
		Low :	4 % =	73	No.		75	5475
	with NC,	Low :	31 % =	572	No.		20	11440
	Total Demand for URBAN population							30715
LIVESTOCK			(L.U.) =	223	No.		50	11150
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			331	No.		5	1655
	Boarding Schools -> Pupils =			0	No.		50	0
HEALTH	Health Centres\Dispensaries =			1	No.		5000	5000
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			18	No.		20	360
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			16	No.		50	800
ADMINISTRATIVE OFFICES			Staff =	2	No.		25	50
BARS			=	0	No.		500	0
SHOPS			=	12	No.		100	1200
			TOTAL DEMAND (l/day)					66160

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Tum

LOCATION : Nyiro
DIVISION : Baragoi

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 473700 mN Long. = 321000 mE

TYPE = 2
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 377 (km²)			
CLASSIFICATION	Rural Area :	High Potential	=	0 % population
		Medium Potential	=	20 % population
		Low Potential	=	40 % population
	Urban Area :	High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	40 % population
POPULATION	: 1979 (census)		=	490 No.
	1988 (estimated)		=	548 No.
LIVESTOCK	: Grade cow		=	0 No.
	Indigenous cow		=	0 No.
	Sheep/goats		=	0 No.
	Donkey		=	0 No.
	Camel		=	0 No.
SCHOOLS	0 Day Schools with WC ->			0 Pupils
	1 Day Schools no WC ->			120 Pupils
	0 Boarding Schools ->			0 Pupils
HEALTH CENTRES/DISPENSARIES			=	1 No.
HOSPITALS	0 Regional Hospitals ->			0 Beds
	0 District Hospitals ->			0 Beds
	0 Other Hospitals ->			0 Beds
	Outpatients/day =			0 No.
HOTELS	0 High Class Hotels ->			0 Beds
	0 Medium Class Hotels ->			0 Beds
	2 Low Class Hotels ->			16 Beds
ADMINISTRATION OFFICES	: Staff =			1 No.
BARS	:		=	0 No.
SHOPS	:		=	5 No.
INDUSTRIES	No			

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Tum DIVISION : Baragoi
LOCATION : Nyiro DISTRICT : Samburu

POPULATION : 548 Rural Pop. = 60 % Urban Pop. = 40 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 20 % population
Low Potential = 40 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 40 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 4 % Urban Area = 4 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.	60	0
		Medium :	2 % =	10	No.	50	500
		Low :	2 % =	10	No.	40	400
	with NC,	High :	0 % =	0	No.	20	0
		Medium :	18 % =	98	No.	15	1470
		Low :	38 % =	208	No.	10	2080
	Total Demand for RURAL population						4450
URBAN POPULATION	with IC,	High :	0 % =	0	No.	250	0
		Medium :	0 % =	0	No.	150	0
		Low :	4 % =	21	No.	75	1575
	with NC,	Low :	36 % =	197	No.	20	3940
	Total Demand for URBAN population						5515
LIVESTOCK			(L.U.) =	0	No.	50	0
SCHOOLS	Day Schools with WC -> Pupils =			0	No.	25	0
	Day Schools no WC -> Pupils =			120	No.	5	600
	Boarding Schools -> Pupils =			0	No.	50	0
HEALTH	Health Centres\Dispensaries =			1	No.	5000	5000
	Regional Hospitals -> Beds =			0	No.	400	0
	District Hospitals -> Beds =			0	No.	200	0
	Other Hospitals -> Beds =			0	No.	100	0
	All Hospitals Outpatients =			0	No.	20	0
HOTELS	High Class Hotels -> Beds =			0	No.	600	0
	Medium Class Hotels -> Beds =			0	No.	300	0
	Low Class Hotels -> Beds =			16	No.	50	800
ADMINISTRATIVE OFFICES			Staff =	1	No.	25	25
BARS			=	0	No.	500	0
SHOPS			=	5	No.	100	500
			TOTAL DEMAND (l/day)				16890

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Uaso Rongai

LOCATION : Nyiro
DIVISION : Baragoi

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 219720 mN Long. = 252200 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 325 (km²)		
CLASSIFICATION	Rural Area : High Potential	=	0 % population
	Medium Potential	=	30 % population
	Low Potential	=	70 % population
	Urban Area : High Class Housing	=	0 % population
	Medium Class Housing	=	0 % population
	Low Class Housing	=	0 % population
POPULATION	: 1979 (census)	=	592 No.
	1988 (estimated)	=	608 No.
LIVESTOCK	: Grade cow	=	0 No.
	Indigenous cow	=	464 No.
	Sheep/goats	=	3475 No.
	Donkey	=	100 No.
	Camel	=	229 No.
SCHOOLS	0 Day Schools with WC ->		0 Pupils
	1 Day Schools no WC ->		47 Pupils
	0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES		=	0 No.
HOSPITALS	0 Regional Hospitals ->		0 Beds
	0 District Hospitals ->		0 Beds
	0 Other Hospitals ->		0 Beds
	Outpatients/day	=	0 No.
HOTELS	0 High Class Hotels ->		0 Beds
	0 Medium Class Hotels ->		0 Beds
	0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES	: Staff	=	0 No.
BARS	:	=	0 No.
SHOPS	:	=	1 No.
INDUSTRIES	No		

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Uaso Rongai DIVISION : Baragoi
LOCATION : Nyiro DISTRICT : Samburu

POPULATION : 608 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 30 % population
Low Potential = 70 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 7 % Urban Area = 0 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC, High :	0 % =	0	No.		60	0
	Medium :	3 % =	18	No.		50	900
	Low :	4 % =	24	No.		40	960
	with NC, High :	0 % =	0	No.		20	0
	Medium :	27 % =	164	No.		15	2460
	Low :	66 % =	401	No.		10	4010
	Total Demand for RURAL population						8330
URBAN POPULATION	with IC, High :	0 % =	0	No.		250	0
	Medium :	0 % =	0	No.		150	0
	Low :	0 % =	0	No.		75	0
	with NC, Low :	0 % =	0	No.		20	0
	Total Demand for URBAN population						0
LIVESTOCK		(L.U.) =	540	No.		50	27000
SCHOOLS	Day Schools with WC -> Pupils =		0	No.		25	0
	Day Schools no WC -> Pupils =		47	No.		5	235
	Boarding Schools -> Pupils =		0	No.		50	0
HEALTH	Health Centres\Dispensaries =		0	No.		5000	0
	Regional Hospitals -> Beds =		0	No.		400	0
	District Hospitals -> Beds =		0	No.		200	0
	Other Hospitals -> Beds =		0	No.		100	0
	All Hospitals Outpatients =		0	No.		20	0
HOTELS	High Class Hotels -> Beds =		0	No.		600	0
	Medium Class Hotels -> Beds =		0	No.		300	0
	Low Class Hotels -> Beds =		0	No.		50	0
ADMINISTRATIVE OFFICES	Staff =		0	No.		25	0
BARS	=		0	No.		500	0
SHOPS	=		1	No.		100	100
	TOTAL DEMAND (l/day)						35665

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Angata Nanyukie

LOCATION : Angata Nanyukie
DIVISION : Lorroki

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 146900 mN Long. = 236100 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA Total = 185 (km²)

CLASSIFICATION	Rural Area	: High Potential	=	0 % population
		Medium Potential	=	100 % population
		Low Potential	=	0 % population
	Urban Area	: High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	0 % population
POPULATION		: 1979 (census)	=	1106 No.
		1988 (estimated)	=	1171 No.
LIVESTOCK		: Grade cow	=	0 No.
		Indigenous cow	=	0 No.
		Sheep/goats	=	0 No.
		Donkey	=	125 No.
		Camel	=	0 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		2 Day Schools no WC ->		156 Pupils
		1 Boarding Schools ->		127 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day =		0 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES		: Staff	=	1 No.
BARS		:	=	0 No.
SHOPS		:	=	1 No.
INDUSTRIES		No		

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Angata Nanyukie DIVISION : Lorroki
LOCATION : Angata Nanyukie DISTRICT : Samburu

POPULATION : 1171 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 100 % population
Low Potential = 0 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 10 % Urban Area = 0 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.	60	0
		Medium :	10 % =	117	No.	50	5850
		Low :	0 % =	0	No.	40	0
	with NC,	High :	0 % =	0	No.	20	0
		Medium :	90 % =	1053	No.	15	15795
		Low :	0 % =	0	No.	10	0
	Total Demand for RURAL population						21645
URBAN POPULATION	with IC,	High :	0 % =	0	No.	250	0
		Medium :	0 % =	0	No.	150	0
		Low :	0 % =	0	No.	75	0
	with NC,	Low :	0 % =	0	No.	20	0
	Total Demand for URBAN population						0
LIVESTOCK			(L.U.) =	50	No.	50	2500
SCHOOLS	Day Schools with WC -> Pupils =			0	No.	25	0
	Day Schools no WC -> Pupils =			156	No.	5	780
	Boarding Schools -> Pupils =			127	No.	50	6350
HEALTH	Health Centres\Dispensaries =			0	No.	5000	0
	Regional Hospitals -> Beds =			0	No.	400	0
	District Hospitals -> Beds =			0	No.	200	0
	Other Hospitals -> Beds =			0	No.	100	0
	All Hospitals Outpatients =			0	No.	20	0
HOTELS	High Class Hotels -> Beds =			0	No.	600	0
	Medium Class Hotels -> Beds =			0	No.	300	0
	Low Class Hotels -> Beds =			0	No.	50	0
ADMINISTRATIVE OFFICES			Staff =	1	No.	25	25
BARS			=	0	No.	500	0
SHOPS			=	1	No.	100	100
			TOTAL DEMAND (l/day)				31400

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Barsaloi

LOCATION : Angata Nanyukie
DIVISION : Lorroki

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 148000 mN Long. = 262400 mE

TYPE = 2
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 237 (km²)			
CLASSIFICATION	Rural Area	: High Potential	=	0 % population
		Medium Potential	=	20 % population
		Low Potential	=	10 % population
	Urban Area	: High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	70 % population
POPULATION		: 1979 (census)	=	610 No.
		1988 (estimated)	=	718 No.
LIVESTOCK		: Grade cow	=	0 No.
		Indigenous cow	=	0 No.
		Sheep/goats	=	0 No.
		Donkey	=	225 No.
		Camel	=	0 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		0 Day Schools no WC ->		0 Pupils
		0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES			=	1 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day	=	0 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES		: Staff	=	0 No.
BARS		:	=	0 No.
SHOPS		:	=	0 No.
INDUSTRIES		No		

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Barsaloi DIVISION : Lorroki
LOCATION : Angata Nanyukie DISTRICT : Samburu

POPULATION : 718 Rural Pop. = 30 % Urban Pop. = 70 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 20 % population
Low Potential = 10 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 70 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 3 % Urban Area = 7 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	2 % =	14	No.		50	700
		Low :	1 % =	7	No.		40	280
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	18 % =	129	No.		15	1935
		Low :	9 % =	64	No.		10	640
	Total Demand for RURAL population							3555
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	0 % =	0	No.		150	0
		Low :	7 % =	50	No.		75	3750
	with NC,	Low :	63 % =	452	No.		20	9040
	Total Demand for URBAN population							12790
LIVESTOCK			(L.U.) =	90	No.		50	4500
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			0	No.		5	0
	Boarding Schools -> Pupils =			0	No.		50	0
HEALTH	Health Centres\Dispensaries =			1	No.		5000	5000
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			0	No.		20	0
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			0	No.		50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.		25	0
BARS			=	0	No.		500	0
SHOPS			=	0	No.		100	0
TOTAL DEMAND (l/day)								25845

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Loibashai

LOCATION : Angata Nanyukie
DIVISION : Lorroki

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 147500 mN Long. = 256000 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 168 (km²)			
CLASSIFICATION	Rural Area :	High Potential	=	0 % population
		Medium Potential	=	75 % population
		Low Potential	=	25 % population
	Urban Area :	High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	0 % population
POPULATION	: 1979 (census)		=	287 No.
	1988 (estimated)		=	304 No.
LIVESTOCK	: Grade cow		=	0 No.
	Indigenous cow		=	175 No.
	Sheep/goats		=	1431 No.
	Donkey		=	0 No.
	Camel		=	72 No.
SCHOOLS	0 Day Schools with WC ->			0 Pupils
	2 Day Schools no WC ->			72 Pupils
	0 Boarding Schools ->			0 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS	0 Regional Hospitals ->			0 Beds
	0 District Hospitals ->			0 Beds
	0 Other Hospitals ->			0 Beds
	Outpatients/day =			0 No.
HOTELS	0 High Class Hotels ->			0 Beds
	0 Medium Class Hotels ->			0 Beds
	0 Low Class Hotels ->			0 Beds
ADMINISTRATION OFFICES	: Staff =			0 No.
BARS	:		=	0 No.
SHOPS	:		=	0 No.
INDUSTRIES	No			

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Loibashai DIVISION : Lorroki
LOCATION : Angata Nanyukie DISTRICT : Samburu

POPULATION : 304 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION :
High Potential = 0 % population
Medium Potential = 75 % population
Low Potential = 25 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 9 % Urban Area = 0 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	8 % =	24	No.		50	1200
		Low :	1 % =	3	No.		40	120
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	67 % =	203	No.		15	3045
		Low :	24 % =	72	No.		10	720
	Total Demand for RURAL population							5085
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	0 % =	0	No.		150	0
		Low :	0 % =	0	No.		75	0
	with NC,	Low :	0 % =	0	No.		20	0
	Total Demand for URBAN population							0
LIVESTOCK			(L.U.) =	189	No.		50	9450
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			72	No.		5	360
	Boarding Schools -> Pupils =			0	No.		50	0
HEALTH	Health Centres\Dispensaries =			0	No.		5000	0
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			0	No.		20	0
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			0	No.		50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.		25	0
BARS			=	0	No.		500	0
SHOPS			=	0	No.		100	0
	TOTAL DEMAND (l/day)							14895

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Lkilorit

LOCATION : Kisima
DIVISION : Lorroki

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 114000 mN Long. = 256000 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 143 (km²)		
CLASSIFICATION	Rural Area : High Potential	=	0 % population
	Medium Potential	=	100 % population
	Low Potential	=	0 % population
	Urban Area : High Class Housing	=	0 % population
	Medium Class Housing	=	0 % population
	Low Class Housing	=	0 % population
POPULATION	: 1979 (census)	=	1515 No.
	1988 (estimated)	=	1604 No.
LIVESTOCK	: Grade cow	=	0 No.
	Indigenous cow	=	1061 No.
	Sheep/goats	=	7350 No.
	Donkey	=	0 No.
	Camel	=	132 No.
SCHOOLS	0 Day Schools with WC ->		0 Pupils
	0 Day Schools no WC ->		0 Pupils
	1 Boarding Schools ->		249 Pupils
HEALTH CENTRES/DISPENSARIES		=	0 No.
HOSPITALS	0 Regional Hospitals ->		0 Beds
	0 District Hospitals ->		0 Beds
	0 Other Hospitals ->		0 Beds
	Outpatients/day	=	0 No.
HOTELS	0 High Class Hotels ->		0 Beds
	0 Medium Class Hotels ->		0 Beds
	0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES	: Staff	=	1 No.
BARS	:	=	0 No.
SHOPS	:	=	2 No.
INDUSTRIES	No		

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Lkilorit DIVISION : Lorroki
LOCATION : Kisima DISTRICT : Samburu

POPULATION : 1604 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION :
High Potential = 0 % population
Medium Potential = 100 % population
Low Potential = 0 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 10 % Urban Area = 0 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC, High :	0 % =	0	No.		60	0
	Medium :	10 % =	160	No.		50	8000
	Low :	0 % =	0	No.		40	0
	with NC, High :	0 % =	0	No.		20	0
	Medium :	90 % =	1443	No.		15	21645
	Low :	0 % =	0	No.		10	0
	Total Demand for RURAL population						29645
URBAN POPULATION	with IC, High :	0 % =	0	No.		250	0
	Medium :	0 % =	0	No.		150	0
	Low :	0 % =	0	No.		75	0
	with NC, Low :	0 % =	0	No.		20	0
	Total Demand for URBAN population						0
LIVESTOCK		(L.U.) =	909	No.		50	45450
SCHOOLS	Day Schools with WC -> Pupils =		0	No.		25	0
	Day Schools no WC -> Pupils =		0	No.		5	0
	Boarding Schools -> Pupils =		249	No.		50	12450
HEALTH	Health Centres\Dispensaries =		0	No.		5000	0
	Regional Hospitals -> Beds =		0	No.		400	0
	District Hospitals -> Beds =		0	No.		200	0
	Other Hospitals -> Beds =		0	No.		100	0
	All Hospitals Outpatients =		0	No.		20	0
HOTELS	High Class Hotels -> Beds =		0	No.		600	0
	Medium Class Hotels -> Beds =		0	No.		300	0
	Low Class Hotels -> Beds =		0	No.		50	0
ADMINISTRATIVE OFFICES	Staff =		1	No.		25	25
BARS	=		0	No.		500	0
SHOPS	=		2	No.		100	200
	TOTAL DEMAND (l/day)						87770

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Lmisigiyoi

LOCATION : Kisima
DIVISION : Lorroki

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 89000 mN Long. = 255000 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA Total = 45 (km²)

CLASSIFICATION	Rural Area :	High Potential =	0 % population
		Medium Potential =	100 % population
		Low Potential =	0 % population
	Urban Area :	High Class Housing =	0 % population
		Medium Class Housing =	0 % population
		Low Class Housing =	0 % population
POPULATION	:	1979 (census) =	608 No.
		1988 (estimated) =	644 No.
LIVESTOCK	:	Grade cow =	0 No.
		Indigenous cow =	903 No.
		Sheep/goats =	2498 No.
		Donkey =	0 No.
		Camel =	42 No.
SCHOOLS		0 Day Schools with WC ->	0 Pupils
		1 Day Schools no WC ->	195 Pupils
		0 Boarding Schools ->	0 Pupils
HEALTH CENTRES/DISPENSARIES		=	0 No.
HOSPITALS		0 Regional Hospitals ->	0 Beds
		0 District Hospitals ->	0 Beds
		0 Other Hospitals ->	0 Beds
		Outpatients/day =	0 No.
HOTELS		0 High Class Hotels ->	0 Beds
		0 Medium Class Hotels ->	0 Beds
		0 Low Class Hotels ->	0 Beds
ADMINISTRATION OFFICES	:	Staff =	0 No.
BARS	:	=	0 No.
SHOPS	:	=	0 No.
INDUSTRIES	No		

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Lmisigiyoi DIVISION : Lorroki
LOCATION : Kisima DISTRICT : Samburu

POPULATION : 644 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 100 % population
Low Potential = 0 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 10 % Urban Area = 0 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.	60	0
		Medium :	10 % =	64	No.	50	3200
		Low :	0 % =	0	No.	40	0
	with NC,	High :	0 % =	0	No.	20	0
		Medium :	90 % =	579	No.	15	8685
		Low :	0 % =	0	No.	10	0
	Total Demand for RURAL population						11885
URBAN POPULATION	with IC,	High :	0 % =	0	No.	250	0
		Medium :	0 % =	0	No.	150	0
		Low :	0 % =	0	No.	75	0
	with NC,	Low :	0 % =	0	No.	20	0
	Total Demand for URBAN population						0
LIVESTOCK			(L.U.) =	488	No.	50	24400
SCHOOLS	Day Schools with WC -> Pupils =			0	No.	25	0
	Day Schools no WC -> Pupils =			195	No.	5	975
	Boarding Schools -> Pupils =			0	No.	50	0
HEALTH	Health Centres\Dispensaries =			0	No.	5000	0
	Regional Hospitals -> Beds =			0	No.	400	0
	District Hospitals -> Beds =			0	No.	200	0
	Other Hospitals -> Beds =			0	No.	100	0
	All Hospitals Outpatients =			0	No.	20	0
HOTELS	High Class Hotels -> Beds =			0	No.	600	0
	Medium Class Hotels -> Beds =			0	No.	300	0
	Low Class Hotels -> Beds =			0	No.	50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.	25	0
BARS			=	0	No.	500	0
SHOPS			=	0	No.	100	0
TOTAL DEMAND (l/day)							37260

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Mbaringon

LOCATION : Kisima
DIVISION : Lorroki

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 105300 mN Long. = 251300 mE

TYPE = 2
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 150 (km²)			
CLASSIFICATION	Rural Area	: High Potential	=	0 % population
		Medium Potential	=	70 % population
		Low Potential	=	0 % population
	Urban Area	: High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	30 % population
POPULATION		: 1979 (census)	=	1297 No.
		1988 (estimated)	=	1402 No.
LIVESTOCK		: Grade cow	=	0 No.
		Indigenous cow	=	2227 No.
		Sheep/goats	=	12774 No.
		Donkey	=	0 No.
		Camel	=	214 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		2 Day Schools no WC ->		330 Pupils
		0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day =		0 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES		: Staff	=	0 No.
BARS		:	=	0 No.
SHOPS		:	=	0 No.
INDUSTRIES		No		

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Mbaringon DIVISION : Lorroki
LOCATION : Kisima DISTRICT : Samburu

POPULATION : 1402 Rural Pop. = 70 % Urban Pop. = 30 %

CLASSIFICATION :
High Potential = 0 % population
Medium Potential = 70 % population
Low Potential = 0 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 30 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 7 % Urban Area = 3 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	7 % =	98	No.		50	4900
		Low :	0 % =	0	No.		40	0
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	63 % =	883	No.		15	13245
		Low :	0 % =	0	No.		10	0
	Total Demand for RURAL population							18145
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	0 % =	0	No.		150	0
		Low :	3 % =	42	No.		75	3150
	with NC,	Low :	27 % =	378	No.		20	7560
	Total Demand for URBAN population							10710
LIVESTOCK			(L.U.) =	1700	No.		50	85000
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			330	No.		5	1650
	Boarding Schools -> Pupils =			0	No.		50	0
HEALTH	Health Centres\Dispensaries =			0	No.		5000	0
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			0	No.		20	0
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			0	No.		50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.		25	0
BARS			=	0	No.		500	0
SHOPS			=	0	No.		100	0
			TOTAL DEMAND (l/day)					115505

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Nauneri

LOCATION : Kisima
DIVISION : Lorroki

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 114500 mN Long. = 246100 mE

TYPE = 1

1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total =	90 (km²)		
CLASSIFICATION	Rural Area :	High Potential	=	0 % population
		Medium Potential	=	100 % population
		Low Potential	=	0 % population
	Urban Area :	High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	0 % population
POPULATION	:	1979 (census)	=	790 No.
		1988 (estimated)	=	836 No.
LIVESTOCK	:	Grade cow	=	0 No.
		Indigenous cow	=	2009 No.
		Sheep/goats	=	7636 No.
		Donkey	=	0 No.
		Camel	=	128 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		2 Day Schools no WC ->		190 Pupils
		0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day =		0 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		5 Low Class Hotels ->		40 Beds
ADMINISTRATION OFFICES	:	Staff =		2 No.
BARS	:	=		2 No.
SHOPS	:	=		29 No.
INDUSTRIES	No			

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Nauneri DIVISION : Lorroki
LOCATION : Kisima DISTRICT : Samburu

POPULATION : 836 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION :
High Potential = 0 % population
Medium Potential = 100 % population
Low Potential = 0 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 10 % Urban Area = 0 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.	60	0
		Medium :	10 % =	83	No.	50	4150
		Low :	0 % =	0	No.	40	0
	with NC,	High :	0 % =	0	No.	20	0
		Medium :	90 % =	752	No.	15	11280
		Low :	0 % =	0	No.	10	0
	Total Demand for RURAL population						15430
URBAN POPULATION	with IC,	High :	0 % =	0	No.	250	0
		Medium :	0 % =	0	No.	150	0
		Low :	0 % =	0	No.	75	0
	with NC,	Low :	0 % =	0	No.	20	0
	Total Demand for URBAN population						0
LIVESTOCK			(L.U.) =	1242	No.	50	62100
SCHOOLS	Day Schools with WC -> Pupils =			0	No.	25	0
	Day Schools no WC -> Pupils =			190	No.	5	950
	Boarding Schools -> Pupils =			0	No.	50	0
HEALTH	Health Centres\Dispensaries =			0	No.	5000	0
	Regional Hospitals -> Beds =			0	No.	400	0
	District Hospitals -> Beds =			0	No.	200	0
	Other Hospitals -> Beds =			0	No.	100	0
	All Hospitals Outpatients =			0	No.	20	0
HOTELS	High Class Hotels -> Beds =			0	No.	600	0
	Medium Class Hotels -> Beds =			0	No.	300	0
	Low Class Hotels -> Beds =			40	No.	50	2000
ADMINISTRATIVE OFFICES			Staff =	2	No.	25	50
BARS			=	2	No.	500	1000
SHOPS			=	29	No.	100	2900
	TOTAL DEMAND (l/day)						84430

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Kirimun

LOCATION : Lodokojek
DIVISION : Lorroki

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 80500 mN Long. = 264000 mE

TYPE = 2
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 124 (km²)			
CLASSIFICATION	Rural Area	: High Potential	=	0 % population
		Medium Potential	=	60 % population
		Low Potential	=	10 % population
	Urban Area	: High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	30 % population
POPULATION		: 1979 (census)	=	1212 No.
		1988 (estimated)	=	1319 No.
LIVESTOCK		: Grade cow	=	0 No.
		Indigenous cow	=	1107 No.
		Sheep/goats	=	8581 No.
		Donkey	=	0 No.
		Camel	=	163 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		1 Day Schools no WC ->		251 Pupils
		0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES			=	1 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day	=	26 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		2 Low Class Hotels ->		16 Beds
ADMINISTRATION OFFICES		: Staff	=	3 No.
BARS		:	=	2 No.
SHOPS		:	=	11 No.
INDUSTRIES		No		

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Kirimun DIVISION : Lorroki
LOCATION : Lodokojek DISTRICT : Samburu

POPULATION : 1319 Rural Pop. = 70 % Urban Pop. = 30 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 60 % population
Low Potential = 10 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 30 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 7 % Urban Area = 3 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	6 % =	79	No.		50	3950
		Low :	1 % =	13	No.		40	520
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	54 % =	712	No.		15	10680
		Low :	9 % =	118	No.		10	1180
	Total Demand for RURAL population							16330
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	0 % =	0	No.		150	0
		Low :	3 % =	39	No.		75	2925
	with NC,	Low :	27 % =	356	No.		20	7120
	Total Demand for URBAN population							10045
LIVESTOCK			(L.U.) =	1022	No.		50	51100
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			251	No.		5	1255
	Boarding Schools -> Pupils =			0	No.		50	0
HEALTH	Health Centres\Dispensaries =			1	No.		5000	5000
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			26	No.		20	520
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			16	No.		50	800
ADMINISTRATIVE OFFICES			Staff =	3	No.		25	75
BARS			=	2	No.		500	1000
SHOPS			=	11	No.		100	1100
			TOTAL DEMAND (l/day)					87225

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Lodokojek

LOCATION : Lodokojek
DIVISION : Lorroki

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 94400 mN Long. = 261500 mE

TYPE = 2
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 153 (km²)			
CLASSIFICATION	Rural Area	: High Potential	=	0 % population
		Medium Potential	=	80 % population
		Low Potential	=	10 % population
	Urban Area	: High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	10 % population
POPULATION		: 1979 (census)	=	1713 No.
		1988 (estimated)	=	1820 No.
LIVESTOCK		: Grade cow	=	0 No.
		Indigenous cow	=	1364 No.
		Sheep/goats	=	7672 No.
		Donkey	=	0 No.
		Camel	=	128 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		2 Day Schools no WC ->		222 Pupils
		0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day =		0 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		1 Low Class Hotels ->		8 Beds
ADMINISTRATION OFFICES		: Staff	=	2 No.
BARS		:	=	1 No.
SHOPS		:	=	5 No.
INDUSTRIES		No		

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Lodokojek DIVISION : Lorroki
LOCATION : Lodokojek DISTRICT : Samburu

POPULATION : 1820 Rural Pop. = 90 % Urban Pop. = 10 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 80 % population
Low Potential = 10 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 10 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 9 % Urban Area = 1 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	8 % =	145	No.		50	7250
		Low :	1 % =	18	No.		40	720
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	72 % =	1310	No.		15	19650
		Low :	9 % =	163	No.		10	1630
	Total Demand for RURAL population							29250
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	0 % =	0	No.		150	0
		Low :	1 % =	18	No.		75	1350
	with NC,	Low :	9 % =	163	No.		20	3260
	Total Demand for URBAN population							4610
LIVESTOCK			(L.U.) =	1030	No.		50	51500
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			222	No.		5	1110
	Boarding Schools -> Pupils =			0	No.		50	0
HEALTH	Health Centres\Dispensaries =			0	No.		5000	0
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			0	No.		20	0
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			8	No.		50	400
ADMINISTRATIVE OFFICES			Staff =	2	No.		25	50
BARS			=	1	No.		500	500
SHOPS			=	5	No.		100	500
			TOTAL DEMAND (l/day)					87920

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Moru

LOCATION : Lodokojek
DIVISION : Lorroki

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 97000 mN Long. = 260000 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 243 (km²)			
CLASSIFICATION	Rural Area	: High Potential	=	0 % population
		Medium Potential	=	70 % population
		Low Potential	=	30 % population
	Urban Area	: High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	0 % population
POPULATION		: 1979 (census)	=	1009 No.
		1988 (estimated)	=	1068 No.
LIVESTOCK		: Grade cow	=	0 No.
		Indigenous cow	=	0 No.
		Sheep/goats	=	0 No.
		Donkey	=	325 No.
		Camel	=	0 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		0 Day Schools no WC ->		0 Pupils
		0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day =		0 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES		: Staff	=	0 No.
BARS		:	=	0 No.
SHOPS		:	=	0 No.
INDUSTRIES		No		

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Moru DIVISION : Lorroki
LOCATION : Lodokojek DISTRICT : Samburu

POPULATION : 1068 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 70 % population
Low Potential = 30 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 9 % Urban Area = 0 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	7 % =	74	No.		50	3700
		Low :	2 % =	21	No.		40	840
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	63 % =	672	No.		15	10080
		Low :	28 % =	299	No.		10	2990
	Total Demand for RURAL population							17610
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	0 % =	0	No.		150	0
		Low :	0 % =	0	No.		75	0
	with NC,	Low :	0 % =	0	No.		20	0
	Total Demand for URBAN population							0
LIVESTOCK			(L.U.) =	130	No.		50	6500
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			0	No.		5	0
	Boarding Schools -> Pupils =			0	No.		50	0
HEALTH	Health Centres\Dispensaries =			0	No.		5000	0
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			0	No.		20	0
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			0	No.		50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.		25	0
BARS			=	0	No.		500	0
SHOPS			=	0	No.		100	0
TOTAL DEMAND (l/day)								24110

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Nonkeek

LOCATION : Lodokojek
DIVISION : Lorroki

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 94600 mN Long. = 261600 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 110 (km²)			
CLASSIFICATION	Rural Area :	High Potential =	0	% population
		Medium Potential =	80	% population
		Low Potential =	20	% population
	Urban Area :	High Class Housing =	0	% population
		Medium Class Housing =	0	% population
		Low Class Housing =	0	% population
POPULATION	: 1979 (census) =		916	No.
	1988 (estimated) =		970	No.
LIVESTOCK	: Grade cow =		0	No.
	Indigenous cow =		0	No.
	Sheep/goats =		0	No.
	Donkey =		0	No.
	Camel =		0	No.
SCHOOLS	0 Day Schools with WC ->		0	Pupils
	1 Day Schools no WC ->		52	Pupils
	0 Boarding Schools ->		0	Pupils
HEALTH CENTRES/DISPENSARIES	=		0	No.
HOSPITALS	0 Regional Hospitals ->		0	Beds
	0 District Hospitals ->		0	Beds
	0 Other Hospitals ->		0	Beds
	Outpatients/day =		0	No.
HOTELS	0 High Class Hotels ->		0	Beds
	0 Medium Class Hotels ->		0	Beds
	0 Low Class Hotels ->		0	Beds
ADMINISTRATION OFFICES	: Staff =		0	No.
BARS	: =		0	No.
SHOPS	: =		0	No.
INDUSTRIES	No			

Printed : 13-07-1990

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Nonkeek DIVISION : Lorroki
LOCATION : Lodokojek DISTRICT : Samburu

POPULATION : 970 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 80 % population
Low Potential = 20 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 9 % Urban Area = 0 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	8 % =	77	No.		50	3850
		Low :	1 % =	9	No.		40	360
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	72 % =	698	No.		15	10470
		Low :	19 % =	184	No.		10	1840
	Total Demand for RURAL population							16520
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	0 % =	0	No.		150	0
		Low :	0 % =	0	No.		75	0
	with NC,	Low :	0 % =	0	No.		20	0
	Total Demand for URBAN population							0
LIVESTOCK			(L.U.) =	0	No.		50	0
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			52	No.		5	260
	Boarding Schools -> Pupils =			0	No.		50	0
HEALTH	Health Centres\Dispensaries =			0	No.		5000	0
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			0	No.		20	0
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			0	No.		50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.		25	0
BARS			=	0	No.		500	0
SHOPS			=	0	No.		100	0
	TOTAL DEMAND (l/day)							16780

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Loosuk

LOCATION : Loosuk
DIVISION : Lorroki

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 113700 mN Long. = 230600 mE

TYPE = 2
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 133 (km²)			
CLASSIFICATION	Rural Area :	High Potential =	0	% population
		Medium Potential =	35	% population
		Low Potential =	15	% population
	Urban Area :	High Class Housing =	0	% population
		Medium Class Housing =	0	% population
		Low Class Housing =	50	% population
POPULATION	: 1979 (census) =		761	No.
	1988 (estimated) =		863	No.
LIVESTOCK	: Grade cow =		0	No.
	Indigenous cow =		1188	No.
	Sheep/goats =		9203	No.
	Donkey =		0	No.
	Camel =		175	No.
SCHOOLS	0 Day Schools with WC ->		0	Pupils
	2 Day Schools no WC ->		371	Pupils
	1 Boarding Schools ->		299	Pupils
HEALTH CENTRES/DISPENSARIES	=		1	No.
HOSPITALS	0 Regional Hospitals ->		0	Beds
	0 District Hospitals ->		0	Beds
	0 Other Hospitals ->		0	Beds
	Outpatients/day =		31	No.
HOTELS	0 High Class Hotels ->		0	Beds
	0 Medium Class Hotels ->		0	Beds
	3 Low Class Hotels ->		24	Beds
ADMINISTRATION OFFICES	: Staff =		2	No.
BARS	: =		3	No.
SHOPS	: =		27	No.
INDUSTRIES	No			

Printed : 13-07-1990

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Loosuk DIVISION : Lorroki
LOCATION : Loosuk DISTRICT : Samburu

POPULATION : 863 Rural Pop. = 50 % Urban Pop. = 50 %

CLASSIFICATION :
High Potential = 0 % population
Medium Potential = 35 % population
Low Potential = 15 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 50 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 5 % Urban Area = 5 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.	60	0
		Medium :	4 % =	34	No.	50	1700
		Low :	1 % =	8	No.	40	320
	with NC,	High :	0 % =	0	No.	20	0
		Medium :	31 % =	267	No.	15	4005
		Low :	14 % =	120	No.	10	1200
	Total Demand for RURAL population						7225
URBAN POPULATION	with IC,	High :	0 % =	0	No.	250	0
		Medium :	0 % =	0	No.	150	0
		Low :	5 % =	43	No.	75	3225
	with NC,	Low :	45 % =	388	No.	20	7760
	Total Demand for URBAN population						10985
LIVESTOCK			(L.U.) =	1097	No.	50	54850
SCHOOLS	Day Schools with WC -> Pupils =			0	No.	25	0
	Day Schools no WC -> Pupils =			371	No.	5	1855
	Boarding Schools -> Pupils =			299	No.	50	14950
HEALTH	Health Centres\Dispensaries =			1	No.	5000	5000
	Regional Hospitals -> Beds =			0	No.	400	0
	District Hospitals -> Beds =			0	No.	200	0
	Other Hospitals -> Beds =			0	No.	100	0
	All Hospitals Outpatients =			31	No.	20	620
HOTELS	High Class Hotels -> Beds =			0	No.	600	0
	Medium Class Hotels -> Beds =			0	No.	300	0
	Low Class Hotels -> Beds =			24	No.	50	1200
ADMINISTRATIVE OFFICES			Staff =	2	No.	25	50
BARS			=	3	No.	500	1500
SHOPS			=	27	No.	100	2700
			TOTAL DEMAND (l/day)				100935

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Malaso

LOCATION : Loosuk
DIVISION : Lorroki

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 122700 mN Long. = 231600 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 205 (km²)			
CLASSIFICATION	Rural Area :	High Potential	=	0 % population
		Medium Potential	=	50 % population
		Low Potential	=	50 % population
	Urban Area :	High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	0 % population
POPULATION	: 1979 (census)		=	677 No.
	1988 (estimated)		=	717 No.
LIVESTOCK	: Grade cow		=	0 No.
	Indigenous cow		=	1220 No.
	Sheep/goats		=	8617 No.
	Donkey		=	0 No.
	Camel		=	155 No.
SCHOOLS	0 Day Schools with WC ->			0 Pupils
	1 Day Schools no WC ->			46 Pupils
	0 Boarding Schools ->			0 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS	0 Regional Hospitals ->			0 Beds
	0 District Hospitals ->			0 Beds
	0 Other Hospitals ->			0 Beds
	Outpatients/day =			0 No.
HOTELS	0 High Class Hotels ->			0 Beds
	0 Medium Class Hotels ->			0 Beds
	0 Low Class Hotels ->			0 Beds
ADMINISTRATION OFFICES	: Staff =			0 No.
BARS	:		=	0 No.
SHOPS	:		=	3 No.
INDUSTRIES	No			

Printed : 13-07-1990

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Malaso DIVISION : Lorroki
LOCATION : Loosuk DISTRICT : Samburu

POPULATION : 717 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 50 % population
Low Potential = 50 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 8 % Urban Area = 0 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	5 % =	35	No.		50	1750
		Low :	3 % =	21	No.		40	840
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	45 % =	322	No.		15	4830
		Low :	47 % =	336	No.		10	3360
	Total Demand for RURAL population							10780
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	0 % =	0	No.		150	0
		Low :	0 % =	0	No.		75	0
	with NC,	Low :	0 % =	0	No.		20	0
	Total Demand for URBAN population							0
LIVESTOCK			(L.U.) =	1058	No.		50	52900
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			46	No.		5	230
	Boarding Schools -> Pupils =			0	No.		50	0
HEALTH	Health Centres\Dispensaries =			0	No.		5000	0
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			0	No.		20	0
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			0	No.		50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.		25	0
BARS			=	0	No.		500	0
SHOPS			=	3	No.		100	300
	TOTAL DEMAND (l/day)							64210

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Tinga

LOCATION : Loosuk
DIVISION : Lorroki

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 113500 mN Long. = 230500 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 147 (km²)		
CLASSIFICATION	Rural Area : High Potential	=	0 % population
	Medium Potential	=	50 % population
	Low Potential	=	50 % population
	Urban Area : High Class Housing	=	0 % population
	Medium Class Housing	=	0 % population
	Low Class Housing	=	0 % population
POPULATION	: 1979 (census)	=	1033 No.
	1988 (estimated)	=	1094 No.
LIVESTOCK	: Grade cow	=	0 No.
	Indigenous cow	=	877 No.
	Sheep/goats	=	7221 No.
	Donkey	=	0 No.
	Camel	=	222 No.
SCHOOLS	0 Day Schools with WC ->		0 Pupils
	1 Day Schools no WC ->		39 Pupils
	0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES		=	0 No.
HOSPITALS	0 Regional Hospitals ->		0 Beds
	0 District Hospitals ->		0 Beds
	0 Other Hospitals ->		0 Beds
	Outpatients/day	=	0 No.
HOTELS	0 High Class Hotels ->		0 Beds
	0 Medium Class Hotels ->		0 Beds
	0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES	: Staff	=	0 No.
BARS	:	=	0 No.
SHOPS	:	=	2 No.
INDUSTRIES	No		

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Tinga DIVISION : Lorroki
LOCATION : Loosuk DISTRICT : Samburu

POPULATION : 1094 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 50 % population
Low Potential = 50 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 8 % Urban Area = 0 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC, High :	0 % =	0	No.		60	0
	Medium :	5 % =	54	No.		50	2700
	Low :	3 % =	32	No.		40	1280
	with NC, High :	0 % =	0	No.		20	0
	Medium :	45 % =	492	No.		15	7380
	Low :	47 % =	514	No.		10	5140
	Total Demand for RURAL population						16500
URBAN POPULATION	with IC, High :	0 % =	0	No.		250	0
	Medium :	0 % =	0	No.		150	0
	Low :	0 % =	0	No.		75	0
	with NC, Low :	0 % =	0	No.		20	0
	Total Demand for URBAN population						0
LIVESTOCK	(L.U.) =		884	No.		50	44200
SCHOOLS	Day Schools with WC -> Pupils =		0	No.		25	0
	Day Schools no WC -> Pupils =		39	No.		5	195
	Boarding Schools -> Pupils =		0	No.		50	0
HEALTH	Health Centres\Dispensaries =		0	No.		5000	0
	Regional Hospitals -> Beds =		0	No.		400	0
	District Hospitals -> Beds =		0	No.		200	0
	Other Hospitals -> Beds =		0	No.		100	0
	All Hospitals Outpatients =		0	No.		20	0
HOTELS	High Class Hotels -> Beds =		0	No.		600	0
	Medium Class Hotels -> Beds =		0	No.		300	0
	Low Class Hotels -> Beds =		0	No.		50	0
ADMINISTRATIVE OFFICES	Staff =		0	No.		25	0
BARS	=		0	No.		500	0
SHOPS	=		2	No.		100	200
	TOTAL DEMAND (l/day)						61095

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Ledero

LOCATION : Maralal
DIVISION : Lorroki

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 121600 mN Long. = 245000 mE

TYPE = 4

1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total =	66 (km²)		
CLASSIFICATION	Rural Area :	High Potential	=	0 % population
		Medium Potential	=	15 % population
		Low Potential	=	0 % population
	Urban Area :	High Class Housing	=	5 % population
		Medium Class Housing	=	30 % population
		Low Class Housing	=	50 % population
POPULATION	:	1979 (census)	=	3698 No.
		1988 (estimated)	=	8197 No.
LIVESTOCK	:	Grade cow	=	0 No.
		Indigenous cow	=	0 No.
		Sheep/goats	=	0 No.
		Donkey	=	0 No.
		Camel	=	0 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		4 Day Schools no WC ->		1511 Pupils
		1 Boarding Schools ->		759 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day	=	0 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES	:	Staff	=	200 No.
BARS	:		=	0 No.
SHOPS	:		=	0 No.
INDUSTRIES	No			

Printed : 13-07-1990

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Ledero DIVISION : Lorroki
LOCATION : Maralal DISTRICT : Samburu

POPULATION : 8197 Rural Pop. = 15 % Urban Pop. = 85 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 15 % population
Low Potential = 0 % population
High Class Housing = 5 % population
Medium Class Housing = 30 % population
Low Class Housing = 50 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 2 % Urban Area = 40 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.	60	0
		Medium :	2 % =	163	No.	50	8150
		Low :	0 % =	0	No.	40	0
	with NC,	High :	0 % =	0	No.	20	0
		Medium :	13 % =	1065	No.	15	15975
		Low :	0 % =	0	No.	10	0
	Total Demand for RURAL population						24125
URBAN POPULATION	with IC,	High :	5 % =	409	No.	250	102250
		Medium :	30 % =	2459	No.	150	368850
		Low :	5 % =	409	No.	75	30675
	with NC,	Low :	45 % =	3688	No.	20	73760
	Total Demand for URBAN population						575535
LIVESTOCK			(L.U.) =	0	No.	50	0
SCHOOLS	Day Schools with WC -> Pupils =			0	No.	25	0
	Day Schools no WC -> Pupils =			1511	No.	5	7555
	Boarding Schools -> Pupils =			759	No.	50	37950
HEALTH	Health Centres\Dispensaries =			0	No.	5000	0
	Regional Hospitals -> Beds =			0	No.	400	0
	District Hospitals -> Beds =			0	No.	200	0
	Other Hospitals -> Beds =			0	No.	100	0
	All Hospitals Outpatients =			0	No.	20	0
HOTELS	High Class Hotels -> Beds =			0	No.	600	0
	Medium Class Hotels -> Beds =			0	No.	300	0
	Low Class Hotels -> Beds =			0	No.	50	0
ADMINISTRATIVE OFFICES			Staff =	200	No.	25	5000
BARS			=	0	No.	500	0
SHOPS			=	0	No.	100	0
TOTAL DEMAND (l/day)							650165

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Lpartuk

LOCATION : Maralal
DIVISION : Lorroki

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 121600 mN Long. = 244100 mE

TYPE = 2
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total =	63 (km²)		
CLASSIFICATION	Rural Area :	High Potential	=	0 % population
		Medium Potential	=	80 % population
		Low Potential	=	0 % population
	Urban Area :	High Class Housing	=	0 % population
		Medium Class Housing	=	5 % population
		Low Class Housing	=	15 % population
POPULATION	:	1979 (census)	=	1120 No.
		1988 (estimated)	=	2483 No.
LIVESTOCK	:	Grade cow	=	0 No.
		Indigenous cow	=	0 No.
		Sheep/goats	=	0 No.
		Donkey	=	0 No.
		Camel	=	0 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		3 Day Schools no WC ->		465 Pupils
		0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day =		0 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES	:	Staff =		0 No.
BARS	:		=	0 No.
SHOPS	:		=	0 No.
INDUSTRIES	No			

Printed : 13-07-1990

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Lpartuk DIVISION : Lorroki
LOCATION : Maralal DISTRICT : Samburu

POPULATION : 2483 Rural Pop. = 80 % Urban Pop. = 20 %

CLASSIFICATION :
High Potential = 0 % population
Medium Potential = 80 % population
Low Potential = 0 % population
High Class Housing = 0 % population
Medium Class Housing = 5 % population
Low Class Housing = 15 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 8 % Urban Area = 7 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	8 % =	198	No.		50	9900
		Low :	0 % =	0	No.		40	0
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	72 % =	1787	No.		15	26805
		Low :	0 % =	0	No.		10	0
	Total Demand for RURAL population							36705
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	5 % =	124	No.		150	18600
		Low :	2 % =	49	No.		75	3675
	with NC,	Low :	13 % =	322	No.		20	6440
	Total Demand for URBAN population							28715
LIVESTOCK			(L.U.) =	0	No.		50	0
SCHOOLS	Day Schools with WC ->	Pupils =		0	No.		25	0
	Day Schools no WC ->	Pupils =		465	No.		5	2325
	Boarding Schools ->	Pupils =		0	No.		50	0
HEALTH	Health Centres\Dispensaries		=	0	No.		5000	0
	Regional Hospitals ->	Beds =		0	No.		400	0
	District Hospitals ->	Beds =		0	No.		200	0
	Other Hospitals ->	Beds =		0	No.		100	0
	All Hospitals Outpatients		=	0	No.		20	0
HOTELS	High Class Hotels ->	Beds =		0	No.		600	0
	Medium Class Hotels ->	Beds =		0	No.		300	0
	Low Class Hotels ->	Beds =		0	No.		50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.		25	0
BARS			=	0	No.		500	0
SHOPS			=	0	No.		100	0
			TOTAL DEMAND (l/day)					67745

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Township

LOCATION : Maralal
DIVISION : Lorroki

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 121500 mN Long. = 244000 mE

TYPE = 4
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total =	53 (km²)		
CLASSIFICATION	Rural Area :	High Potential	=	0 % population
		Medium Potential	=	15 % population
		Low Potential	=	0 % population
	Urban Area :	High Class Housing	=	5 % population
		Medium Class Housing	=	35 % population
		Low Class Housing	=	45 % population
POPULATION	:	1979 (census)	=	5412 No.
		1988 (estimated)	=	11997 No.
LIVESTOCK	:	Grade cow	=	0 No.
		Indigenous cow	=	0 No.
		Sheep/goats	=	0 No.
		Donkey	=	0 No.
		Camel	=	0 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		2 Day Schools no WC ->		309 Pupils
		0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES			=	2 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		1 District Hospitals ->		68 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day =		145 No.
HOTELS		1 High Class Hotels ->		25 Beds
		0 Medium Class Hotels ->		0 Beds
		25 Low Class Hotels ->		200 Beds
ADMINISTRATION OFFICES	:	Staff =		1000 No.
BARS	:		=	5 No.
SHOPS	:		=	216 No.
INDUSTRIES			->	3 ha.

Printed : 13-07-1990

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Township DIVISION : Lorroki
LOCATION : Maralal DISTRICT : Samburu

POPULATION : 11997 Rural Pop. = 15 % Urban Pop. = 85 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 15 % population
Low Potential = 0 % population
High Class Housing = 5 % population
Medium Class Housing = 35 % population
Low Class Housing = 45 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 2 % Urban Area = 45 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	2 % =	239	No.		50	11950
		Low :	0 % =	0	No.		40	0
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	13 % =	1559	No.		15	23385
		Low :	0 % =	0	No.		10	0
	Total Demand for RURAL population							35335
URBAN POPULATION	with IC,	High :	5 % =	599	No.		250	149750
		Medium :	35 % =	4198	No.		150	629700
		Low :	5 % =	599	No.		75	44925
	with NC,	Low :	40 % =	4798	No.		20	95960
	Total Demand for URBAN population							920335
LIVESTOCK			(L.U.) =	0	No.		50	0
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			309	No.		5	1545
	Boarding Schools -> Pupils =			0	No.		50	0
HEALTH	Health Centres\Dispensaries =			2	No.		5000	10000
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			68	No.		200	13600
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			145	No.		20	2900
HOTELS	High Class Hotels -> Beds =			25	No.		600	15000
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			200	No.		50	10000
ADMINISTRATIVE OFFICES			Staff =	1000	No.		25	25000
BARS			=	5	No.		500	2500
SHOPS			=	216	No.		100	21600
INDUSTRIES			=	3	ha.		20000	60000
			TOTAL DEMAND (l/day)					1117815

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Mabati

LOCATION : Opiroi
DIVISION : Lorroki

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 127500 mN Long. = 255300 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 129 (km²)			
CLASSIFICATION	Rural Area	: High Potential	=	0 % population
		Medium Potential	=	40 % population
		Low Potential	=	60 % population
	Urban Area	: High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	0 % population
POPULATION		: 1979 (census)	=	410 No.
		1988 (estimated)	=	434 No.
LIVESTOCK		: Grade cow	=	0 No.
		Indigenous cow	=	0 No.
		Sheep/goats	=	0 No.
		Donkey	=	0 No.
		Camel	=	0 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		0 Day Schools no WC ->		0 Pupils
		0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day =		0 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES		: Staff	=	0 No.
BARS		:	=	0 No.
SHOPS		:	=	0 No.
INDUSTRIES		No		

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Mabati DIVISION : Lorroki
LOCATION : Opiroi DISTRICT : Samburu

POPULATION : 434 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION :
High Potential = 0 % population
Medium Potential = 40 % population
Low Potential = 60 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 7 % Urban Area = 0 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	4 % =	17	No.		50	850
		Low :	3 % =	13	No.		40	520
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	36 % =	156	No.		15	2340
		Low :	57 % =	247	No.		10	2470
	Total Demand for RURAL population							6180
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	0 % =	0	No.		150	0
		Low :	0 % =	0	No.		75	0
	with NC,	Low :	0 % =	0	No.		20	0
	Total Demand for URBAN population							0
LIVESTOCK			(L.U.) =	0	No.		50	0
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			0	No.		5	0
	Boarding Schools -> Pupils =			0	No.		50	0
HEALTH	Health Centres\Dispensaries =			0	No.		5000	0
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			0	No.		20	0
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			0	No.		50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.		25	0
BARS			=	0	No.		500	0
SHOPS			=	0	No.		100	0
			TOTAL DEMAND (l/day)					6180

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Mbukoi

LOCATION : Opiroi
DIVISION : Lorroki

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 129500 mN Long. = 263000 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 119 (km²)			
CLASSIFICATION	Rural Area	: High Potential	=	0 % population
		Medium Potential	=	20 % population
		Low Potential	=	80 % population
	Urban Area	: High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	0 % population
POPULATION		: 1979 (census)	=	837 No.
		1988 (estimated)	=	886 No.
LIVESTOCK		: Grade cow	=	0 No.
		Indigenous cow	=	0 No.
		Sheep/goats	=	0 No.
		Donkey	=	49 No.
		Camel	=	0 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		0 Day Schools no WC ->		0 Pupils
		0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day =		0 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES		: Staff =		0 No.
BARS		: =		0 No.
SHOPS		: =		0 No.
INDUSTRIES		No		

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Mbukoi DIVISION : Lorroki
LOCATION : Opiroi DISTRICT : Samburu

POPULATION : 886 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 20 % population
Low Potential = 80 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 6 % Urban Area = 0 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.	60	0
		Medium :	2 % =	17	No.	50	850
		Low :	4 % =	35	No.	40	1400
	with NC,	High :	0 % =	0	No.	20	0
		Medium :	18 % =	159	No.	15	2385
		Low :	76 % =	673	No.	10	6730
	Total Demand for RURAL population						11365
URBAN POPULATION	with IC,	High :	0 % =	0	No.	250	0
		Medium :	0 % =	0	No.	150	0
		Low :	0 % =	0	No.	75	0
	with NC,	Low :	0 % =	0	No.	20	0
	Total Demand for URBAN population						0
LIVESTOCK			(L.U.) =	19	No.	50	950
SCHOOLS	Day Schools with WC -> Pupils =			0	No.	25	0
	Day Schools no WC -> Pupils =			0	No.	5	0
	Boarding Schools -> Pupils =			0	No.	50	0
HEALTH	Health Centres\Dispensaries =			0	No.	5000	0
	Regional Hospitals -> Beds =			0	No.	400	0
	District Hospitals -> Beds =			0	No.	200	0
	Other Hospitals -> Beds =			0	No.	100	0
	All Hospitals Outpatients =			0	No.	20	0
HOTELS	High Class Hotels -> Beds =			0	No.	600	0
	Medium Class Hotels -> Beds =			0	No.	300	0
	Low Class Hotels -> Beds =			0	No.	50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.	25	0
BARS			=	0	No.	500	0
SHOPS			=	0	No.	100	0
TOTAL DEMAND (l/day)							12315

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Opiroi

LOCATION : Opiroi
DIVISION : Lorroki

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 128500 mN Long. = 256300 mE

TYPE = 2
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 323 (km²)			
CLASSIFICATION	Rural Area	: High Potential	=	0 % population
		Medium Potential	=	45 % population
		Low Potential	=	25 % population
	Urban Area	: High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	30 % population
POPULATION		: 1979 (census)	=	2017 No.
		1988 (estimated)	=	2200 No.
LIVESTOCK		: Grade cow	=	0 No.
		Indigenous cow	=	0 No.
		Sheep/goats	=	0 No.
		Donkey	=	0 No.
		Camel	=	0 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		1 Day Schools no WC ->		82 Pupils
		1 Boarding Schools ->		150 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day =		0 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES		: Staff	=	1 No.
BARS		:	=	0 No.
SHOPS		:	=	5 No.
INDUSTRIES		No		

Printed : 13-07-1990

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Opiroi DIVISION : Lorroki
LOCATION : Opiroi DISTRICT : Samburu

POPULATION : 2200 Rural Pop. = 70 % Urban Pop. = 30 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 45 % population
Low Potential = 25 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 30 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 6 % Urban Area = 3 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	5 % =	110	No.		50	5500
		Low :	1 % =	22	No.		40	880
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	40 % =	880	No.		15	13200
		Low :	24 % =	528	No.		10	5280
	Total Demand for RURAL population							24860
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	0 % =	0	No.		150	0
		Low :	3 % =	66	No.		75	4950
	with NC,	Low :	27 % =	594	No.		20	11880
	Total Demand for URBAN population							16830
LIVESTOCK			(L.U.) =	0	No.		50	0
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			82	No.		5	410
	Boarding Schools -> Pupils =			150	No.		50	7500
HEALTH	Health Centres\Dispensaries =			0	No.		5000	0
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			0	No.		20	0
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			0	No.		50	0
ADMINISTRATIVE OFFICES			Staff =	1	No.		25	25
BARS			=	0	No.		500	0
SHOPS			=	5	No.		100	500
			TOTAL DEMAND (l/day)					50125

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Nkejemueny

LOCATION : Poro
DIVISION : Lorroki

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 110500 mN Long. = 239100 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total =	20 (km²)		
CLASSIFICATION	Rural Area :	High Potential	=	0 % population
		Medium Potential	=	100 % population
		Low Potential	=	0 % population
	Urban Area :	High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	0 % population
POPULATION	:	1979 (census)	=	278 No.
		1988 (estimated)	=	294 No.
LIVESTOCK	:	Grade cow	=	0 No.
		Indigenous cow	=	594 No.
		Sheep/goats	=	2324 No.
		Donkey	=	0 No.
		Camel	=	39 No.
SCHOOLS	0	Day Schools with WC ->		0 Pupils
	1	Day Schools no WC ->		136 Pupils
	0	Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS	0	Regional Hospitals ->		0 Beds
	0	District Hospitals ->		0 Beds
	0	Other Hospitals ->		0 Beds
		Outpatients/day =		0 No.
HOTELS	0	High Class Hotels ->		0 Beds
	0	Medium Class Hotels ->		0 Beds
	0	Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES	:	Staff =		0 No.
BARS	:		=	0 No.
SHOPS	:		=	0 No.
INDUSTRIES	No			

Printed : 13-07-1990

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Nkejemueny DIVISION : Lorroki
LOCATION : Poro DISTRICT : Samburu

POPULATION : 294 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 100 % population
Low Potential = 0 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 10 % Urban Area = 0 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.	60	0
		Medium :	10 % =	29	No.	50	1450
		Low :	0 % =	0	No.	40	0
	with NC,	High :	0 % =	0	No.	20	0
		Medium :	90 % =	264	No.	15	3960
		Low :	0 % =	0	No.	10	0
	Total Demand for RURAL population						5410
URBAN POPULATION	with IC,	High :	0 % =	0	No.	250	0
		Medium :	0 % =	0	No.	150	0
		Low :	0 % =	0	No.	75	0
	with NC,	Low :	0 % =	0	No.	20	0
	Total Demand for URBAN population						0
LIVESTOCK			(L.U.) =	372	No.	50	18600
SCHOOLS	Day Schools with WC -> Pupils =			0	No.	25	0
	Day Schools no WC -> Pupils =			136	No.	5	680
	Boarding Schools -> Pupils =			0	No.	50	0
HEALTH	Health Centres\Dispensaries =			0	No.	5000	0
	Regional Hospitals -> Beds =			0	No.	400	0
	District Hospitals -> Beds =			0	No.	200	0
	Other Hospitals -> Beds =			0	No.	100	0
	All Hospitals Outpatients =			0	No.	20	0
HOTELS	High Class Hotels -> Beds =			0	No.	600	0
	Medium Class Hotels -> Beds =			0	No.	300	0
	Low Class Hotels -> Beds =			0	No.	50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.	25	0
BARS			=	0	No.	500	0
SHOPS			=	0	No.	100	0
TOTAL DEMAND (l/day)							24690

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Seketet

LOCATION : Poro
DIVISION : Lorroki

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 126250 mN Long. = 232000 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 60 (km²)			
CLASSIFICATION	Rural Area	: High Potential	= 0	% population
		Medium Potential	= 100	% population
		Low Potential	= 0	% population
	Urban Area	: High Class Housing	= 0	% population
		Medium Class Housing	= 0	% population
		Low Class Housing	= 0	% population
POPULATION		: 1979 (census)	= 432	No.
		1988 (estimated)	= 457	No.
LIVESTOCK		: Grade cow	= 0	No.
		Indigenous cow	= 891	No.
		Sheep/goats	= 4014	No.
		Donkey	= 0	No.
		Camel	= 67	No.
SCHOOLS		0 Day Schools with WC ->	0	Pupils
		2 Day Schools no WC ->	355	Pupils
		0 Boarding Schools ->	0	Pupils
HEALTH CENTRES/DISPENSARIES			= 0	No.
HOSPITALS		0 Regional Hospitals ->	0	Beds
		0 District Hospitals ->	0	Beds
		0 Other Hospitals ->	0	Beds
		Outpatients/day =	0	No.
HOTELS		0 High Class Hotels ->	0	Beds
		0 Medium Class Hotels ->	0	Beds
		0 Low Class Hotels ->	0	Beds
ADMINISTRATION OFFICES		: Staff =	0	No.
BARS		: =	0	No.
SHOPS		: =	0	No.
INDUSTRIES		No		

Printed : 13-07-1990

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Seketet DIVISION : Lorroki
LOCATION : Poro DISTRICT : Samburu

POPULATION : 457 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 100 % population
Low Potential = 0 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 10 % Urban Area = 0 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	10 % =	45	No.		50	2250
		Low :	0 % =	0	No.		40	0
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	90 % =	411	No.		15	6165
		Low :	0 % =	0	No.		10	0
	Total Demand for RURAL population							8415
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	0 % =	0	No.		150	0
		Low :	0 % =	0	No.		75	0
	with NC,	Low :	0 % =	0	No.		20	0
	Total Demand for URBAN population							0
LIVESTOCK			(L.U.) =	598	No.		50	29900
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			355	No.		5	1775
	Boarding Schools -> Pupils =			0	No.		50	0
HEALTH	Health Centres\Dispensaries =			0	No.		5000	0
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			0	No.		20	0
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			0	No.		50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.		25	0
BARS			=	0	No.		500	0
SHOPS			=	0	No.		100	0
TOTAL DEMAND (l/day)								40090

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Siambu

LOCATION : Poro
DIVISION : Lorroki

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 135000 mN Long. = 232500 mE

TYPE = 2
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 421 (km²)			
CLASSIFICATION	Rural Area :	High Potential	=	0 % population
		Medium Potential	=	15 % population
		Low Potential	=	35 % population
	Urban Area :	High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	50 % population
POPULATION	: 1979 (census)		=	919 No.
	1988 (estimated)		=	1046 No.
LIVESTOCK	: Grade cow		=	0 No.
	Indigenous cow		=	0 No.
	Sheep/goats		=	0 No.
	Donkey		=	0 No.
	Camel		=	0 No.
SCHOOLS	0 Day Schools with WC ->			0 Pupils
	0 Day Schools no WC ->			0 Pupils
	0 Boarding Schools ->			0 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS	0 Regional Hospitals ->			0 Beds
	0 District Hospitals ->			0 Beds
	0 Other Hospitals ->			0 Beds
	Outpatients/day =			0 No.
HOTELS	0 High Class Hotels ->			0 Beds
	0 Medium Class Hotels ->			0 Beds
	3 Low Class Hotels ->			24 Beds
ADMINISTRATION OFFICES	:	Staff	=	0 No.
BARS	:		=	2 No.
SHOPS	:		=	29 No.
INDUSTRIES	No			

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Siambu DIVISION : Lorroki
LOCATION : Poro DISTRICT : Samburu

POPULATION : 1046 Rural Pop. = 50 % Urban Pop. = 50 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 15 % population
Low Potential = 35 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 50 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 4 % Urban Area = 5 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.	60	0
		Medium :	2 % =	20	No.	50	1000
		Low :	2 % =	20	No.	40	800
	with NC,	High :	0 % =	0	No.	20	0
		Medium :	13 % =	135	No.	15	2025
		Low :	33 % =	345	No.	10	3450
	Total Demand for RURAL population						7275
URBAN POPULATION	with IC,	High :	0 % =	0	No.	250	0
		Medium :	0 % =	0	No.	150	0
		Low :	5 % =	52	No.	75	3900
	with NC,	Low :	45 % =	470	No.	20	9400
	Total Demand for URBAN population						13300
LIVESTOCK			(L.U.) =	0	No.	50	0
SCHOOLS	Day Schools with WC -> Pupils =			0	No.	25	0
	Day Schools no WC -> Pupils =			0	No.	5	0
	Boarding Schools -> Pupils =			0	No.	50	0
HEALTH	Health Centres\Dispensaries =			0	No.	5000	0
	Regional Hospitals -> Beds =			0	No.	400	0
	District Hospitals -> Beds =			0	No.	200	0
	Other Hospitals -> Beds =			0	No.	100	0
	All Hospitals Outpatients =			0	No.	20	0
HOTELS	High Class Hotels -> Beds =			0	No.	600	0
	Medium Class Hotels -> Beds =			0	No.	300	0
	Low Class Hotels -> Beds =			24	No.	50	1200
ADMINISTRATIVE OFFICES			Staff =	0	No.	25	0
BARS			=	2	No.	500	1000
SHOPS			=	29	No.	100	2900
TOTAL DEMAND (l/day)							25675

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Sirata Oirobi

LOCATION : Poro
DIVISION : Lorroki

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 116200 mN Long. = 238500 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 48 (km²)			
CLASSIFICATION	Rural Area :	High Potential	= 0	% population
		Medium Potential	= 100	% population
		Low Potential	= 0	% population
	Urban Area :	High Class Housing	= 0	% population
		Medium Class Housing	= 0	% population
		Low Class Housing	= 0	% population
POPULATION	: 1979 (census)		= 864	No.
	1988 (estimated)		= 915	No.
LIVESTOCK	: Grade cow		= 0	No.
	Indigenous cow		= 566	No.
	Sheep/goats		= 3636	No.
	Donkey		= 0	No.
	Camel		= 62	No.
SCHOOLS	0 Day Schools with WC ->		0	Pupils
	1 Day Schools no WC ->		57	Pupils
	1 Boarding Schools ->		276	Pupils
HEALTH CENTRES/DISPENSARIES			= 1	No.
HOSPITALS	0 Regional Hospitals ->		0	Beds
	0 District Hospitals ->		0	Beds
	0 Other Hospitals ->		0	Beds
	Outpatients/day =		10	No.
HOTELS	0 High Class Hotels ->		0	Beds
	0 Medium Class Hotels ->		0	Beds
	0 Low Class Hotels ->		0	Beds
ADMINISTRATION OFFICES	: Staff =		0	No.
BARS	: =		0	No.
SHOPS	: =		0	No.
INDUSTRIES	No			

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Sirata Oirobi DIVISION : Lorroki
LOCATION : Poro DISTRICT : Samburu

POPULATION : 915 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 100 % population
Low Potential = 0 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 10 % Urban Area = 0 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.	60	0
		Medium :	10 % =	91	No.	50	4550
		Low :	0 % =	0	No.	40	0
	with NC,	High :	0 % =	0	No.	20	0
		Medium :	90 % =	823	No.	15	12345
		Low :	0 % =	0	No.	10	0
	Total Demand for RURAL population						16895
URBAN POPULATION	with IC,	High :	0 % =	0	No.	250	0
		Medium :	0 % =	0	No.	150	0
		Low :	0 % =	0	No.	75	0
	with NC,	Low :	0 % =	0	No.	20	0
	Total Demand for URBAN population						0
LIVESTOCK			(L.U.) =	462	No.	50	23100
SCHOOLS	Day Schools with WC -> Pupils =			0	No.	25	0
	Day Schools no WC -> Pupils =			57	No.	5	285
	Boarding Schools -> Pupils =			276	No.	50	13800
HEALTH	Health Centres\Dispensaries =			1	No.	5000	5000
	Regional Hospitals -> Beds =			0	No.	400	0
	District Hospitals -> Beds =			0	No.	200	0
	Other Hospitals -> Beds =			0	No.	100	0
	All Hospitals Outpatients =			10	No.	20	200
HOTELS	High Class Hotels -> Beds =			0	No.	600	0
	Medium Class Hotels -> Beds =			0	No.	300	0
	Low Class Hotels -> Beds =			0	No.	50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.	25	0
BARS			=	0	No.	500	0
SHOPS			=	0	No.	100	0
			TOTAL DEMAND (l/day)				59280

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Amaiya

LOCATION : Sukuta Marmar
DIVISION : Lorroki

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES UTM-grid = 37N
(main Centre) Lat. = 94000 mN Long. = 221000 mE

TYPE = 2
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total =	100 (km²)		
CLASSIFICATION	Rural Area :	High Potential	=	0 % population
		Medium Potential	=	40 % population
		Low Potential	=	20 % population
	Urban Area :	High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	40 % population
POPULATION	:	1979 (census)	=	490 No.
		1988 (estimated)	=	545 No.
LIVESTOCK	:	Grade cow	=	0 No.
		Indigenous cow	=	0 No.
		Sheep/goats	=	0 No.
		Donkey	=	0 No.
		Camel	=	0 No.
SCHOOLS	0	Day Schools with WC ->		0 Pupils
	0	Day Schools no WC ->		0 Pupils
	1	Boarding Schools ->		151 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS	0	Regional Hospitals ->		0 Beds
	0	District Hospitals ->		0 Beds
	0	Other Hospitals ->		0 Beds
		Outpatients/day	=	0 No.
HOTELS	0	High Class Hotels ->		0 Beds
	0	Medium Class Hotels ->		0 Beds
	0	Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES	:	Staff	=	1 No.
BARS	:		=	0 No.
SHOPS	:		=	2 No.
INDUSTRIES	No			

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Amaiya DIVISION : Lorroki
LOCATION : Sukuta Marmar DISTRICT : Samburu

POPULATION : 545 Rural Pop. = 60 % Urban Pop. = 40 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 40 % population
Low Potential = 20 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 40 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 5 % Urban Area = 4 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.	60	0
		Medium :	4 % =	21	No.	50	1050
		Low :	1 % =	5	No.	40	200
	with NC,	High :	0 % =	0	No.	20	0
		Medium :	36 % =	196	No.	15	2940
		Low :	19 % =	103	No.	10	1030
	Total Demand for RURAL population						5220
URBAN POPULATION	with IC,	High :	0 % =	0	No.	250	0
		Medium :	0 % =	0	No.	150	0
		Low :	4 % =	21	No.	75	1575
	with NC,	Low :	36 % =	196	No.	20	3920
	Total Demand for URBAN population						5495
LIVESTOCK			(L.U.) =	0	No.	50	0
SCHOOLS	Day Schools with WC -> Pupils =			0	No.	25	0
	Day Schools no WC -> Pupils =			0	No.	5	0
	Boarding Schools -> Pupils =			151	No.	50	7550
HEALTH	Health Centres\Dispensaries =			0	No.	5000	0
	Regional Hospitals -> Beds =			0	No.	400	0
	District Hospitals -> Beds =			0	No.	200	0
	Other Hospitals -> Beds =			0	No.	100	0
	All Hospitals Outpatients =			0	No.	20	0
HOTELS	High Class Hotels -> Beds =			0	No.	600	0
	Medium Class Hotels -> Beds =			0	No.	300	0
	Low Class Hotels -> Beds =			0	No.	50	0
ADMINISTRATIVE OFFICES			Staff =	1	No.	25	25
BARS			=	0	No.	500	0
SHOPS			=	2	No.	100	200
			TOTAL DEMAND (l/day)				18490

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Logorate

LOCATION : Sukuta Marmar
DIVISION : Lorroki

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 92000 mN Long. = 235000 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total =	67 (km²)		
CLASSIFICATION	Rural Area :	High Potential	=	0 % population
		Medium Potential	=	100 % population
		Low Potential	=	0 % population
	Urban Area :	High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	0 % population
POPULATION	:	1979 (census)	=	923 No.
		1988 (estimated)	=	977 No.
LIVESTOCK	:	Grade cow	=	0 No.
		Indigenous cow	=	1996 No.
		Sheep/goats	=	7178 No.
		Donkey	=	50 No.
		Camel	=	120 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		1 Day Schools no WC ->		233 Pupils
		0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day	=	0 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES	:	Staff	=	0 No.
BARS	:		=	0 No.
SHOPS	:		=	0 No.
INDUSTRIES	No			

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Logorate DIVISION : Lorroki
LOCATION : Sukuta Marmar DISTRICT : Samburu

POPULATION : 977 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 100 % population
Low Potential = 0 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 10 % Urban Area = 0 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	10 % =	97	No.		50	4850
		Low :	0 % =	0	No.		40	0
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	90 % =	879	No.		15	13185
		Low :	0 % =	0	No.		10	0
	Total Demand for RURAL population							18035
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	0 % =	0	No.		150	0
		Low :	0 % =	0	No.		75	0
	with NC,	Low :	0 % =	0	No.		20	0
	Total Demand for URBAN population							0
LIVESTOCK			(L.U.) =	1223	No.		50	61150
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			233	No.		5	1165
	Boarding Schools -> Pupils =			0	No.		50	0
HEALTH	Health Centres\Dispensaries =			0	No.		5000	0
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			0	No.		20	0
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			0	No.		50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.		25	0
BARS			=	0	No.		500	0
SHOPS			=	0	No.		100	0
			TOTAL DEMAND (l/day)					80350

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Lolmolok

LOCATION : Sukuta Marmar
DIVISION : Lorroki

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 111000 mN Long. = 234000 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 214 (km²)			
CLASSIFICATION	Rural Area :	High Potential =	0	% population
		Medium Potential =	80	% population
		Low Potential =	20	% population
	Urban Area :	High Class Housing =	0	% population
		Medium Class Housing =	0	% population
		Low Class Housing =	0	% population
POPULATION	: 1979 (census) =		1406	No.
	1988 (estimated) =		1488	No.
LIVESTOCK	: Grade cow =		0	No.
	Indigenous cow =		2924	No.
	Sheep/goats =		8091	No.
	Donkey =		0	No.
	Camel =		136	No.
SCHOOLS	0 Day Schools with WC ->		0	Pupils
	2 Day Schools no WC ->		363	Pupils
	0 Boarding Schools ->		0	Pupils
HEALTH CENTRES/DISPENSARIES	=		0	No.
HOSPITALS	0 Regional Hospitals ->		0	Beds
	0 District Hospitals ->		0	Beds
	0 Other Hospitals ->		0	Beds
	Outpatients/day =		0	No.
HOTELS	0 High Class Hotels ->		0	Beds
	0 Medium Class Hotels ->		0	Beds
	0 Low Class Hotels ->		0	Beds
ADMINISTRATION OFFICES	: Staff =		1	No.
BARS	: =		0	No.
SHOPS	: =		2	No.
INDUSTRIES	No			

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Lolmolok DIVISION : Lorroki
LOCATION : Sukuta Marmar DISTRICT : Samburu

POPULATION : 1488 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION :
High Potential = 0 % population
Medium Potential = 80 % population
Low Potential = 20 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 9 % Urban Area = 0 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.	60	0
		Medium :	8 % =	119	No.	50	5950
		Low :	1 % =	14	No.	40	560
	with NC,	High :	0 % =	0	No.	20	0
		Medium :	72 % =	1071	No.	15	16065
		Low :	19 % =	282	No.	10	2820
	Total Demand for RURAL population						25395
URBAN POPULATION	with IC,	High :	0 % =	0	No.	250	0
		Medium :	0 % =	0	No.	150	0
		Low :	0 % =	0	No.	75	0
	with NC,	Low :	0 % =	0	No.	20	0
	Total Demand for URBAN population						0
LIVESTOCK			(L.U.) =	1582	No.	50	79100
SCHOOLS	Day Schools with WC -> Pupils =			0	No.	25	0
	Day Schools no WC -> Pupils =			363	No.	5	1815
	Boarding Schools -> Pupils =			0	No.	50	0
HEALTH	Health Centres\Dispensaries =			0	No.	5000	0
	Regional Hospitals -> Beds =			0	No.	400	0
	District Hospitals -> Beds =			0	No.	200	0
	Other Hospitals -> Beds =			0	No.	100	0
	All Hospitals Outpatients =			0	No.	20	0
HOTELS	High Class Hotels -> Beds =			0	No.	600	0
	Medium Class Hotels -> Beds =			0	No.	300	0
	Low Class Hotels -> Beds =			0	No.	50	0
ADMINISTRATIVE OFFICES			Staff =	1	No.	25	25
BARS			=	0	No.	500	0
SHOPS			=	2	No.	100	200
	TOTAL DEMAND (l/day)						106535

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Longewan

LOCATION : Sukuta Marmar
DIVISION : Lorroki

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 95100 mN Long. = 226100 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total =	90 (km²)		
CLASSIFICATION	Rural Area :	High Potential	=	0 % population
		Medium Potential	=	100 % population
		Low Potential	=	0 % population
	Urban Area :	High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	0 % population
POPULATION	:	1979 (census)	=	483 No.
		1988 (estimated)	=	512 No.
LIVESTOCK	:	Grade cow	=	0 No.
		Indigenous cow	=	2425 No.
		Sheep/goats	=	6708 No.
		Donkey	=	0 No.
		Camel	=	112 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		0 Day Schools no WC ->		0 Pupils
		1 Boarding Schools ->		173 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day	=	0 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES	:	Staff	=	1 No.
BARS	:		=	0 No.
SHOPS	:		=	4 No.
INDUSTRIES	No			

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Longewan DIVISION : Lorroki
LOCATION : Sukuta Marmar DISTRICT : Samburu

POPULATION : 512 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION :
High Potential = 0 % population
Medium Potential = 100 % population
Low Potential = 0 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 10 % Urban Area = 0 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.	60	0
		Medium :	10 % =	51	No.	50	2550
		Low :	0 % =	0	No.	40	0
	with NC,	High :	0 % =	0	No.	20	0
		Medium :	90 % =	460	No.	15	6900
		Low :	0 % =	0	No.	10	0
	Total Demand for RURAL population						9450
URBAN POPULATION	with IC,	High :	0 % =	0	No.	250	0
		Medium :	0 % =	0	No.	150	0
		Low :	0 % =	0	No.	75	0
	with NC,	Low :	0 % =	0	No.	20	0
	Total Demand for URBAN population						0
LIVESTOCK			(L.U.) =	1311	No.	50	65550
SCHOOLS	Day Schools with WC -> Pupils =			0	No.	25	0
	Day Schools no WC -> Pupils =			0	No.	5	0
	Boarding Schools -> Pupils =			173	No.	50	8650
HEALTH	Health Centres\Dispensaries =			0	No.	5000	0
	Regional Hospitals -> Beds =			0	No.	400	0
	District Hospitals -> Beds =			0	No.	200	0
	Other Hospitals -> Beds =			0	No.	100	0
	All Hospitals Outpatients =			0	No.	20	0
HOTELS	High Class Hotels -> Beds =			0	No.	600	0
	Medium Class Hotels -> Beds =			0	No.	300	0
	Low Class Hotels -> Beds =			0	No.	50	0
ADMINISTRATIVE OFFICES			Staff =	1	No.	25	25
BARS			=	0	No.	500	0
SHOPS			=	4	No.	100	400
			TOTAL DEMAND (l/day)				84075

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Sukuta Marmar

LOCATION : Sukuta Marmar
DIVISION : Lorroki

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 91500 mN Long. = 242800 mE

TYPE = 2
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 103 (km²)			
CLASSIFICATION	Rural Area :	High Potential	=	0 % population
		Medium Potential	=	60 % population
		Low Potential	=	0 % population
	Urban Area :	High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	40 % population
POPULATION	: 1979 (census)		=	1930 No.
	1988 (estimated)		=	3750 No.
LIVESTOCK	: Grade cow		=	0 No.
	Indigenous cow		=	3070 No.
	Sheep/goats		=	9591 No.
	Donkey		=	0 No.
	Camel		=	161 No.
SCHOOLS	0 Day Schools with WC ->			0 Pupils
	1 Day Schools no WC ->			88 Pupils
	1 Boarding Schools ->			541 Pupils
HEALTH CENTRES/DISPENSARIES			=	2 No.
HOSPITALS	0 Regional Hospitals ->			0 Beds
	0 District Hospitals ->			0 Beds
	0 Other Hospitals ->			0 Beds
	Outpatients/day		=	31 No.
HOTELS	0 High Class Hotels ->			0 Beds
	0 Medium Class Hotels ->			0 Beds
	4 Low Class Hotels ->			32 Beds
ADMINISTRATION OFFICES	:	Staff	=	0 No.
BARS	:		=	3 No.
SHOPS	:		=	44 No.
INDUSTRIES	No			

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Sukuta Marmar DIVISION : Lorroki
LOCATION : Sukuta Marmar DISTRICT : Samburu

POPULATION : 3750 Rural Pop. = 60 % Urban Pop. = 40 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 60 % population
Low Potential = 0 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 40 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 6 % Urban Area = 4 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.	60	0
		Medium :	6 % =	225	No.	50	11250
		Low :	0 % =	0	No.	40	0
	with NC,	High :	0 % =	0	No.	20	0
		Medium :	54 % =	2025	No.	15	30375
		Low :	0 % =	0	No.	10	0
	Total Demand for RURAL population						41625
URBAN POPULATION	with IC,	High :	0 % =	0	No.	250	0
		Medium :	0 % =	0	No.	150	0
		Low :	4 % =	150	No.	75	11250
	with NC,	Low :	36 % =	1350	No.	20	27000
	Total Demand for URBAN population						38250
LIVESTOCK			(L.U.) =	1743	No.	50	87150
SCHOOLS	Day Schools with WC -> Pupils =			0	No.	25	0
	Day Schools no WC -> Pupils =			88	No.	5	440
	Boarding Schools -> Pupils =			541	No.	50	27050
HEALTH	Health Centres\Dispensaries =			2	No.	5000	10000
	Regional Hospitals -> Beds =			0	No.	400	0
	District Hospitals -> Beds =			0	No.	200	0
	Other Hospitals -> Beds =			0	No.	100	0
	All Hospitals Outpatients =			31	No.	20	620
HOTELS	High Class Hotels -> Beds =			0	No.	600	0
	Medium Class Hotels -> Beds =			0	No.	300	0
	Low Class Hotels -> Beds =			32	No.	50	1600
ADMINISTRATIVE OFFICES			Staff =	0	No.	25	0
BARS			=	3	No.	500	1500
SHOPS			=	44	No.	100	4400
			TOTAL DEMAND (l/day)				212635

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Lpus

LOCATION : Lodungokwe
DIVISION : Wamba

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 97000 mN Long. = 278000 mE

TYPE = 2
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 130 (km²)			
CLASSIFICATION	Rural Area :	High Potential =	0	% population
		Medium Potential =	0	% population
		Low Potential =	60	% population
	Urban Area :	High Class Housing =	0	% population
		Medium Class Housing =	0	% population
		Low Class Housing =	40	% population
POPULATION	: 1979 (census) =		1177	No.
	1988 (estimated) =		1300	No.
LIVESTOCK	: Grade cow =		0	No.
	Indigenous cow =		0	No.
	Sheep/goats =		0	No.
	Donkey =		0	No.
	Camel =		0	No.
SCHOOLS	0 Day Schools with WC ->		0	Pupils
	1 Day Schools no WC ->		160	Pupils
	0 Boarding Schools ->		0	Pupils
HEALTH CENTRES/DISPENSARIES	=		0	No.
HOSPITALS	0 Regional Hospitals ->		0	Beds
	0 District Hospitals ->		0	Beds
	0 Other Hospitals ->		0	Beds
	Outpatients/day =		0	No.
HOTELS	0 High Class Hotels ->		0	Beds
	0 Medium Class Hotels ->		0	Beds
	3 Low Class Hotels ->		24	Beds
ADMINISTRATION OFFICES	: Staff =		1	No.
BARS	: =		0	No.
SHOPS	: =		15	No.
INDUSTRIES	No			

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Lpus DIVISION : Wamba
LOCATION : Lodungokwe DISTRICT : Samburu

POPULATION : 1300 Rural Pop. = 60 % Urban Pop. = 40 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 0 % population
Low Potential = 60 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 40 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 3 % Urban Area = 4 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	0 % =	0	No.		50	0
		Low :	3 % =	39	No.		40	1560
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	0 % =	0	No.		15	0
		Low :	57 % =	741	No.		10	7410
	Total Demand for RURAL population							8970
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	0 % =	0	No.		150	0
		Low :	4 % =	52	No.		75	3900
	with NC,	Low :	36 % =	468	No.		20	9360
	Total Demand for URBAN population							13260
LIVESTOCK			(L.U.) =	0	No.		50	0
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			160	No.		5	800
	Boarding Schools -> Pupils =			0	No.		50	0
HEALTH	Health Centres\Dispensaries =			0	No.		5000	0
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			0	No.		20	0
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			24	No.		50	1200
ADMINISTRATIVE OFFICES	Staff =			1	No.		25	25
BARS	=			0	No.		500	0
SHOPS	=			15	No.		100	1500
	TOTAL DEMAND (l/day)							25755

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Ltrimin

LOCATION : Lodungokwe
DIVISION : Wamba

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 88000 mN Long. = 289000 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 167 (km²)			
CLASSIFICATION	Rural Area :	High Potential =	0	% population
		Medium Potential =	20	% population
		Low Potential =	80	% population
	Urban Area :	High Class Housing =	0	% population
		Medium Class Housing =	0	% population
		Low Class Housing =	0	% population
POPULATION	: 1979 (census) =		1298	No.
	1988 (estimated) =		1333	No.
LIVESTOCK	: Grade cow =		0	No.
	Indigenous cow =		0	No.
	Sheep/goats =		0	No.
	Donkey =		0	No.
	Camel =		0	No.
SCHOOLS	0 Day Schools with WC ->		0	Pupils
	0 Day Schools no WC ->		0	Pupils
	0 Boarding Schools ->		0	Pupils
HEALTH CENTRES/DISPENSARIES	=		0	No.
HOSPITALS	0 Regional Hospitals ->		0	Beds
	0 District Hospitals ->		0	Beds
	0 Other Hospitals ->		0	Beds
	Outpatients/day =		0	No.
HOTELS	0 High Class Hotels ->		0	Beds
	0 Medium Class Hotels ->		0	Beds
	0 Low Class Hotels ->		0	Beds
ADMINISTRATION OFFICES	: Staff =		0	No.
BARS	: =		0	No.
SHOPS	: =		0	No.
INDUSTRIES	No			

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Ltrimin DIVISION : Wamba
LOCATION : Lodungokwe DISTRICT : Samburu

POPULATION : 1333 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION :
High Potential = 0 % population
Medium Potential = 20 % population
Low Potential = 80 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 6 % Urban Area = 0 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	2 % =	26	No.		50	1300
		Low :	4 % =	53	No.		40	2120
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	18 % =	239	No.		15	3585
		Low :	76 % =	1013	No.		10	10130
	Total Demand for RURAL population							17135
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	0 % =	0	No.		150	0
		Low :	0 % =	0	No.		75	0
	with NC,	Low :	0 % =	0	No.		20	0
	Total Demand for URBAN population							0
LIVESTOCK			(L.U.) =	0	No.		50	0
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			0	No.		5	0
	Boarding Schools -> Pupils =			0	No.		50	0
HEALTH	Health Centres\Dispensaries =			0	No.		5000	0
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			0	No.		20	0
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			0	No.		50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.		25	0
BARS			=	0	No.		500	0
SHOPS			=	0	No.		100	0
			TOTAL DEMAND (l/day)					17135

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Nkaroni

LOCATION : Lodungokwe
DIVISION : Wamba

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 114200 mN Long. = 305200 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 325 (km²)		
CLASSIFICATION	Rural Area : High Potential	=	0 % population
	Medium Potential	=	0 % population
	Low Potential	=	100 % population
	Urban Area : High Class Housing	=	0 % population
	Medium Class Housing	=	0 % population
	Low Class Housing	=	0 % population
POPULATION	: 1979 (census)	=	479 No.
	1988 (estimated)	=	492 No.
LIVESTOCK	: Grade cow	=	0 No.
	Indigenous cow	=	0 No.
	Sheep/goats	=	0 No.
	Donkey	=	0 No.
	Camel	=	0 No.
SCHOOLS	0 Day Schools with WC ->		0 Pupils
	1 Day Schools no WC ->		59 Pupils
	0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES		=	0 No.
HOSPITALS	0 Regional Hospitals ->		0 Beds
	0 District Hospitals ->		0 Beds
	0 Other Hospitals ->		0 Beds
	Outpatients/day	=	0 No.
HOTELS	0 High Class Hotels ->		0 Beds
	0 Medium Class Hotels ->		0 Beds
	0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES	: Staff	=	0 No.
BARS	:	=	0 No.
SHOPS	:	=	0 No.
INDUSTRIES	No		

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Nkaroni DIVISION : Wamba
LOCATION : Lodungokwe DISTRICT : Samburu

POPULATION : 492 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION :
High Potential = 0 % population
Medium Potential = 0 % population
Low Potential = 100 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 5 % Urban Area = 0 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	0 % =	0	No.		50	0
		Low :	5 % =	24	No.		40	960
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	0 % =	0	No.		15	0
		Low :	95 % =	467	No.		10	4670
	Total Demand for RURAL population							5630
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	0 % =	0	No.		150	0
		Low :	0 % =	0	No.		75	0
	with NC,	Low :	0 % =	0	No.		20	0
	Total Demand for URBAN population							0
LIVESTOCK			(L.U.) =	0	No.		50	0
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			59	No.		5	295
	Boarding Schools -> Pupils =			0	No.		50	0
HEALTH	Health Centres\Dispensaries =			0	No.		5000	0
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			0	No.		20	0
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			0	No.		50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.		25	0
BARS			=	0	No.		500	0
SHOPS			=	0	No.		100	0
			TOTAL DEMAND (l/day)					5925

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Sesia

LOCATION : Lodungokwe
DIVISION : Wamba

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 88200 mN Long. = 289500 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 420 (km²)			
CLASSIFICATION	Rural Area	: High Potential	=	0 % population
		Medium Potential	=	10 % population
		Low Potential	=	90 % population
	Urban Area	: High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	0 % population
POPULATION		: 1979 (census)	=	799 No.
		1988 (estimated)	=	821 No.
LIVESTOCK		: Grade cow	=	0 No.
		Indigenous cow	=	0 No.
		Sheep/goats	=	0 No.
		Donkey	=	100 No.
		Camel	=	0 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		1 Day Schools no WC ->		23 Pupils
		0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day	=	0 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES		: Staff	=	0 No.
BARS		:	=	0 No.
SHOPS		:	=	2 No.
INDUSTRIES		No		

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Sesia DIVISION : Wamba
LOCATION : Lodungokwe DISTRICT : Samburu

POPULATION : 821 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION :
High Potential = 0 % population
Medium Potential = 10 % population
Low Potential = 90 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 6 % Urban Area = 0 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.	60	0
		Medium :	1 % =	8	No.	50	400
		Low :	5 % =	41	No.	40	1640
	with NC,	High :	0 % =	0	No.	20	0
		Medium :	9 % =	73	No.	15	1095
		Low :	85 % =	697	No.	10	6970
	Total Demand for RURAL population						10105
URBAN POPULATION	with IC,	High :	0 % =	0	No.	250	0
		Medium :	0 % =	0	No.	150	0
		Low :	0 % =	0	No.	75	0
	with NC,	Low :	0 % =	0	No.	20	0
	Total Demand for URBAN population						0
LIVESTOCK			(L.U.) =	40	No.	50	2000
SCHOOLS	Day Schools with WC -> Pupils =			0	No.	25	0
	Day Schools no WC -> Pupils =			23	No.	5	115
	Boarding Schools -> Pupils =			0	No.	50	0
HEALTH	Health Centres\Dispensaries =			0	No.	5000	0
	Regional Hospitals -> Beds =			0	No.	400	0
	District Hospitals -> Beds =			0	No.	200	0
	Other Hospitals -> Beds =			0	No.	100	0
	All Hospitals Outpatients =			0	No.	20	0
HOTELS	High Class Hotels -> Beds =			0	No.	600	0
	Medium Class Hotels -> Beds =			0	No.	300	0
	Low Class Hotels -> Beds =			0	No.	50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.	25	0
BARS			=	0	No.	500	0
SHOPS			=	2	No.	100	200
TOTAL DEMAND (l/day)							12420

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Lkisin

LOCATION : Ngilai
DIVISION : Wamba

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 114000 mN Long. = 305000 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 177 (km²)		
CLASSIFICATION	Rural Area : High Potential	=	0 % population
	Medium Potential	=	30 % population
	Low Potential	=	70 % population
	Urban Area : High Class Housing	=	0 % population
	Medium Class Housing	=	0 % population
	Low Class Housing	=	0 % population
POPULATION	: 1979 (census)	=	681 No.
	1988 (estimated)	=	700 No.
LIVESTOCK	: Grade cow	=	0 No.
	Indigenous cow	=	0 No.
	Sheep/goats	=	0 No.
	Donkey	=	0 No.
	Camel	=	0 No.
SCHOOLS	0 Day Schools with WC ->		0 Pupils
	1 Day Schools no WC ->		136 Pupils
	0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES		=	0 No.
HOSPITALS	0 Regional Hospitals ->		0 Beds
	0 District Hospitals ->		0 Beds
	0 Other Hospitals ->		0 Beds
	Outpatients/day	=	0 No.
HOTELS	0 High Class Hotels ->		0 Beds
	0 Medium Class Hotels ->		0 Beds
	0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES	: Staff	=	1 No.
BARS	:	=	0 No.
SHOPS	:	=	3 No.
INDUSTRIES	No		

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Lkisin DIVISION : Wamba
LOCATION : Ngilai DISTRICT : Samburu

POPULATION : 700 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 30 % population
Low Potential = 70 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 7 % Urban Area = 0 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC, High :	0 % =	0	No.		60	0
	Medium :	3 % =	21	No.		50	1050
	Low :	4 % =	28	No.		40	1120
	with NC, High :	0 % =	0	No.		20	0
	Medium :	27 % =	189	No.		15	2835
	Low :	66 % =	462	No.		10	4620
	Total Demand for RURAL population						9625
URBAN POPULATION	with IC, High :	0 % =	0	No.		250	0
	Medium :	0 % =	0	No.		150	0
	Low :	0 % =	0	No.		75	0
	with NC, Low :	0 % =	0	No.		20	0
	Total Demand for URBAN population						0
LIVESTOCK		(L.U.) =	0	No.		50	0
SCHOOLS	Day Schools with WC -> Pupils =		0	No.		25	0
	Day Schools no WC -> Pupils =		136	No.		5	680
	Boarding Schools -> Pupils =		0	No.		50	0
HEALTH	Health Centres\Dispensaries =		0	No.		5000	0
	Regional Hospitals -> Beds =		0	No.		400	0
	District Hospitals -> Beds =		0	No.		200	0
	Other Hospitals -> Beds =		0	No.		100	0
	All Hospitals Outpatients =		0	No.		20	0
HOTELS	High Class Hotels -> Beds =		0	No.		600	0
	Medium Class Hotels -> Beds =		0	No.		300	0
	Low Class Hotels -> Beds =		0	No.		50	0
ADMINISTRATIVE OFFICES	Staff =		1	No.		25	25
BARS	=		0	No.		500	0
SHOPS	=		3	No.		100	300
	TOTAL DEMAND (l/day)						10630

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Ngare Narok

LOCATION : Ngilai
DIVISION : Wamba

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 165000 mN Long. = 310000 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 911 (km²)			
CLASSIFICATION	Rural Area :	High Potential	=	0 % population
		Medium Potential	=	20 % population
		Low Potential	=	80 % population
	Urban Area :	High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	0 % population
POPULATION	: 1979 (census)		=	1437 No.
	1988 (estimated)		=	1476 No.
LIVESTOCK	: Grade cow		=	0 No.
	Indigenous cow		=	976 No.
	Sheep/goats		=	3469 No.
	Donkey		=	325 No.
	Camel		=	173 No.
SCHOOLS	0 Day Schools with WC ->			0 Pupils
	0 Day Schools no WC ->			0 Pupils
	0 Boarding Schools ->			0 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS	0 Regional Hospitals ->			0 Beds
	0 District Hospitals ->			0 Beds
	0 Other Hospitals ->			0 Beds
	Outpatients/day =			0 No.
HOTELS	0 High Class Hotels ->			0 Beds
	0 Medium Class Hotels ->			0 Beds
	0 Low Class Hotels ->			0 Beds
ADMINISTRATION OFFICES	:	Staff	=	0 No.
BARS	:		=	0 No.
SHOPS	:		=	0 No.
INDUSTRIES	No			

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Ngare Narok DIVISION : Wamba
LOCATION : Ngilai DISTRICT : Samburu

POPULATION : 1476 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION :
High Potential = 0 % population
Medium Potential = 20 % population
Low Potential = 80 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 6 % Urban Area = 0 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	2 % =	29	No.		50	1450
		Low :	4 % =	59	No.		40	2360
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	18 % =	265	No.		15	3975
		Low :	76 % =	1121	No.		10	11210
	Total Demand for RURAL population							18995
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	0 % =	0	No.		150	0
		Low :	0 % =	0	No.		75	0
	with NC,	Low :	0 % =	0	No.		20	0
	Total Demand for URBAN population							0
LIVESTOCK			(L.U.) =	773	No.		50	38650
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			0	No.		5	0
	Boarding Schools -> Pupils =			0	No.		50	0
HEALTH	Health Centres\Dispensaries =			0	No.		5000	0
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			0	No.		20	0
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			0	No.		50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.		25	0
BARS			=	0	No.		500	0
SHOPS			=	0	No.		100	0
TOTAL DEMAND (l/day)								57645

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Ngilai

LOCATION : Ngilai
DIVISION : Wamba

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 127800 mN Long. = 306500 mE

TYPE = 2
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA Total = 1002 (km²)

CLASSIFICATION	Rural Area	: High Potential	=	0 % population
		Medium Potential	=	30 % population
		Low Potential	=	50 % population
	Urban Area	: High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	20 % population
POPULATION		: 1979 (census)	=	1519 No.
		1988 (estimated)	=	1608 No.
LIVESTOCK		: Grade cow	=	0 No.
		Indigenous cow	=	0 No.
		Sheep/goats	=	0 No.
		Donkey	=	350 No.
		Camel	=	0 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		2 Day Schools no WC ->		195 Pupils
		0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day	=	0 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES		: Staff	=	1 No.
BARS		:	=	0 No.
SHOPS		:	=	5 No.
INDUSTRIES		No		

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Ngilai DIVISION : Wamba
LOCATION : Ngilai DISTRICT : Samburu

POPULATION : 1608 Rural Pop. = 80 % Urban Pop. = 20 %

CLASSIFICATION :
High Potential = 0 % population
Medium Potential = 30 % population
Low Potential = 50 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 20 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 6 % Urban Area = 2 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	3 % =	48	No.		50	2400
		Low :	3 % =	48	No.		40	1920
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	27 % =	434	No.		15	6510
		Low :	47 % =	755	No.		10	7550
	Total Demand for RURAL population							18380
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	0 % =	0	No.		150	0
		Low :	2 % =	32	No.		75	2400
	with NC,	Low :	18 % =	289	No.		20	5780
	Total Demand for URBAN population							8180
LIVESTOCK			(L.U.) =	140	No.		50	7000
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			195	No.		5	975
	Boarding Schools -> Pupils =			0	No.		50	0
HEALTH	Health Centres\Dispensaries =			0	No.		5000	0
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			0	No.		20	0
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			0	No.		50	0
ADMINISTRATIVE OFFICES			Staff =	1	No.		25	25
BARS			=	0	No.		500	0
SHOPS			=	5	No.		100	500
TOTAL DEMAND (l/day)								35060

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Ngogoltin

LOCATION : Ngilai
DIVISION : Wamba

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 114100 mN Long. = 315100 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 468 (km²)			
CLASSIFICATION	Rural Area :	High Potential	=	0 % population
		Medium Potential	=	50 % population
		Low Potential	=	50 % population
	Urban Area :	High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	0 % population
POPULATION	:	1979 (census)	=	843 No.
		1988 (estimated)	=	866 No.
LIVESTOCK	:	Grade cow	=	0 No.
		Indigenous cow	=	167 No.
		Sheep/goats	=	1291 No.
		Donkey	=	0 No.
		Camel	=	82 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		1 Day Schools no WC ->		108 Pupils
		0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day =		0 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES	:	Staff =		0 No.
BARS	:	=		0 No.
SHOPS	:	=		0 No.
INDUSTRIES	No			

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Ngogoltin DIVISION : Wamba
LOCATION : Ngilai DISTRICT : Samburu

POPULATION : 866 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION :
High Potential = 0 % population
Medium Potential = 50 % population
Low Potential = 50 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 8 % Urban Area = 0 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	5 % =	43	No.		50	2150
		Low :	3 % =	25	No.		40	1000
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	45 % =	389	No.		15	5835
		Low :	47 % =	407	No.		10	4070
	Total Demand for RURAL population							13055
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	0 % =	0	No.		150	0
		Low :	0 % =	0	No.		75	0
	with NC,	Low :	0 % =	0	No.		20	0
	Total Demand for URBAN population							0
LIVESTOCK			(L.U.) =	182	No.		50	9100
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			108	No.		5	540
	Boarding Schools -> Pupils =			0	No.		50	0
HEALTH	Health Centres\Dispensaries =			0	No.		5000	0
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			0	No.		20	0
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			0	No.		50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.		25	0
BARS			=	0	No.		500	0
SHOPS			=	0	No.		100	0
TOTAL DEMAND (l/day)								22695

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Swari

LOCATION : Ngilai
DIVISION : Wamba

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 121800 mN Long. = 285300 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 803 (km²)			
CLASSIFICATION	Rural Area	: High Potential	=	0 % population
		Medium Potential	=	5 % population
		Low Potential	=	95 % population
	Urban Area	: High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	0 % population
POPULATION		: 1979 (census)	=	1535 No.
		1988 (estimated)	=	1577 No.
LIVESTOCK		: Grade cow	=	0 No.
		Indigenous cow	=	0 No.
		Sheep/goats	=	0 No.
		Donkey	=	125 No.
		Camel	=	0 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		2 Day Schools no WC ->		71 Pupils
		2 Boarding Schools ->		336 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day	=	0 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES		: Staff	=	1 No.
BARS		:	=	1 No.
SHOPS		:	=	12 No.
INDUSTRIES		No		

Printed : 13-07-1990

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Swari DIVISION : Wamba
LOCATION : Ngilai DISTRICT : Samburu

POPULATION : 1577 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION :
High Potential = 0 % population
Medium Potential = 5 % population
Low Potential = 95 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 6 % Urban Area = 0 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	1 % =	15	No.		50	750
		Low :	5 % =	78	No.		40	3120
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	4 % =	63	No.		15	945
		Low :	90 % =	1419	No.		10	14190
	Total Demand for RURAL population							19005
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	0 % =	0	No.		150	0
		Low :	0 % =	0	No.		75	0
	with NC,	Low :	0 % =	0	No.		20	0
	Total Demand for URBAN population							0
LIVESTOCK			(L.U.) =	50	No.		50	2500
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			71	No.		5	355
	Boarding Schools -> Pupils =			336	No.		50	16800
HEALTH	Health Centres\Dispensaries =			0	No.		5000	0
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			0	No.		20	0
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			0	No.		50	0
ADMINISTRATIVE OFFICES			Staff =	1	No.		25	25
BARS			=	1	No.		500	500
SHOPS			=	12	No.		100	1200
			TOTAL DEMAND (l/day)					40385

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Kolting

LOCATION : Wamba
DIVISION : Wamba

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 108950 mN Long. = 314600 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 409 (km²)			
CLASSIFICATION	Rural Area :	High Potential	=	0 % population
		Medium Potential	=	20 % population
		Low Potential	=	80 % population
	Urban Area :	High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	0 % population
POPULATION	:	1979 (census)	=	830 No.
		1988 (estimated)	=	853 No.
LIVESTOCK	:	Grade cow	=	0 No.
		Indigenous cow	=	0 No.
		Sheep/goats	=	0 No.
		Donkey	=	0 No.
		Camel	=	0 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		1 Day Schools no WC ->		56 Pupils
		0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day =		0 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES	:	Staff =		1 No.
BARS	:		=	0 No.
SHOPS	:		=	3 No.
INDUSTRIES	No			

Printed : 13-07-1990

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Kolting DIVISION : Wamba
LOCATION : Wamba DISTRICT : Samburu

POPULATION : 853 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 20 % population
Low Potential = 80 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 6 % Urban Area = 0 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	2 % =	17	No.		50	850
		Low :	4 % =	34	No.		40	1360
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	18 % =	153	No.		15	2295
		Low :	76 % =	648	No.		10	6480
	Total Demand for RURAL population							10985
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	0 % =	0	No.		150	0
		Low :	0 % =	0	No.		75	0
	with NC,	Low :	0 % =	0	No.		20	0
	Total Demand for URBAN population							0
LIVESTOCK			(L.U.) =	0	No.		50	0
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			56	No.		5	280
	Boarding Schools -> Pupils =			0	No.		50	0
HEALTH	Health Centres\Dispensaries =			0	No.		5000	0
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			0	No.		20	0
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			0	No.		50	0
ADMINISTRATIVE OFFICES			Staff =	1	No.		25	25
BARS			=	0	No.		500	0
SHOPS			=	3	No.		100	300
			TOTAL DEMAND (l/day)					11590

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Matakwen

LOCATION : Wamba
DIVISION : Wamba

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 108700 mN Long. = 313900 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 306 (km²)			
CLASSIFICATION	Rural Area :	High Potential	=	0 % population
		Medium Potential	=	5 % population
		Low Potential	=	95 % population
	Urban Area :	High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	0 % population
POPULATION	:	1979 (census)	=	316 No.
		1988 (estimated)	=	325 No.
LIVESTOCK	:	Grade cow	=	0 No.
		Indigenous cow	=	136 No.
		Sheep/goats	=	1054 No.
		Donkey	=	0 No.
		Camel	=	67 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		0 Day Schools no WC ->		0 Pupils
		0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day	=	0 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES	:	Staff	=	0 No.
BARS	:		=	0 No.
SHOPS	:		=	0 No.
INDUSTRIES	No			

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Matakwen DIVISION : Wamba
LOCATION : Wamba DISTRICT : Samburu

POPULATION : 325 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 5 % population
Low Potential = 95 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 6 % Urban Area = 0 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.	60	0
		Medium :	1 % =	3	No.	50	150
		Low :	5 % =	16	No.	40	640
	with NC,	High :	0 % =	0	No.	20	0
		Medium :	4 % =	13	No.	15	195
		Low :	90 % =	292	No.	10	2920
	Total Demand for RURAL population						3905
URBAN POPULATION	with IC,	High :	0 % =	0	No.	250	0
		Medium :	0 % =	0	No.	150	0
		Low :	0 % =	0	No.	75	0
	with NC,	Low :	0 % =	0	No.	20	0
	Total Demand for URBAN population						0
LIVESTOCK			(L.U.) =	149	No.	50	7450
SCHOOLS	Day Schools with WC -> Pupils =			0	No.	25	0
	Day Schools no WC -> Pupils =			0	No.	5	0
	Boarding Schools -> Pupils =			0	No.	50	0
HEALTH	Health Centres\Dispensaries =			0	No.	5000	0
	Regional Hospitals -> Beds =			0	No.	400	0
	District Hospitals -> Beds =			0	No.	200	0
	Other Hospitals -> Beds =			0	No.	100	0
	All Hospitals Outpatients =			0	No.	20	0
HOTELS	High Class Hotels -> Beds =			0	No.	600	0
	Medium Class Hotels -> Beds =			0	No.	300	0
	Low Class Hotels -> Beds =			0	No.	50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.	25	0
BARS			=	0	No.	500	0
SHOPS			=	0	No.	100	0
TOTAL DEMAND (l/day)							11355

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Wamba Town

LOCATION : Wamba
DIVISION : Wamba

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 108500 mN Long. = 313700 mE

TYPE = 4
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total =	45 (km²)		
CLASSIFICATION	Rural Area :	High Potential =	0	% population
		Medium Potential =	10	% population
		Low Potential =	10	% population
	Urban Area :	High Class Housing =	0	% population
		Medium Class Housing =	0	% population
		Low Class Housing =	80	% population
POPULATION	:	1979 (census) =	3421	No.
		1988 (estimated) =	6370	No.
LIVESTOCK	:	Grade cow =	0	No.
		Indigenous cow =	0	No.
		Sheep/goats =	0	No.
		Donkey =	0	No.
		Camel =	0	No.
SCHOOLS	0	Day Schools with WC ->	0	Pupils
	1	Day Schools no WC ->	743	Pupils
	1	Boarding Schools ->	579	Pupils
HEALTH CENTRES/DISPENSARIES		=	1	No.
HOSPITALS	0	Regional Hospitals ->	0	Beds
	0	District Hospitals ->	0	Beds
	1	Other Hospitals ->	202	Beds
		Outpatients/day =	169	No.
HOTELS	0	High Class Hotels ->	0	Beds
	0	Medium Class Hotels ->	0	Beds
	7	Low Class Hotels ->	56	Beds
ADMINISTRATION OFFICES	:	Staff =	50	No.
BARS	:	=	1	No.
SHOPS	:	=	35	No.
INDUSTRIES	No			

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Wamba Town DIVISION : Wamba
LOCATION : Wamba DISTRICT : Samburu

POPULATION : 6370 Rural Pop. = 20 % Urban Pop. = 80 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 10 % population
Low Potential = 10 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 80 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 2 % Urban Area = 8 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.	60	0
		Medium :	1 % =	63	No.	50	3150
		Low :	1 % =	63	No.	40	2520
	with NC,	High :	0 % =	0	No.	20	0
		Medium :	9 % =	573	No.	15	8595
		Low :	9 % =	573	No.	10	5730
	Total Demand for RURAL population						19995
URBAN POPULATION	with IC,	High :	0 % =	0	No.	250	0
		Medium :	0 % =	0	No.	150	0
		Low :	8 % =	509	No.	75	38175
	with NC,	Low :	72 % =	4586	No.	20	91720
	Total Demand for URBAN population						129895
LIVESTOCK		(L.U.) =		0	No.	50	0
SCHOOLS	Day Schools with WC -> Pupils =			0	No.	25	0
	Day Schools no WC -> Pupils =			743	No.	5	3715
	Boarding Schools -> Pupils =			579	No.	50	28950
HEALTH	Health Centres\Dispensaries =			1	No.	5000	5000
	Regional Hospitals -> Beds =			0	No.	400	0
	District Hospitals -> Beds =			0	No.	200	0
	Other Hospitals -> Beds =			202	No.	100	20200
	All Hospitals Outpatients =			169	No.	20	3380
HOTELS	High Class Hotels -> Beds =			0	No.	600	0
	Medium Class Hotels -> Beds =			0	No.	300	0
	Low Class Hotels -> Beds =			56	No.	50	2800
ADMINISTRATIVE OFFICES		Staff =		50	No.	25	1250
BARS		=		1	No.	500	500
SHOPS		=		35	No.	100	3500
	TOTAL DEMAND (l/day)						219185

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Donyo Uasin

LOCATION : Serolipi
DIVISION : Waso

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 150200 mN Long. = 326500 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA Total = 574 (km²)

CLASSIFICATION	Rural Area	: High Potential	=	0 % population
		Medium Potential	=	0 % population
		Low Potential	=	100 % population
	Urban Area	: High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	0 % population
POPULATION		: 1979 (census)	=	115 No.
		1988 (estimated)	=	118 No.
LIVESTOCK		: Grade cow	=	0 No.
		Indigenous cow	=	746 No.
		Sheep/goats	=	2542 No.
		Donkey	=	0 No.
		Camel	=	0 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		1 Day Schools no WC ->		61 Pupils
		0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day =		0 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES		: Staff	=	0 No.
BARS		:	=	0 No.
SHOPS		:	=	0 No.
INDUSTRIES		No		

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Donyo Uasin DIVISION : Waso
LOCATION : Serolipi DISTRICT : Samburu

POPULATION : 118 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 0 % population
Low Potential = 100 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 5 % Urban Area = 0 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	0 % =	0	No.		50	0
		Low :	5 % =	5	No.		40	200
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	0 % =	0	No.		15	0
		Low :	95 % =	112	No.		10	1120
	Total Demand for RURAL population							1320
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	0 % =	0	No.		150	0
		Low :	0 % =	0	No.		75	0
	with NC,	Low :	0 % =	0	No.		20	0
	Total Demand for URBAN population							0
LIVESTOCK			(L.U.) =	418	No.		50	20900
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			61	No.		5	305
	Boarding Schools -> Pupils =			0	No.		50	0
HEALTH	Health Centres\Dispensaries =			0	No.		5000	0
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			0	No.		20	0
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			0	No.		50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.		25	0
BARS			=	0	No.		500	0
SHOPS			=	0	No.		100	0
TOTAL DEMAND (l/day)								22525

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Serolipi

LOCATION : Serolipi
DIVISION : Waso

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 151000 mN Long. = 328500 mE

TYPE = 2
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA Total = 1514 (km²)

CLASSIFICATION	Rural Area :	High Potential	=	0 % population
		Medium Potential	=	0 % population
		Low Potential	=	45 % population
	Urban Area :	High Class Housing	=	0 % population
		Medium Class Housing	=	5 % population
		Low Class Housing	=	50 % population
POPULATION	:	1979 (census)	=	693 No.
		1988 (estimated)	=	794 No.
LIVESTOCK	:	Grade cow	=	0 No.
		Indigenous cow	=	1968 No.
		Sheep/goats	=	6706 No.
		Donkey	=	250 No.
		Camel	=	0 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		0 Day Schools no WC ->		0 Pupils
		1 Boarding Schools ->		85 Pupils
HEALTH CENTRES/DISPENSARIES			=	1 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day =		10 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		1 Low Class Hotels ->		8 Beds
ADMINISTRATION OFFICES	:	Staff	=	2 No.
BARS	:		=	2 No.
SHOPS	:		=	13 No.
INDUSTRIES	No			

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Serolipi DIVISION : Waso
LOCATION : Serolipi DISTRICT : Samburu

POPULATION : 794 Rural Pop. = 45 % Urban Pop. = 55 %

CLASSIFICATION :
High Potential = 0 % population
Medium Potential = 0 % population
Low Potential = 45 % population
High Class Housing = 0 % population
Medium Class Housing = 5 % population
Low Class Housing = 50 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 2 % Urban Area = 10 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	0 % =	0	No.		50	0
		Low :	2 % =	15	No.		40	600
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	0 % =	0	No.		15	0
		Low :	43 % =	341	No.		10	3410
	Total Demand for RURAL population							4010
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	5 % =	39	No.		150	5850
		Low :	5 % =	39	No.		75	2925
	with NC,	Low :	45 % =	357	No.		20	7140
	Total Demand for URBAN population							15915
LIVESTOCK			(L.U.) =	1203	No.		50	60150
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			0	No.		5	0
	Boarding Schools -> Pupils =			85	No.		50	4250
HEALTH	Health Centres\Dispensaries =			1	No.		5000	5000
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			10	No.		20	200
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			8	No.		50	400
ADMINISTRATIVE OFFICES			Staff =	2	No.		25	50
BARS			=	2	No.		500	1000
SHOPS			=	13	No.		100	1300
			TOTAL DEMAND (l/day)					92275

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Archers Post

LOCATION : Waso
DIVISION : Waso

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 71500 mN Long. = 351300 mE

TYPE = 2
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 325 (km²)			
CLASSIFICATION	Rural Area :	High Potential	=	0 % population
		Medium Potential	=	0 % population
		Low Potential	=	40 % population
	Urban Area :	High Class Housing	=	0 % population
		Medium Class Housing	=	10 % population
		Low Class Housing	=	50 % population
POPULATION	:	1979 (census)	=	1468 No.
		1988 (estimated)	=	1687 No.
LIVESTOCK	:	Grade cow	=	0 No.
		Indigenous cow	=	508 No.
		Sheep/goats	=	3525 No.
		Donkey	=	350 No.
		Camel	=	68 No.
SCHOOLS	0	Day Schools with WC ->		0 Pupils
	0	Day Schools no WC ->		0 Pupils
	1	Boarding Schools ->		590 Pupils
HEALTH CENTRES/DISPENSARIES			=	2 No.
HOSPITALS	0	Regional Hospitals ->		0 Beds
	0	District Hospitals ->		0 Beds
	0	Other Hospitals ->		0 Beds
		Outpatients/day	=	33 No.
HOTELS	0	High Class Hotels ->		0 Beds
	0	Medium Class Hotels ->		0 Beds
	1	Low Class Hotels ->		8 Beds
ADMINISTRATION OFFICES	:	Staff	=	5 No.
BARS	:		=	2 No.
SHOPS	:		=	22 No.
INDUSTRIES	No			

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Archers Post DIVISION : Waso
LOCATION : Waso DISTRICT : Samburu

POPULATION : 1687 Rural Pop. = 40 % Urban Pop. = 60 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 0 % population
Low Potential = 40 % population
High Class Housing = 0 % population
Medium Class Housing = 10 % population
Low Class Housing = 50 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 2 % Urban Area = 15 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	0 % =	0	No.		50	0
		Low :	2 % =	33	No.		40	1320
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	0 % =	0	No.		15	0
		Low :	38 % =	641	No.		10	6410
	Total Demand for RURAL population							7730
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	10 % =	168	No.		150	25200
		Low :	5 % =	84	No.		75	6300
	with NC,	Low :	45 % =	759	No.		20	15180
	Total Demand for URBAN population							46680
LIVESTOCK			(L.U.) =	578	No.		50	28900
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			0	No.		5	0
	Boarding Schools -> Pupils =			590	No.		50	29500
HEALTH	Health Centres\Dispensaries =			2	No.		5000	10000
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			33	No.		20	660
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			8	No.		50	400
ADMINISTRATIVE OFFICES			Staff =	5	No.		25	125
BARS			=	2	No.		500	1000
SHOPS			=	22	No.		100	2200
			TOTAL DEMAND (l/day)					127195

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Lengusaka

LOCATION : Waso
DIVISION : Waso

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 93000 mN Long. = 311000 mE

TYPE = 1

1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total =	98 (km²)		
CLASSIFICATION	Rural Area :	High Potential	=	0 % population
		Medium Potential	=	0 % population
		Low Potential	=	100 % population
	Urban Area :	High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	0 % population
POPULATION	:	1979 (census)	=	485 No.
		1988 (estimated)	=	498 No.
LIVESTOCK	:	Grade cow	=	0 No.
		Indigenous cow	=	19 No.
		Sheep/goats	=	189 No.
		Donkey	=	425 No.
		Camel	=	12 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		0 Day Schools no WC ->		0 Pupils
		0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day	=	0 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES	:	Staff	=	2 No.
BARS	:		=	0 No.
SHOPS	:		=	4 No.
INDUSTRIES	No			

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Lengusaka DIVISION : Waso
LOCATION : Waso DISTRICT : Samburu

POPULATION : 498 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION :
High Potential = 0 % population
Medium Potential = 0 % population
Low Potential = 100 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 5 % Urban Area = 0 %

DEMAND CALCULATION						RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.	60	0
		Medium :	0 % =	0	No.	50	0
		Low :	5 % =	24	No.	40	960
	with NC,	High :	0 % =	0	No.	20	0
		Medium :	0 % =	0	No.	15	0
		Low :	95 % =	473	No.	10	4730
	Total Demand for RURAL population						5690
URBAN POPULATION	with IC,	High :	0 % =	0	No.	250	0
		Medium :	0 % =	0	No.	150	0
		Low :	0 % =	0	No.	75	0
	with NC,	Low :	0 % =	0	No.	20	0
	Total Demand for URBAN population						0
LIVESTOCK			(L.U.) =	194	No.	50	9700
SCHOOLS	Day Schools with WC -> Pupils =			0	No.	25	0
	Day Schools no WC -> Pupils =			0	No.	5	0
	Boarding Schools -> Pupils =			0	No.	50	0
HEALTH	Health Centres\Dispensaries =			0	No.	5000	0
	Regional Hospitals -> Beds =			0	No.	400	0
	District Hospitals -> Beds =			0	No.	200	0
	Other Hospitals -> Beds =			0	No.	100	0
	All Hospitals Outpatients =			0	No.	20	0
HOTELS	High Class Hotels -> Beds =			0	No.	600	0
	Medium Class Hotels -> Beds =			0	No.	300	0
	Low Class Hotels -> Beds =			0	No.	50	0
ADMINISTRATIVE OFFICES			Staff =	2	No.	25	50
BARS			=	0	No.	500	0
SHOPS			=	4	No.	100	400
TOTAL DEMAND (l/day)							15840

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Lerata

LOCATION : Waso
DIVISION : Waso

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 86700 mN Long. = 334900 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA Total = 319 (km²)

CLASSIFICATION	Rural Area	: High Potential	=	0 % population
		Medium Potential	=	20 % population
		Low Potential	=	80 % population
	Urban Area	: High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	0 % population
POPULATION		: 1979 (census)	=	359 No.
		1988 (estimated)	=	369 No.
LIVESTOCK		: Grade cow	=	0 No.
		Indigenous cow	=	0 No.
		Sheep/goats	=	0 No.
		Donkey	=	0 No.
		Camel	=	0 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		1 Day Schools no WC ->		135 Pupils
		0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day =		0 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES		: Staff	=	0 No.
BARS		:	=	0 No.
SHOPS		:	=	0 No.
INDUSTRIES		No		

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Lerata DIVISION : Waso
LOCATION : Waso DISTRICT : Samburu

POPULATION : 369 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION :
High Potential = 0 % population
Medium Potential = 20 % population
Low Potential = 80 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 6 % Urban Area = 0 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	2 % =	7	No.		50	350
		Low :	4 % =	14	No.		40	560
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	18 % =	66	No.		15	990
		Low :	76 % =	280	No.		10	2800
	Total Demand for RURAL population							4700
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	0 % =	0	No.		150	0
		Low :	0 % =	0	No.		75	0
	with NC,	Low :	0 % =	0	No.		20	0
	Total Demand for URBAN population							0
LIVESTOCK			(L.U.) =	0	No.		50	0
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			135	No.		5	675
	Boarding Schools -> Pupils =			0	No.		50	0
HEALTH	Health Centres\Dispensaries =			0	No.		5000	0
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			0	No.		20	0
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			0	No.		50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.		25	0
BARS			=	0	No.		500	0
SHOPS			=	0	No.		100	0
TOTAL DEMAND (l/day)								5375

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Losesia

LOCATION : Waso
DIVISION : Waso

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 92200 mN Long. = 383200 mE

TYPE = 1
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA Total = 1463 (km²)

CLASSIFICATION	Rural Area	: High Potential	=	0 % population
		Medium Potential	=	0 % population
		Low Potential	=	100 % population
	Urban Area	: High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	0 % population
POPULATION		: 1979 (census)	=	335 No.
		1988 (estimated)	=	344 No.
LIVESTOCK		: Grade cow	=	0 No.
		Indigenous cow	=	661 No.
		Sheep/goats	=	2126 No.
		Donkey	=	325 No.
		Camel	=	180 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		0 Day Schools no WC ->		0 Pupils
		0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day =		0 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES		: Staff	=	0 No.
BARS		:	=	0 No.
SHOPS		:	=	0 No.
INDUSTRIES		No		

Printed : 13-07-1990

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Losesia DIVISION : Waso
LOCATION : Waso DISTRICT : Samburu

POPULATION : 344 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 0 % population
Low Potential = 100 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 5 % Urban Area = 0 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	0 % =	0	No.		50	0
		Low :	5 % =	17	No.		40	680
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	0 % =	0	No.		15	0
		Low :	95 % =	326	No.		10	3260
	Total Demand for RURAL population							3940
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	0 % =	0	No.		150	0
		Low :	0 % =	0	No.		75	0
	with NC,	Low :	0 % =	0	No.		20	0
	Total Demand for URBAN population							0
LIVESTOCK			(L.U.) =	582	No.		50	29100
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			0	No.		5	0
	Boarding Schools -> Pupils =			0	No.		50	0
HEALTH	Health Centres\Dispensaries =			0	No.		5000	0
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			0	No.		20	0
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			0	No.		50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.		25	0
BARS			=	0	No.		500	0
SHOPS			=	0	No.		100	0
TOTAL DEMAND (l/day)								33040

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Ngutuk Ongiron

LOCATION : Waso
DIVISION : Waso

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 75700 mN Long. = 313100 mE

TYPE = 2
1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total = 239 (km²)			
CLASSIFICATION	Rural Area :	High Potential	=	0 % population
		Medium Potential	=	0 % population
		Low Potential	=	65 % population
	Urban Area :	High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	35 % population
POPULATION	:	1979 (census)	=	663 No.
		1988 (estimated)	=	728 No.
LIVESTOCK	:	Grade cow	=	0 No.
		Indigenous cow	=	182 No.
		Sheep/goats	=	1484 No.
		Donkey	=	650 No.
		Camel	=	0 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		2 Day Schools no WC ->		77 Pupils
		0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES			=	1 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day =		2 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES	:	Staff =		0 No.
BARS	:		=	0 No.
SHOPS	:		=	0 No.
INDUSTRIES	No			

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Ngutuk Ongiron DIVISION : Waso
LOCATION : Waso DISTRICT : Samburu

POPULATION : 728 Rural Pop. = 65 % Urban Pop. = 35 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 0 % population
Low Potential = 65 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 35 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 3 % Urban Area = 4 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	0 % =	0	No.		50	0
		Low :	3 % =	21	No.		40	840
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	0 % =	0	No.		15	0
		Low :	62 % =	451	No.		10	4510
	Total Demand for RURAL population							5350
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	0 % =	0	No.		150	0
		Low :	4 % =	29	No.		75	2175
	with NC,	Low :	31 % =	225	No.		20	4500
	Total Demand for URBAN population							6675
LIVESTOCK			(L.U.) =	419	No.		50	20950
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			77	No.		5	385
	Boarding Schools -> Pupils =			0	No.		50	0
HEALTH	Health Centres\Dispensaries =			1	No.		5000	5000
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			2	No.		20	40
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			0	No.		50	0
ADMINISTRATIVE OFFICES			Staff =	0	No.		25	0
BARS			=	0	No.		500	0
SHOPS			=	0	No.		100	0
TOTAL DEMAND (l/day)								38400

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DATA (1988)

SUB-LOCATION : Remote

LOCATION : Waso
DIVISION : Waso

DISTRICT : Samburu PROVINCE : Rift Valley

COORDINATES (main Centre) UTM-grid = 37N
Lat. = 75900 mN Long. = 312000 mE

TYPE = 1

1 = Rural
2 = Market or Local Centre < 2000 population
3 = Rural Centre > 2000 population
4 = Urban Centre > 5000 population

AREA	Total =	76 (km²)		
CLASSIFICATION	Rural Area :	High Potential	=	0 % population
		Medium Potential	=	0 % population
		Low Potential	=	100 % population
	Urban Area :	High Class Housing	=	0 % population
		Medium Class Housing	=	0 % population
		Low Class Housing	=	0 % population
POPULATION	:	1979 (census)	=	311 No.
		1988 (estimated)	=	319 No.
LIVESTOCK	:	Grade cow	=	0 No.
		Indigenous cow	=	58 No.
		Sheep/goats	=	587 No.
		Donkey	=	0 No.
		Camel	=	38 No.
SCHOOLS		0 Day Schools with WC ->		0 Pupils
		0 Day Schools no WC ->		0 Pupils
		0 Boarding Schools ->		0 Pupils
HEALTH CENTRES/DISPENSARIES			=	0 No.
HOSPITALS		0 Regional Hospitals ->		0 Beds
		0 District Hospitals ->		0 Beds
		0 Other Hospitals ->		0 Beds
		Outpatients/day =		0 No.
HOTELS		0 High Class Hotels ->		0 Beds
		0 Medium Class Hotels ->		0 Beds
		0 Low Class Hotels ->		0 Beds
ADMINISTRATION OFFICES	:	Staff	=	1 No.
BARS	:		=	0 No.
SHOPS	:		=	2 No.
INDUSTRIES	No			

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MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

WATER DEVELOPMENT PLANNING - BASE YEAR DEMAND (1988)

SUB-LOCATION : Remote DIVISION : Waso
LOCATION : Waso DISTRICT : Samburu

POPULATION : 319 Rural Pop. = 100 % Urban Pop. = 0 %

CLASSIFICATION : High Potential = 0 % population
Medium Potential = 0 % population
Low Potential = 100 % population
High Class Housing = 0 % population
Medium Class Housing = 0 % population
Low Class Housing = 0 % population

ASSESSMENT OF IC-POTENTIAL : Rural Area = 5 % Urban Area = 0 %

DEMAND CALCULATION							RATE	DEMAND
RURAL POPULATION	with IC,	High :	0 % =	0	No.		60	0
		Medium :	0 % =	0	No.		50	0
		Low :	5 % =	15	No.		40	600
	with NC,	High :	0 % =	0	No.		20	0
		Medium :	0 % =	0	No.		15	0
		Low :	95 % =	303	No.		10	3030
	Total Demand for RURAL population							3630
URBAN POPULATION	with IC,	High :	0 % =	0	No.		250	0
		Medium :	0 % =	0	No.		150	0
		Low :	0 % =	0	No.		75	0
	with NC,	Low :	0 % =	0	No.		20	0
	Total Demand for URBAN population							0
LIVESTOCK			(L.U.) =	77	No.		50	3850
SCHOOLS	Day Schools with WC -> Pupils =			0	No.		25	0
	Day Schools no WC -> Pupils =			0	No.		5	0
	Boarding Schools -> Pupils =			0	No.		50	0
HEALTH	Health Centres\Dispensaries =			0	No.		5000	0
	Regional Hospitals -> Beds =			0	No.		400	0
	District Hospitals -> Beds =			0	No.		200	0
	Other Hospitals -> Beds =			0	No.		100	0
	All Hospitals Outpatients =			0	No.		20	0
HOTELS	High Class Hotels -> Beds =			0	No.		600	0
	Medium Class Hotels -> Beds =			0	No.		300	0
	Low Class Hotels -> Beds =			0	No.		50	0
ADMINISTRATIVE OFFICES			Staff =	1	No.		25	25
BARS			=	0	No.		500	0
SHOPS			=	2	No.		100	200
			TOTAL DEMAND (l/day)					7705

APPENDIX 4

DEMAND SUMMARIES

APPENDIX 4

DEMAND SUMMARIES

SUMMARY PER SUB-LOCATION TYPE	YEAR	SCENARIO	PAGE
	1988	-	4-1
	1993	1	4-2
	2003	1	4-3
	2013	1	4-4
	1993	2	4-5
	2003	2	4-6
	2013	2	4-7
	1993	3	4-8
	2003	3	4-9
	2013	3	4-10

SUMMARY PER SUB-LOCATION	YEAR	SCENARIO	PAGE
Baragoi Division	1988	-	4-11
Lorroki Division	1988	-	4-13
Wamba Division	1988	-	4-15
Waso Division	1988	-	4-16
Baragoi Division	1993	1	4-17
Lorroki Division	1993	1	4-19
Wamba Division	1993	1	4-21
Waso Division	1993	1	4-22
Baragoi Division	2003	1	4-23
Lorroki Division	2003	1	4-25
Wamba Division	2003	1	4-27
Waso Division	2003	1	4-28
Baragoi Division	2013	1	4-29
Lorroki Division	2013	1	4-31
Wamba Division	2013	1	4-33
Waso Division	2013	1	4-34
Baragoi Division	1993	2	4-35
Lorroki Division	1993	2	4-37
Wamba Division	1993	2	4-39
Waso Division	1993	2	4-40

SUMMARY PER SUB-LOCATION	YEAR	SCENARIO	PAGE
Baragoi Division	2003	2	4-41
Lorroki Division	2003	2	4-43
Wamba Division	2003	2	4-45
Waso Division	2003	2	4-46
Baragoi Division	2013	2	4-47
Lorroki Division	2013	2	4-49
Wamba Division	2013	2	4-51
Waso Division	2013	2	4-53
Baragoi Division	1993	3	4-54
Lorroki Division	1993	3	4-56
Wamba Division	1993	3	4-57
Waso Division	1993	3	4-58
Baragoi Division	2003	3	4-59
Lorroki Division	2003	3	4-61
Wamba Division	2003	3	4-63
Waso Division	2003	3	4-64
Baragoi Division	2013	3	4-65
Lorroki Division	2013	3	4-67
Wamba Division	2013	3	4-69
Waso Division	2013	3	4-70

SAMBURU DISTRICT WATER DEMAND SUMMARY (1988)

Division	Number of Sub-locations	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
BARAGOI	Type #1: 15	402845	210195	192650	175790	0	192650	25585	5120	0	3700
	Type #2: 4	251695	166545	85150	74580	48355	85150	16055	20980	0	6575
	Type #3: 1	223720	223220	500	12120	137955	500	53735	8460	0	10950
	Type #4: 0	0	0	0	0	0	0	0	0	0	0
	DIVISION TOTAL:	878260	599960	278300	262490	186310	278300	95375	34560	0	21225
LORROKI	Type #1: 17	835465	309615	525850	246245	0	525850	50720	5200	0	7450
	Type #2: 10	792100	458000	334100	190190	151730	334100	66095	26760	0	23225
	Type #3: 0	0	0	0	0	0	0	0	0	0	0
	Type #4: 2	1767980	1707980	60000	59460	1495870	0	47050	26500	60000	79100
	DIVISION TOTAL:	3395545	2475595	919950	495895	1647600	859950	163865	58460	60000	109775
WAMBA	Type #1: 9	189780	130080	59700	108440	0	59700	19065	0	0	2575
	Type #2: 2	60815	53815	7000	27350	21440	7000	1775	0	0	3250
	Type #3: 0	0	0	0	0	0	0	0	0	0	0
	Type #4: 1	219185	219185	0	19995	129895	0	32665	28580	0	8050
	DIVISION TOTAL:	469780	403080	66700	155785	151335	66700	53505	28580	0	13875
WASO	Type #1: 5	84485	20935	63550	19280	0	63550	980	0	0	675
	Type #2: 3	257870	147870	110000	17090	69270	110000	34135	20900	0	6475
	Type #3: 0	0	0	0	0	0	0	0	0	0	0
	Type #4: 0	0	0	0	0	0	0	0	0	0	0
	DIVISION TOTAL:	342355	168805	173550	36370	69270	173550	35115	20900	0	7150
	DISTRICT TOTAL (l/day):	5085940	3647440	1438500	950540	2054515	1378500	347860	142500	60000	152025

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

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SAMBURU DISTRICT WATER DEMAND SUMMARY (1993) - Scenario 1

Division	Number of Sub-locations	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
BARAGOI	Type #1: 15	432435	229935	202500	184835	0	202500	35115	5160	0	4825
	Type #2: 4	283525	194025	89500	78520	62405	89500	23610	21240	0	8250
	Type #3: 1	287625	287125	500	13180	171470	500	78935	9440	0	14100
	Type #4: 0	0	0	0	0	0	0	0	0	0	0
	DIVISION TOTAL:	1003585	711085	292500	276535	233875	292500	137660	35840	0	27175
LORROKI	Type #1: 17	890895	338245	552650	258915	0	552650	64245	5260	0	9825
	Type #2: 10	899655	548505	351150	199745	194420	351150	92030	32260	0	30050
	Type #3: 0	0	0	0	0	0	0	0	0	0	0
	Type #4: 2	2245615	2165615	80000	57650	1901920	0	69120	36100	80000	100825
	DIVISION TOTAL:	4036165	3052365	983800	516310	2096340	903800	225395	73620	80000	140700
WAMBA	Type #1: 9	207780	145080	62700	113925	0	62700	27980	0	0	3175
	Type #2: 2	69935	62585	7350	28440	27435	7350	2610	0	0	4100
	Type #3: 0	0	0	0	0	0	0	0	0	0	0
	Type #4: 1	276720	276720	0	20355	163085	0	48010	35120	0	10150
	DIVISION TOTAL:	554435	484385	70050	162720	190520	70050	78600	35120	0	17425
WASO	Type #1: 5	89025	22225	66800	20305	0	66800	1020	0	0	900
	Type #2: 3	299440	183890	115550	18100	88090	115550	42815	26160	0	8725
	Type #3: 0	0	0	0	0	0	0	0	0	0	0
	Type #4: 0	0	0	0	0	0	0	0	0	0	0
	DIVISION TOTAL:	388465	206115	182350	38405	88090	182350	43835	26160	0	9625
	DISTRICT TOTAL (l/day):	5982650	4453950	1528700	993970	2608825	1448700	485490	170740	80000	194925

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SAMBURU DISTRICT WATER DEMAND SUMMARY (2003) - Scenario 1

Division	Number of Sub-locations	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
BARAGOI	Type #1: 15	527095	303345	223750	232520	0	223750	52590	10260	0	7975
	Type #2: 4	435730	336880	98850	99760	131205	98850	50440	42000	0	13475
	Type #3: 0	0	0	0	0	0	0	0	0	0	0
	Type #4: 1	534520	533970	550	17600	345715	550	130195	17260	0	23200
	DIVISION TOTAL:	1497345	1174195	323150	349880	476920	323150	233225	69520	0	44650
LORROKI	Type #1: 17	1061370	450870	610500	337605	0	610500	86670	10420	0	16175
	Type #2: 9	959510	672760	286750	202435	320060	286750	84110	32380	0	33775
	Type #3: 1	404145	302945	101200	56775	116725	101200	87195	26300	0	15950
	Type #4: 2	3855795	3715795	140000	80200	3292300	0	119600	59420	140000	164275
	DIVISION TOTAL:	6280820	5142370	1138450	677015	3729085	998450	377575	128520	140000	230175
WAMBA	Type #1: 9	251375	182125	69250	143530	0	69250	33145	0	0	5450
	Type #2: 2	120850	112750	8100	35915	64500	8100	5635	0	0	6700
	Type #3: 0	0	0	0	0	0	0	0	0	0	0
	Type #4: 1	593420	593420	0	26090	387950	0	103640	59040	0	16700
	DIVISION TOTAL:	965645	888295	77350	205535	452450	77350	142420	59040	0	28850
WASO	Type #1: 5	101950	28150	73800	25550	0	73800	1125	0	0	1475
	Type #2: 2	209290	115190	94100	12380	61345	94100	14720	20520	0	6225
	Type #3: 1	246400	212850	33550	10380	115910	33550	52050	26360	0	8150
	Type #4: 0	0	0	0	0	0	0	0	0	0	0
	DIVISION TOTAL:	557640	356190	201450	48310	177255	201450	67895	46880	0	15850
	DISTRICT TOTAL (l/day):	9301450	7561050	1740400	1280740	4835710	1600400	821115	303960	140000	319525

SAMBURU DISTRICT WATER DEMAND SUMMARY (2013) - Scenario 1

Division	Number of Sub-locations	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
BARAGOI	Type #1: 15	658605	411455	247150	321120	0	247150	62065	15420	0	12850
	Type #2: 3	457005	362105	94900	113910	112510	94900	73550	47060	0	15075
	Type #3: 1	223180	208930	14250	28920	150010	14250	7000	16200	0	6800
	Type #4: 1	965395	964795	600	21010	678305	600	201135	26820	0	37525
	DIVISION TOTAL:	2304185	1947285	356900	484960	940825	356900	343750	105500	0	72250
LORROKI	Type #1: 17	1300950	626400	674550	487690	0	674550	96880	15680	0	26150
	Type #2: 8	1302290	985540	316750	243820	557635	316750	82455	48880	0	52750
	Type #3: 1	195885	195885	0	47155	106245	0	40810	0	0	1675
	Type #4: 3	7191350	6859550	331800	180860	5933885	111800	313310	138120	220000	293375
	DIVISION TOTAL:	9990475	8667375	1323100	959525	6597765	1103100	533455	202680	220000	373950
WAMBA	Type #1: 9	321435	244885	76550	198790	0	76550	37470	0	0	8625
	Type #2: 2	214745	205745	9000	49660	136230	9000	9055	0	0	10800
	Type #3: 0	0	0	0	0	0	0	0	0	0	0
	Type #4: 1	1150720	1150720	0	37610	823555	0	167620	94860	0	27075
	DIVISION TOTAL:	1686900	1601350	85550	286060	959785	85550	214145	94860	0	46500
WASO	Type #1: 5	120085	38485	81600	34860	0	81600	1250	0	0	2375
	Type #2: 2	312095	208145	103950	16950	126270	103950	23985	30840	0	10100
	Type #3: 1	405635	368585	37050	13760	221955	37050	77450	42220	0	13200
	Type #4: 0	0	0	0	0	0	0	0	0	0	0
	DIVISION TOTAL:	837815	615215	222600	65570	348225	222600	102685	73060	0	25675
	DISTRICT TOTAL (l/day):	14819375	12831225	1988150	1796115	8846600	1768150	1194035	476100	220000	518375

Printed: 06/07/90

SAMBURU DISTRICT WATER DEMAND SUMMARY (1993) - Scenario 2

Division	Number of Sub-locations	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
BARAGOI	Type #1: 15	414355	216755	197600	175790	0	197600	30980	5160	0	4825
	Type #2: 4	262190	174890	87300	75225	49700	87300	20475	21240	0	8250
	Type #3: 1	282680	282180	500	12540	177540	500	68560	9440	0	14100
	Type #4: 0	0	0	0	0	0	0	0	0	0	0
	DIVISION TOTAL:	959225	673825	285400	263555	227240	285400	120015	35840	0	27175
LORROKI	Type #1: 17	858545	319445	539100	246270	0	539100	58090	5260	0	9825
	Type #2: 10	848025	505575	342450	189325	173760	342450	80180	32260	0	30050
	Type #3: 0	0	0	0	0	0	0	0	0	0	0
	Type #4: 2	2225745	2145745	80000	53580	1895180	0	60060	36100	80000	100825
	DIVISION TOTAL:	3932315	2970765	961550	489175	2068940	881550	198330	73620	80000	140700
WAMBA	Type #1: 9	197105	135955	61150	108440	0	61150	24340	0	0	3175
	Type #2: 2	63040	55890	7150	27510	22015	7150	2265	0	0	4100
	Type #3: 0	0	0	0	0	0	0	0	0	0	0
	Type #4: 1	270060	270060	0	18230	164870	0	41690	35120	0	10150
	DIVISION TOTAL:	530205	461905	68300	154180	186885	68300	68295	35120	0	17425
WASO	Type #1: 5	86300	21150	65150	19280	0	65150	970	0	0	900
	Type #2: 3	273920	161120	112800	17250	71795	112800	37190	26160	0	8725
	Type #3: 0	0	0	0	0	0	0	0	0	0	0
	Type #4: 0	0	0	0	0	0	0	0	0	0	0
	DIVISION TOTAL:	360220	182270	177950	36530	71795	177950	38160	26160	0	9625
	DISTRICT TOTAL (l/day):	5781965	4288765	1493200	943440	2554860	1413200	424800	170740	80000	194925

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

Printed: 06/07/90

SAMBURU DISTRICT WATER DEMAND SUMMARY (2003) - Scenario 2

Division	Number of Sub-locations	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
BARAGOI	Type #1: 15	465700	257950	207750	200270	0	207750	39445	10260	0	7975
	Type #2: 4	337830	246080	91750	87480	69990	91750	33135	42000	0	13475
	Type #3: 0	0	0	0	0	0	0	0	0	0	0
	Type #4: 1	521590	521090	500	13450	355510	500	111670	17260	0	23200
	DIVISION TOTAL:	1325120	1025120	300000	301200	425500	300000	184250	69520	0	44650
LORROKI	Type #1: 17	955125	388375	566750	290655	0	566750	71125	10420	0	16175
	Type #2: 9	768395	502345	266050	173615	205185	266050	57390	32380	0	33775
	Type #3: 1	354505	260605	93900	48825	112420	93900	57110	26300	0	15950
	Type #4: 2	3841390	3701390	140000	73545	3306335	0	97815	59420	140000	164275
	DIVISION TOTAL:	5919415	4852715	1066700	586640	3623940	926700	283440	128520	140000	230175
WAMBA	Type #1: 9	221135	156885	64250	123680	0	64250	27755	0	0	5450
	Type #2: 2	85415	77915	7500	31665	35860	7500	3690	0	0	6700
	Type #3: 0	0	0	0	0	0	0	0	0	0	0
	Type #4: 1	556590	556590	0	22495	390435	0	67920	59040	0	16700
	DIVISION TOTAL:	863140	791390	71750	177840	426295	71750	99365	59040	0	28850
WASO	Type #1: 5	92790	24340	68450	21895	0	68450	970	0	0	1475
	Type #2: 3	339795	221245	118550	19840	97250	118550	42900	46880	0	14375
	Type #3: 0	0	0	0	0	0	0	0	0	0	0
	Type #4: 0	0	0	0	0	0	0	0	0	0	0
	DIVISION TOTAL:	432585	245585	187000	41735	97250	187000	43870	46880	0	15850
	DISTRICT TOTAL (l/day):	8540260	6914810	1625450	1107415	4572985	1485450	610925	303960	140000	319525

Printed: 06/07/90

SAMBURU DISTRICT WATER DEMAND SUMMARY (2013) - Scenario 2

Division	Number of Sub-locations	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
BARAGOI	Type #1: 15	544820	326470	218350	250290	0	218350	47910	15420	0	12850
	Type #2: 4	440160	343660	96500	110760	96370	96500	51395	63260	0	21875
	Type #3: 0	0	0	0	0	0	0	0	0	0	0
	Type #4: 1	955100	954550	550	18300	690005	550	181900	26820	0	37525
	DIVISION TOTAL:	1940080	1624680	315400	379350	786375	315400	281205	105500	0	72250
LORROKI	Type #1: 17	1092675	496975	595700	380175	0	595700	74970	15680	0	26150
	Type #2: 9	1003110	723410	279700	228760	319525	279700	71820	48880	0	54425
	Type #3: 0	0	0	0	0	0	0	0	0	0	0
	Type #4: 3	7127530	6808830	318700	153795	5971200	98700	252340	138120	220000	293375
	DIVISION TOTAL:	9223315	8029215	1194100	762730	6290725	974100	399130	202680	220000	373950
WAMBA	Type #1: 9	260075	192475	67600	154870	0	67600	28980	0	0	8625
	Type #2: 2	114615	106715	7900	39710	50545	7900	5660	0	0	10800
	Type #3: 0	0	0	0	0	0	0	0	0	0	0
	Type #4: 1	1089660	1089660	0	26040	831060	0	110625	94860	0	27075
	DIVISION TOTAL:	1464350	1388850	75500	220620	881605	75500	145265	94860	0	46500
WASO	Type #1: 5	102465	30515	71950	27170	0	71950	970	0	0	2375
	Type #2: 3	424365	299765	124600	24570	127680	124600	51155	73060	0	23300
	Type #3: 0	0	0	0	0	0	0	0	0	0	0
	Type #4: 0	0	0	0	0	0	0	0	0	0	0
	DIVISION TOTAL:	526830	330280	196550	51740	127680	196550	52125	73060	0	25675
	DISTRICT TOTAL (l/day):	13154575	11373025	1781550	1414440	8086385	1561550	877725	476100	220000	518375

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

Printed: 13/07/90

SAMBURU DISTRICT WATER DEMAND SUMMARY (1993) - Scenario 3

Division	Number of Sub-locations	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
BARAGOI	Type #1: 15	396845	204195	192650	167190	0	192650	27715	5140	0	4150
	Type #2: 4	250490	165340	85150	71440	47225	85150	18150	21100	0	7425
	Type #3: 1	231160	230660	500	11530	137145	500	60820	8940	0	12225
	Type #4: 0	0	0	0	0	0	0	0	0	0	0
	DIVISION TOTAL:	878495	600195	278300	250160	184370	278300	106685	35180	0	23800
LORROKI	Type #1: 17	826805	300955	525850	234270	0	525850	53265	5220	0	8200
	Type #2: 10	799200	465100	334100	181215	159075	334100	72255	26980	0	25575
	Type #3: 0	0	0	0	0	0	0	0	0	0	0
	Type #4: 2	1972780	1912780	60000	51225	1690200	0	53250	28680	60000	89425
	DIVISION TOTAL:	3598785	2678835	919950	466710	1849275	859950	178770	60880	60000	123200
WAMBA	Type #1: 9	187145	127445	59700	103110	0	59700	21560	0	0	2775
	Type #2: 2	59445	52445	7000	25555	21180	7000	2010	0	0	3700
	Type #3: 0	0	0	0	0	0	0	0	0	0	0
	Type #4: 1	226215	226215	0	19845	128620	0	36955	31720	0	9075
	DIVISION TOTAL:	472805	406105	66700	148510	149800	66700	60525	31720	0	15550
WASO	Type #1: 5	83650	20100	63550	18405	0	63550	920	0	0	775
	Type #2: 3	257985	147985	110000	16440	68410	110000	35035	21000	0	7100
	Type #3: 0	0	0	0	0	0	0	0	0	0	0
	Type #4: 0	0	0	0	0	0	0	0	0	0	0
	DIVISION TOTAL:	341635	168085	173550	34845	68410	173550	35955	21000	0	7875
	DISTRICT TOTAL (l/day):	5291720	3853220	1438500	900225	2251855	1378500	381935	148780	60000	170425

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

Printed: 13/07/90

SAMBURU DISTRICT WATER DEMAND SUMMARY (2003) - Scenario 3

Division	Number of Sub-locations	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
BARAGOI	Type #1: 15	406320	213670	192650	172175	0	192650	30840	5180	0	5475
	Type #2: 4	274945	189795	85150	75310	60250	85150	23215	21420	0	9600
	Type #3: 1	271695	271195	500	11690	165635	500	68105	10040	0	15725
	Type #4: 0	0	0	0	0	0	0	0	0	0	0
	DIVISION TOTAL:	952960	674660	278300	259175	225885	278300	122160	36640	0	30800
LORROKI	Type #1: 17	848445	322595	525850	249770	0	525850	56770	5280	0	10775
	Type #2: 9	650605	403655	246950	149390	169730	246950	45245	16640	0	22650
	Type #3: 1	274935	187785	87150	41835	79560	87150	39790	15900	0	10700
	Type #4: 2	2643830	2563830	80000	60340	2281630	0	68185	39000	80000	114675
	DIVISION TOTAL:	4417815	3477865	939950	501335	2530920	859950	209990	76820	80000	158800
WAMBA	Type #1: 9	192775	133075	59700	106210	0	59700	23390	0	0	3475
	Type #2: 2	72175	65175	7000	27050	30750	7000	2575	0	0	4800
	Type #3: 0	0	0	0	0	0	0	0	0	0	0
	Type #4: 1	306535	306535	0	20225	188370	0	47285	39180	0	11475
	DIVISION TOTAL:	571485	504785	66700	153485	219120	66700	73250	39180	0	19750
WASO	Type #1: 5	84130	20580	63550	18830	0	63550	750	0	0	1000
	Type #2: 3	281970	171970	110000	17020	83690	110000	35405	26280	0	9575
	Type #3: 0	0	0	0	0	0	0	0	0	0	0
	Type #4: 0	0	0	0	0	0	0	0	0	0	0
	DIVISION TOTAL:	366100	192550	173550	35850	83690	173550	36155	26280	0	10575
	DISTRICT TOTAL (l/day):	6308360	4849860	1458500	949845	3059615	1378500	441555	178920	80000	219925

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

Printed: 13/07/90

SAMBURU DISTRICT WATER DEMAND SUMMARY (2013) - Scenario 3

Division	Number of Sub-locations	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
BARAGOI	Type #1: 15	432300	239650	192650	194670	0	192650	32690	5240	0	7050
	Type #2: 4	309740	224590	85150	86105	75300	85150	29260	21800	0	12125
	Type #3: 1	309265	308765	500	13070	197580	500	66690	11400	0	20025
	Type #4: 0	0	0	0	0	0	0	0	0	0	0
	DIVISION TOTAL:	1051305	773005	278300	293845	272880	278300	128640	38440	0	39200
LORROKI	Type #1: 17	898550	372700	525850	295540	0	525850	57900	5360	0	13900
	Type #2: 9	745795	498845	246950	177705	226720	246950	48445	17100	0	28875
	Type #3: 1	357080	269930	87150	51815	132385	87150	50920	21160	0	13650
	Type #4: 2	3570050	3470050	100000	71595	3113800	0	87275	50780	100000	146600
	DIVISION TOTAL:	5571475	4611525	959950	596655	3472905	859950	244540	94400	100000	203025
WAMBA	Type #1: 9	206260	146560	59700	120385	0	59700	21900	0	0	4275
	Type #2: 2	87130	80130	7000	30165	40570	7000	3295	0	0	6100
	Type #3: 0	0	0	0	0	0	0	0	0	0	0
	Type #4: 1	385255	385255	0	22365	245005	0	54620	48740	0	14525
	DIVISION TOTAL:	678645	611945	66700	172915	285575	66700	79815	48740	0	24900
WASO	Type #1: 5	86680	23130	63550	21060	0	63550	745	0	0	1325
	Type #2: 3	308565	198565	110000	19090	99275	110000	36210	31640	0	12350
	Type #3: 0	0	0	0	0	0	0	0	0	0	0
	Type #4: 0	0	0	0	0	0	0	0	0	0	0
	DIVISION TOTAL:	395245	221695	173550	40150	99275	173550	36955	31640	0	13675
	DISTRICT TOTAL (l/day):	7696670	6218170	1478500	1103565	4130635	1378500	489950	213220	100000	280800

DISTRICT WATER DEMAND SUMMARY (1988)

DIVISION: BARAGOI

DISTRICT: SAMBURU

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Arsim	Arsim	14150	6050	8100	6025	0	8100	0	0	0	25
	Illaut	16605	14055	2550	3885	0	2550	4550	5120	0	500
	Ngurunoit	17680	9080	8600	8880	0	8600	0	0	0	200
	Total (l/day):	48435	29185	19250	18790	0	19250	4550	5120	0	725
Baragoi	Baragoi	223720	223220	500	12120	137955	500	53735	8460	0	10950
	Total (l/day):	223720	223220	500	12120	137955	500	53735	8460	0	10950
Elbarta	Marti	54830	23380	31450	12335	4335	31450	0	5460	0	1250
	Masikita	15635	11135	4500	9590	0	4500	545	0	0	1000
	Ngilai	10155	5155	5000	4630	0	5000	525	0	0	0
	Total (l/day):	80620	39670	40950	26555	4335	40950	1070	5460	0	2250
Kawop	Lonyangatan	39870	32820	7050	32820	0	7050	0	0	0	0
	Losurukoi	51315	12665	38650	12440	0	38650	0	0	0	225
	Total (l/day):	91185	45485	45700	45260	0	45700	0	0	0	225
Marti	Kalele	52440	22540	29900	10940	0	29900	11600	0	0	0
	Lokorkor	34950	9950	25000	9950	0	25000	0	0	0	0
	Moru-Akiring	10020	10020	0	10020	0	0	0	0	0	0
	Total (l/day):	97410	42510	54900	30910	0	54900	11600	0	0	0
Nachola	Nachola	51670	22570	29100	14720	0	29100	7650	0	0	200

Continued on next page

DISTRICT WATER DEMAND SUMMARY (1988)

DIVISION: BARAGOI (Continued) **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Nachola	Terter	17180	10980	6200	10980	0	6200	0	0	0	0
	Total (l/day):	68850	33550	35300	25700	0	35300	7650	0	0	200
Ndoto	Latakweny	28395	27395	1000	25590	0	1000	355	0	0	1450
	Lesirikan	113815	71265	42550	42565	7790	42550	13800	5160	0	1950
	Total (l/day):	142210	98660	43550	68155	7790	43550	14155	5160	0	3400
Nyiro	Parkate	7115	7115	0	6990	0	0	125	0	0	0
	South Horr	66160	55010	11150	15230	30715	11150	1655	5360	0	2050
	Tum	16890	16890	0	4450	5515	0	600	5000	0	1325
	Uaso Rongai	35665	8665	27000	8330	0	27000	235	0	0	100
	Total (l/day):	125830	87680	38150	35000	36230	38150	2615	10360	0	3475
	Division Total (l/day):	878260	599960	278300	262490	186310	278300	95375	34560	0	21225

DISTRICT WATER DEMAND SUMMARY (1988)

DIVISION: LORROKI **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Angata Nanyukie	Angata Nanyukie	31400	28900	2500	21645	0	2500	7130	0	0	125
	Barsaloi	25845	21345	4500	3555	12790	4500	0	5000	0	0
	Loibashai	14895	5445	9450	5085	0	9450	360	0	0	0
	Total (l/day):	72140	55690	16450	30285	12790	16450	7490	5000	0	125
Kisima	Lkilorit	87770	42320	45450	29645	0	45450	12450	0	0	225
	Lmisigiyoi	37260	12860	24400	11885	0	24400	975	0	0	0
	Mbaringon	115505	30505	85000	18145	10710	85000	1650	0	0	0
	Nauneri	84430	22330	62100	15430	0	62100	950	0	0	5950
	Total (l/day):	324965	108015	216950	75105	10710	216950	16025	0	0	6175
Lodokojek	Kirimun	87225	36125	51100	16330	10045	51100	1255	5520	0	2975
	Lodokojek	87920	36420	51500	29250	4610	51500	1110	0	0	1450
	Moru	24110	17610	6500	17610	0	6500	0	0	0	0
	Nonkeek	16780	16780	0	16520	0	0	260	0	0	0
	Total (l/day):	216035	106935	109100	79710	14655	109100	2625	5520	0	4425
Loosuk	Loosuk	100935	46085	54850	7225	10985	54850	16805	5620	0	5450
	Malaso	64210	11310	52900	10780	0	52900	230	0	0	300
	Tinga	61095	16895	44200	16500	0	44200	195	0	0	200
	Total (l/day):	226240	74290	151950	34505	10985	151950	17230	5620	0	5950
Maralal	Ledero	650165	650165	0	24125	575535	0	45505	0	0	5000
	Lpartuk	67745	67745	0	36705	28715	0	2325	0	0	0

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DISTRICT WATER DEMAND SUMMARY (1988)

DIVISION: LORROKI (Continued) **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Maralal	Township	1117815	1057815	60000	35335	920335	0	1545	26500	60000	74100
	Total (l/day):	1835725	1775725	60000	96165	1524585	0	49375	26500	60000	79100
Opiroi	Mabati	6180	6180	0	6180	0	0	0	0	0	0
	Mbukoi	12315	11365	950	11365	0	950	0	0	0	0
	Opiroi	50125	50125	0	24860	16830	0	7910	0	0	525
	Total (l/day):	68620	67670	950	42405	16830	950	7910	0	0	525
Poro	Nkejemueny	24690	6090	18600	5410	0	18600	680	0	0	0
	Seketet	40090	10190	29900	8415	0	29900	1775	0	0	0
	Siambu	25675	25675	0	7275	13300	0	0	0	0	5100
	Sirata Oirobi	59280	36180	23100	16895	0	23100	14085	5200	0	0
	Total (l/day):	149735	78135	71600	37995	13300	71600	16540	5200	0	5100
Sukuta Marmar	Amaiya	18490	18490	0	5220	5495	0	7550	0	0	225
	Logorate	80350	19200	61150	18035	0	61150	1165	0	0	0
	Lolmolok	106535	27435	79100	25395	0	79100	1815	0	0	225
	Longewan	84075	18525	65550	9450	0	65550	8650	0	0	425
	Sukuta Marmar	212635	125485	87150	41625	38250	87150	27490	10620	0	7500
	Total (l/day):	502085	209135	292950	99725	43745	292950	46670	10620	0	8375
	Division Total (l/day):	3395545	2475595	919950	495895	1647600	859950	163865	58460	60000	109775

Printed: 04/07/90

DISTRICT WATER DEMAND SUMMARY (1988)

DIVISION: WAMBA

DISTRICT: SAMBURU

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Lodungokwe	Lpus	25755	25755	0	8970	13260	0	800	0	0	2725
	Ltrimin	17135	17135	0	17135	0	0	0	0	0	0
	Nkaroni	5925	5925	0	5630	0	0	295	0	0	0
	Sesia	12420	10420	2000	10105	0	2000	115	0	0	200
	Total (l/day):	61235	59235	2000	41840	13260	2000	1210	0	0	2925
Ngilai	Lkisin	10630	10630	0	9625	0	0	680	0	0	325
	Ngare Narok	57645	18995	38650	18995	0	38650	0	0	0	0
	Ngilai	35060	28060	7000	18380	8180	7000	975	0	0	525
	Ngogoltin	22695	13595	9100	13055	0	9100	540	0	0	0
	Swari	40385	37885	2500	19005	0	2500	17155	0	0	1725
	Total (l/day):	166415	109165	57250	79060	8180	57250	19350	0	0	2575
Wamba	Kolting	11590	11590	0	10985	0	0	280	0	0	325
	Matakwen	11355	3905	7450	3905	0	7450	0	0	0	0
	Wamba Town	219185	219185	0	19995	129895	0	32665	28580	0	8050
	Total (l/day):	242130	234680	7450	34885	129895	7450	32945	28580	0	8375
	Division Total (l/day):	469780	403080	66700	155785	151335	66700	53505	28580	0	13875

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

Printed: 04/07/90

DISTRICT WATER DEMAND SUMMARY (1988)

DIVISION: WASO **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Serolipi	Donyo Uasin	22525	1625	20900	1320	0	20900	305	0	0	0
	Serolipi	92275	32125	60150	4010	15915	60150	4250	5200	0	2750
	Total (l/day):	114800	33750	81050	5330	15915	81050	4555	5200	0	2750
Waso	Archers Post	127195	98295	28900	7730	46680	28900	29500	10660	0	3725
	Lengusaka	15840	6140	9700	5690	0	9700	0	0	0	450
	Lerata	5375	5375	0	4700	0	0	675	0	0	0
	Losesia	33040	3940	29100	3940	0	29100	0	0	0	0
	Ngutuk Ongiron	38400	17450	20950	5350	6675	20950	385	5040	0	0
	Remote	7705	3855	3850	3630	0	3850	0	0	0	225
	Total (l/day):	227555	135055	92500	31040	53355	92500	30560	15700	0	4400
	Division Total (l/day):	342355	168805	173550	36370	69270	173550	35115	20900	0	7150

DISTRICT WATER DEMAND SUMMARY (1993) - Scenario 1

DIVISION: BARAGOI

DISTRICT: SAMBURU

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Arsim	Arsim	14930	6380	8550	6355	0	8550	0	0	0	25
	Illaut	16835	14185	2650	4075	0	2650	4350	5160	0	600
	Ngurunoit	18580	9580	9000	9280	0	9000	0	0	0	300
	Total (l/day):	50345	30145	20200	19710	0	20200	4350	5160	0	925
Baragoi	Baragoi	287625	287125	500	13180	171470	500	78935	9440	0	14100
	Total (l/day):	287625	287125	500	13180	171470	500	78935	9440	0	14100
Elbarta	Marti	58245	25195	33050	12635	5405	33050	0	5580	0	1575
	Masikita	16920	12220	4700	10120	0	4700	800	0	0	1300
	Ngilai	10885	5635	5250	4870	0	5250	765	0	0	0
	Total (l/day):	86050	43050	43000	27625	5405	43000	1565	5580	0	2875
Kawop	Lonyangatan	41920	34520	7400	34520	0	7400	0	0	0	0
	Losurukoi	54025	13375	40650	13050	0	40650	0	0	0	325
	Total (l/day):	95945	47895	48050	47570	0	48050	0	0	0	325
Marti	Kalele	59870	28420	31450	11520	0	31450	16900	0	0	0
	Lokorkor	36750	10450	26300	10450	0	26300	0	0	0	0
	Moru-Akiring	10530	10530	0	10530	0	0	0	0	0	0
	Total (l/day):	107150	49400	57750	32500	0	57750	16900	0	0	0
Nachola	Nachola	57560	27010	30550	15460	0	30550	11250	0	0	300

Continued on next page

DISTRICT WATER DEMAND SUMMARY (1993) - Scenario 1

DIVISION: BARAGOI (Continued) **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Nachola	Terter	18110	11560	6550	11560	0	6550	0	0	0	0
	Total (l/day):	75670	38570	37100	27020	0	37100	11250	0	0	300
Ndoto	Latakweny	30390	29340	1050	26945	0	1050	520	0	0	1875
	Lesirikan	127380	82630	44750	44920	9735	44750	20300	5200	0	2475
	Total (l/day):	157770	111970	45800	71865	9735	45800	20820	5200	0	4350
Nyiro	Parkate	7545	7545	0	7360	0	0	185	0	0	0
	South Horr	78310	66610	11700	16205	39940	11700	2430	5460	0	2575
	Tum	19590	19590	0	4760	7325	0	880	5000	0	1625
	Uaso Rongai	37585	9185	28400	8740	0	28400	345	0	0	100
	Total (l/day):	143030	102930	40100	37065	47265	40100	3840	10460	0	4300
	Division Total (l/day):	1003585	711085	292500	276535	233875	292500	137660	35840	0	27175

DISTRICT WATER DEMAND SUMMARY (1993) - Scenario 1

DIVISION: LORROKI

DISTRICT: SAMBURU

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Angata Nanyukie	Angata Nanyukie	35975	33375	2600	22755	0	2600	10495	0	0	125
	Barsaloi	29380	24680	4700	3580	16100	4700	0	5000	0	0
	Loibashai	15820	5870	9950	5340	0	9950	530	0	0	0
	Total (l/day):	81175	63925	17250	31675	16100	17250	11025	5000	0	125
Kisima	Lkilorit	97580	49780	47800	31155	0	47800	18300	0	0	325
	Lmisigiyoi	39355	13705	25650	12485	0	25650	1220	0	0	0
	Mbaringon	124345	34995	89350	19325	13245	89350	2425	0	0	0
	Nauneri	90735	25435	65300	16215	0	65300	1395	0	0	7825
	Total (l/day):	352015	123915	228100	79180	13245	228100	23340	0	0	8150
Lodokojek	Kirimun	94735	41035	53700	16790	12740	53700	1845	5660	0	4000
	Lodokojek	93975	39825	54150	30815	5705	54150	1630	0	0	1675
	Moru	25325	18525	6800	18525	0	6800	0	0	0	0
	Nonkeek	17770	17770	0	17390	0	0	380	0	0	0
	Total (l/day):	231805	117155	114650	83520	18445	114650	3855	5660	0	5675
Loosuk	Loosuk	111780	54130	57650	7565	14120	57650	19620	5800	0	7025
	Malaso	67695	12095	55600	11355	0	55600	340	0	0	400
	Tinga	64400	17950	46450	17365	0	46450	285	0	0	300
	Total (l/day):	243875	84175	159700	36285	14120	159700	20245	5800	0	7725
Maralal	Ledero	829280	829280	0	23380	732675	0	66850	0	0	6375
	Lpartuk	79080	79080	0	39005	36660	0	3415	0	0	0

Continued on next page

DISTRICT WATER DEMAND SUMMARY (1993) - Scenario 1

DIVISION: LORROKI (Continued) **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Maralal	Township	1416335	1336335	80000	34270	1169245	0	2270	36100	80000	94450
	Total (l/day):	2324695	2244695	80000	96655	1938580	0	72535	36100	80000	100825
Opiroi	Mabati	6470	6470	0	6470	0	0	0	0	0	0
	Mbukoi	12955	11955	1000	11955	0	1000	0	0	0	0
	Opiroi	58720	58720	0	25280	21215	0	11600	0	0	625
	Total (l/day):	78145	77145	1000	43705	21215	1000	11600	0	0	625
Poro	Nkejemueny	25930	6380	19550	5670	0	19550	710	0	0	0
	Seketet	42150	10750	31400	8880	0	31400	1870	0	0	0
	Siambu	31485	31485	0	7580	17155	0	0	0	0	6750
	Sirata Oirobi	61930	37680	24250	17775	0	24250	14645	5260	0	0
	Total (l/day):	161495	86295	75200	39905	17155	75200	17225	5260	0	6750
Sukuta Marmar	Amaiya	24275	24275	0	5565	7285	0	11100	0	0	325
	Logorate	84970	20670	64300	18960	0	64300	1710	0	0	0
	Lolmolok	112800	29700	83100	26710	0	83100	2665	0	0	325
	Longewan	89035	20135	68900	9910	0	68900	9700	0	0	525
	Sukuta Marmar	251880	160280	91600	44240	50195	91600	40395	15800	0	9650
	Total (l/day):	562960	255060	307900	105385	57480	307900	65570	15800	0	10825
	Division Total (l/day):	4036165	3052365	983800	516310	2096340	903800	225395	73620	80000	140700

Printed: 06/07/90

DISTRICT WATER DEMAND SUMMARY (1993) - Scenario 1

DIVISION: WAMBA

DISTRICT: SAMBURU

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Lodungokwe	Lpus	31530	31530	0	9470	17410	0	1175	0	0	3475
	Ltrimin	18060	18060	0	18060	0	0	0	0	0	0
	Nkaroni	6345	6345	0	5910	0	0	435	0	0	0
	Sesia	13175	11075	2100	10605	0	2100	170	0	0	300
	Total (l/day):	69110	67010	2100	44045	17410	2100	1780	0	0	3775
Ngilai	Lkisin	11505	11505	0	10080	0	0	1000	0	0	425
	Ngare Narok	60595	19995	40600	19995	0	40600	0	0	0	0
	Ngilai	38405	31055	7350	18970	10025	7350	1435	0	0	625
	Ngogoltin	24130	14530	9600	13735	0	9600	795	0	0	0
	Swari	49785	47185	2600	19990	0	2600	25170	0	0	2025
	Total (l/day):	184420	124270	60150	82770	10025	60150	28400	0	0	3075
Wamba	Kolting	12300	12300	0	11465	0	0	410	0	0	425
	Matakwen	11885	4085	7800	4085	0	7800	0	0	0	0
	Wamba Town	276720	276720	0	20355	163085	0	48010	35120	0	10150
	Total (l/day):	300905	293105	7800	35905	163085	7800	48420	35120	0	10575
	Division Total (l/day):	554435	484385	70050	162720	190520	70050	78600	35120	0	17425

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

Printed: 06/07/90

DISTRICT WATER DEMAND SUMMARY (1993) - Scenario 1

DIVISION: WASO **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Serolipi	Donyo Uasin	23680	1730	21950	1410	0	21950	320	0	0	0
	Serolipi	102435	39235	63200	4260	19690	63200	6250	5260	0	3775
	Total (l/day):	126115	40965	85150	5670	19690	85150	6570	5260	0	3775
Waso	Archers Post	155440	125090	30350	8200	60100	30350	36000	15840	0	4950
	Lengusaka	16825	6575	10250	6000	0	10250	0	0	0	575
	Lerata	5625	5625	0	4925	0	0	700	0	0	0
	Losesia	34700	4150	30550	4150	0	30550	0	0	0	0
	Ngutuk Ongiron	41565	19565	22000	5640	8300	22000	565	5060	0	0
	Remote	8195	4145	4050	3820	0	4050	0	0	0	325
	Total (l/day):	262350	165150	97200	32735	68400	97200	37265	20900	0	5850
	Division Total (l/day):	388465	206115	182350	38405	88090	182350	43835	26160	0	9625

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DISTRICT WATER DEMAND SUMMARY (2003) - Scenario 1

DIVISION: BARAGOI

DISTRICT: SAMBURU

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Arsim	Arsim	17665	8215	9450	8165	0	9450	0	0	0	50
	Illaut	24330	21380	2950	5320	0	2950	4800	10260	0	1000
	Ngurunoit	22600	12600	10000	12100	0	10000	0	0	0	500
	Total (l/day):	64595	42195	22400	25585	0	22400	4800	10260	0	1550
Baragoi	Baragoi	534520	533970	550	17600	345715	550	130195	17260	0	23200
	Total (l/day):	534520	533970	550	17600	345715	550	130195	17260	0	23200
Elbarta	Marti	78025	41475	36550	15850	12160	36550	0	10940	0	2525
	Masikita	21645	16445	5200	12620	0	5200	1725	0	0	2100
	Ngilai	12705	6905	5800	6060	0	5800	845	0	0	0
	Total (l/day):	112375	64825	47550	34530	12160	47550	2570	10940	0	4625
Kawop	Lonyangatan	51290	43090	8200	43090	0	8200	0	0	0	0
	Losurukoi	61760	16860	44900	16310	0	44900	0	0	0	550
	Total (l/day):	113050	59950	53100	59400	0	53100	0	0	0	550
Marti	Kalele	67740	32990	34750	14340	0	34750	18650	0	0	0
	Lokorkor	42050	13050	29000	13050	0	29000	0	0	0	0
	Moru-Akiring	13170	13170	0	13170	0	0	0	0	0	0
	Total (l/day):	122960	59210	63750	40560	0	63750	18650	0	0	0
Nachola	Nachola	77850	44100	33750	19300	0	33750	24300	0	0	500

Continued on next page

DISTRICT WATER DEMAND SUMMARY (2003) - Scenario 1

DIVISION: BARAGOI (Continued) **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Nachola	Terter	21640	14440	7200	14440	0	7200	0	0	0	0
	Total (l/day):	99490	58540	40950	33740	0	40950	24300	0	0	500
Ndoto	Latakweny	39700	38550	1150	34350	0	1150	1125	0	0	3075
	Lesirikan	188950	139550	49400	57645	23660	49400	43850	10320	0	4075
	Total (l/day):	228650	178100	50550	91995	23660	50550	44975	10320	0	7150
Nyiro	Parkate	9570	9570	0	9170	0	0	400	0	0	0
	South Horr	131540	118640	12900	20265	78375	12900	5085	10740	0	4175
	Tum	37215	37215	0	6000	17010	0	1505	10000	0	2700
	Uaso Rongai	43380	11980	31400	11035	0	31400	745	0	0	200
	Total (l/day):	221705	177405	44300	46470	95385	44300	7735	20740	0	7075
	Division Total (l/day):	1497345	1174195	323150	349880	476920	323150	233225	69520	0	44650

DISTRICT WATER DEMAND SUMMARY (2003) - Scenario 1

DIVISION: LORROKI

DISTRICT: SAMBURU

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Angata Nanyukie	Angata Nanyukie	45415	42515	2900	29920	0	2900	12345	0	0	250
	Barsaloi	58015	52815	5200	5085	37730	5200	0	10000	0	0
	Loibashai	18570	7570	11000	6935	0	11000	635	0	0	0
	Total (l/day):	122000	102900	19100	41940	37730	19100	12980	10000	0	250
Kisima	Lkilorit	127785	74985	52800	40935	0	52800	33500	0	0	550
	Lmisigiyoi	46115	17765	28350	16420	0	28350	1345	0	0	0
	Mbaringon	158930	60180	98750	24925	31635	98750	3620	0	0	0
	Nauneri	107965	35865	72100	21340	0	72100	1750	0	0	12775
	Total (l/day):	440795	188795	252000	103620	31635	252000	40215	0	0	13325
Lodokojek	Kirimun	132355	73005	59350	22360	29560	59350	3380	11080	0	6625
	Lodokojek	120230	60430	59800	39975	14010	59800	3520	0	0	2925
	Moru	31430	23880	7550	23880	0	7550	0	0	0	0
	Nonkeek	23520	23520	0	22700	0	0	820	0	0	0
	Total (l/day):	307535	180835	126700	108915	43570	126700	7720	11080	0	9550
Loosuk	Loosuk	156500	92850	63650	9675	32705	63650	27545	11300	0	11625
	Malaso	77395	15945	61450	14510	0	61450	735	0	0	700
	Tinga	74615	23315	51300	22200	0	51300	615	0	0	500
	Total (l/day):	308510	132110	176400	46385	32705	176400	28895	11300	0	12825
Maralal	Ledero	1430680	1430680	0	32530	1273075	0	114700	0	0	10375
	Lpartuk	124830	124830	0	50795	68035	0	6000	0	0	0

Continued on next page

DISTRICT WATER DEMAND SUMMARY (2003) - Scenario 1

DIVISION: LORROKI (Continued) **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Maralal	Township	2425115	2285115	140000	47670	2019225	0	4900	59420	140000	153900
	Total (l/day):	3980625	3840625	140000	130995	3360335	0	125600	59420	140000	164275
Opiroi	Mabati	8310	8310	0	8310	0	0	0	0	0	0
	Mbukoi	16290	15190	1100	15190	0	1100	0	0	0	0
	Opiroi	108540	108540	0	32615	49830	0	25045	0	0	1050
	Total (l/day):	133140	132040	1100	56115	49830	1100	25045	0	0	1050
Poro	Nkejemueny	29865	8265	21600	7480	0	21600	785	0	0	0
	Seketet	48375	13725	34650	11660	0	34650	2065	0	0	0
	Siambu	60445	60445	0	9785	39660	0	0	0	0	11000
	Sirata Oirobi	76795	49995	26800	23350	0	26800	16225	10420	0	0
	Total (l/day):	215480	132430	83050	52275	39660	83050	19075	10420	0	11000
Sukuta Marmar	Amaiya	39665	39665	0	7220	16895	0	15000	0	0	550
	Logorate	97945	26945	71000	24905	0	71000	2040	0	0	0
	Lolmolok	130305	38505	91800	34845	0	91800	3110	0	0	550
	Longewan	100675	24575	76100	13025	0	76100	10700	0	0	850
	Sukuta Marmar	404145	302945	101200	56775	116725	101200	87195	26300	0	15950
	Total (l/day):	772735	432635	340100	136770	133620	340100	118045	26300	0	17900
	Division Total (l/day):	6280820	5142370	1138450	677015	3729085	998450	377575	128520	140000	230175

Printed: 06/07/90

DISTRICT WATER DEMAND SUMMARY (2003) - Scenario 1

DIVISION: WAMBA

DISTRICT: SAMBURU

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Lodungokwe	Lpus	60575	60575	0	11920	40470	0	2535	0	0	5650
	Ltrimin	22815	22815	0	22815	0	0	0	0	0	0
	Nkaroni	8350	8350	0	7410	0	0	940	0	0	0
	Sesia	16365	14065	2300	13200	0	2300	365	0	0	500
	Total (l/day):	108105	105805	2300	55345	40470	2300	3840	0	0	6150
Ngilai	Lkisin	14900	14900	0	12685	0	0	1465	0	0	750
	Ngare Narok	70180	25330	44850	25330	0	44850	0	0	0	0
	Ngilai	60275	52175	8100	23995	24030	8100	3100	0	0	1050
	Ngogoltin	29865	19265	10600	17550	0	10600	1715	0	0	0
	Swari	59010	56110	2900	24885	0	2900	27775	0	0	3450
	Total (l/day):	234230	167780	66450	104445	24030	66450	34055	0	0	5250
Wamba	Kolting	16235	16235	0	14600	0	0	885	0	0	750
	Matakwen	13655	5055	8600	5055	0	8600	0	0	0	0
	Wamba Town	593420	593420	0	26090	387950	0	103640	59040	0	16700
	Total (l/day):	623310	614710	8600	45745	387950	8600	104525	59040	0	17450
	Division Total (l/day):	965645	888295	77350	205535	452450	77350	142420	59040	0	28850

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

Printed: 06/07/90

DISTRICT WATER DEMAND SUMMARY (2003) - Scenario 1

DIVISION: WASO **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Serolipi	Donyo Uasin	26355	2105	24250	1750	0	24250	355	0	0	0
	Serolipi	146940	77140	69800	5360	41635	69800	13500	10420	0	6225
	Total (l/day):	173295	79245	94050	7110	41635	94050	13855	10420	0	6225
Waso	Archers Post	246400	212850	33550	10380	115910	33550	52050	26360	0	8150
	Lengusaka	19705	8405	11300	7480	0	11300	0	0	0	925
	Lerata	7080	7080	0	6310	0	0	770	0	0	0
	Losesia	39000	5200	33800	5200	0	33800	0	0	0	0
	Ngutuk Ongiron	62350	38050	24300	7020	19710	24300	1220	10100	0	0
	Remote	9810	5360	4450	4810	0	4450	0	0	0	550
	Total (l/day):	384345	276945	107400	41200	135620	107400	54040	36460	0	9625
	Division Total (l/day):	557640	356190	201450	48310	177255	201450	67895	46880	0	15850

Printed: 06/07/90

DISTRICT WATER DEMAND SUMMARY (2013) - Scenario 1

DIVISION: BARAGOI

DISTRICT: SAMBURU

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Arsim	Arsim	22295	11895	10400	11820	0	10400	0	0	0	75
	Illaut	33295	30045	3250	7725	0	3250	5300	15420	0	1600
	Ngurunoit	29080	18080	11000	17280	0	11000	0	0	0	800
	Total (l/day):	84670	60020	24650	36825	0	24650	5300	15420	0	2475
Baragoi	Baragoi	965395	964795	600	21010	678305	600	201135	26820	0	37525
	Total (l/day):	965395	964795	600	21010	678305	600	201135	26820	0	37525
Elbarta	Marti	109395	69045	40350	22850	25555	40350	0	16540	0	4100
	Masikita	28235	22485	5750	17150	0	5750	1935	0	0	3400
	Ngilai	15590	9190	6400	8260	0	6400	930	0	0	0
	Total (l/day):	153220	100720	52500	48260	25555	52500	2865	16540	0	7500
Kawop	Lonyangatan	67640	58590	9050	58590	0	9050	0	0	0	0
	Losurukoi	72665	23065	49600	22190	0	49600	0	0	0	875
	Total (l/day):	140305	81655	58650	80780	0	58650	0	0	0	875
Marti	Kalele	78810	40410	38400	19760	0	38400	20650	0	0	0
	Lokorkor	49810	17760	32050	17760	0	32050	0	0	0	0
	Moru-Akiring	17920	17920	0	17920	0	0	0	0	0	0
	Total (l/day):	146540	76090	70450	55440	0	70450	20650	0	0	0
Nachola	Nachola	93910	56610	37300	26260	0	37300	29550	0	0	800

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DISTRICT WATER DEMAND SUMMARY (2013) - Scenario 1

DIVISION: BARAGOI (Continued) **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Nachola	Terter	27620	19620	8000	19620	0	8000	0	0	0	0
	Total (l/day):	121530	76230	45300	45880	0	45300	29550	0	0	800
Ndoto	Latakweny	56960	55660	1300	48825	0	1300	1835	0	0	5000
	Lesirikan	282055	227505	54550	82415	51520	54550	71450	15520	0	6600
	Total (l/day):	339015	283165	55850	131240	51520	55850	73285	15520	0	11600
Nyiro	Parkate	13140	13140	0	12490	0	0	650	0	0	0
	South Horr	223180	208930	14250	28920	150010	14250	7000	16200	0	6800
	Tum	65555	65555	0	8645	35435	0	2100	15000	0	4375
	Uaso Rongai	51635	16985	34650	15470	0	34650	1215	0	0	300
	Total (l/day):	353510	304610	48900	65525	185445	48900	10965	31200	0	11475
	Division Total (l/day):	2304185	1947285	356900	484960	940825	356900	343750	105500	0	72250

DISTRICT WATER DEMAND SUMMARY (2013) - Scenario 1

DIVISION: LORROKI

DISTRICT: SAMBURU

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Angata Nanyukie	Angata Nanyukie	60730	57530	3200	43515	0	3200	13640	0	0	375
	Barsaloi	109055	103305	5750	6985	81320	5750	0	15000	0	0
	Loibashai	22805	10655	12150	9955	0	12150	700	0	0	0
	Total (l/day):	192590	171490	21100	60455	81320	21100	14340	15000	0	375
Kisima	Lkilorit	155885	97535	58350	59610	0	58350	37050	0	0	875
	Lmisigiyoi	56710	25410	31300	23925	0	31300	1485	0	0	0
	Mbaringon	218600	109500	109100	36635	68050	109100	4815	0	0	0
	Nauneri	133475	53775	79700	31095	0	79700	1930	0	0	20750
	Total (l/day):	564670	286220	278450	151265	68050	278450	45280	0	0	21625
Lodokojek	Kirimun	193625	128075	65550	31800	64290	65550	4550	16760	0	10675
	Lodokojek	163805	97755	66050	57280	30970	66050	4905	0	0	4600
	Moru	42685	34335	8350	34335	0	8350	0	0	0	0
	Nonkeek	34140	34140	0	32805	0	0	1335	0	0	0
	Total (l/day):	434255	294305	139950	156220	95260	139950	10790	16760	0	15275
Loosuk	Loosuk	229860	159560	70300	14255	69750	70300	39685	17120	0	18750
	Malaso	90845	22995	67850	20700	0	67850	1195	0	0	1100
	Tinga	90000	33300	56700	31500	0	56700	1000	0	0	800
	Total (l/day):	410705	215855	194850	66455	69750	194850	41880	17120	0	20650
Maralal	Ledero	2440910	2440910	0	39775	2204665	0	179570	0	0	16900
	Lpartuk	204485	204485	0	73450	123435	0	7600	0	0	0

Continued on next page

DISTRICT WATER DEMAND SUMMARY (2013) - Scenario 1

DIVISION: LORROKI (Continued) **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Maralal	Township	4119825	3899825	220000	58815	3486305	0	7980	96000	220000	250725
	Total (l/day):	6765220	6545220	220000	172040	5814405	0	195150	96000	220000	267625
Opiroi	Mabati	11695	11695	0	11695	0	0	0	0	0	0
	Mbukoi	22250	21050	1200	21050	0	1200	0	0	0	0
	Opiroi	195885	195885	0	47155	106245	0	40810	0	0	1675
	Total (l/day):	229830	228630	1200	79900	106245	1200	40810	0	0	1675
Poro	Nkejemueny	35605	11755	23850	10890	0	23850	865	0	0	0
	Seketet	57545	19245	38300	16965	0	38300	2280	0	0	0
	Siambu	115530	115530	0	13105	84575	0	0	0	0	17850
	Sirata Oirobi	97200	67600	29600	34010	0	29600	17910	15680	0	0
	Total (l/day):	305880	214130	91750	74970	84575	91750	21055	15680	0	17850
Sukuta Marmar	Amaiya	67330	67330	0	10310	35245	0	20900	0	0	875
	Logorate	117020	38570	78450	36315	0	78450	2255	0	0	0
	Lolmolok	156090	54640	101450	50330	0	101450	3435	0	0	875
	Longewan	116270	32170	84100	18995	0	84100	11800	0	0	1375
	Sukuta Marmar	630615	518815	111800	82270	242915	111800	125760	42120	0	25750
	Total (l/day):	1087325	711525	375800	198220	278160	375800	164150	42120	0	28875
	Division Total (l/day):	9990475	8667375	1323100	959525	6597765	1103100	533455	202680	220000	373950

DISTRICT WATER DEMAND SUMMARY (2013) - Scenario 1

DIVISION: WAMBA

DISTRICT: SAMBURU

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Lodungokwe	Lpus	113310	113310	0	15790	84265	0	4130	0	0	9125
	Ltrimin	31735	31735	0	31735	0	0	0	0	0	0
	Nkaroni	11215	11215	0	10080	0	0	1135	0	0	0
	Sesia	22120	19570	2550	18175	0	2550	595	0	0	800
	Total (l/day):	178380	175830	2550	75780	84265	2550	5860	0	0	9925
Ngilai	Lkisin	20575	20575	0	17785	0	0	1615	0	0	1175
	Ngare Narok	84795	35195	49600	35195	0	49600	0	0	0	0
	Ngilai	101435	92435	9000	33870	51965	9000	4925	0	0	1675
	Ngogoltin	38675	26975	11700	24975	0	11700	2000	0	0	0
	Swari	72990	69790	3200	33630	0	3200	30685	0	0	5475
	Total (l/day):	318470	244970	73500	145455	51965	73500	39225	0	0	8325
Wamba	Kolting	22930	22930	0	20315	0	0	1440	0	0	1175
	Matakwen	16400	6900	9500	6900	0	9500	0	0	0	0
	Wamba Town	1150720	1150720	0	37610	823555	0	167620	94860	0	27075
	Total (l/day):	1190050	1180550	9500	64825	823555	9500	169060	94860	0	28250
	Division Total (l/day):	1686900	1601350	85550	286060	959785	85550	214145	94860	0	46500

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

Printed: 06/07/90

DISTRICT WATER DEMAND SUMMARY (2013) - Scenario 1

DIVISION: WASO **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Serolipi	Donyo Uasin	29595	2795	26800	2400	0	26800	395	0	0	0
	Serolipi	216575	139475	77100	7510	84185	77100	22000	15680	0	10100
	Total (l/day):	246170	142270	103900	9910	84185	103900	22395	15680	0	10100
Waso	Archers Post	405635	368585	37050	13760	221955	37050	77450	42220	0	13200
	Lengusaka	24180	11680	12500	10180	0	12500	0	0	0	1500
	Lerata	9575	9575	0	8720	0	0	855	0	0	0
	Losesia	44400	7050	37350	7050	0	37350	0	0	0	0
	Ngutuk Ongiron	95520	68670	26850	9440	42085	26850	1985	15160	0	0
	Remote	12335	7385	4950	6510	0	4950	0	0	0	875
	Total (l/day):	591645	472945	118700	55660	264040	118700	80290	57380	0	15575
	Division Total (l/day):	837815	615215	222600	65570	348225	222600	102685	73060	0	25675

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DISTRICT WATER DEMAND SUMMARY (1993) - Scenario 2

DIVISION: BARAGOI

DISTRICT: SAMBURU

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Arsim	Arsim	14400	6050	8350	6025	0	8350	0	0	0	25
	Illaut	16395	13795	2600	3885	0	2600	4150	5160	0	600
	Ngurunoit	17980	9180	8800	8880	0	8800	0	0	0	300
	Total (l/day):	48775	29025	19750	18790	0	19750	4150	5160	0	925
Baragoi	Baragoi	282680	282180	500	12540	177540	500	68560	9440	0	14100
	Total (l/day):	282680	282180	500	12540	177540	500	68560	9440	0	14100
Elbarta	Marti	56255	24005	32250	12495	4355	32250	0	5580	0	1575
	Masikita	16185	11585	4600	9590	0	4600	695	0	0	1300
	Ngilai	10400	5300	5100	4630	0	5100	670	0	0	0
	Total (l/day):	82840	40890	41950	26715	4355	41950	1365	5580	0	2875
Kawop	Lonyangatan	40070	32820	7250	32820	0	7250	0	0	0	0
	Losurukoi	52415	12765	39650	12440	0	39650	0	0	0	325
	Total (l/day):	92485	45585	46900	45260	0	46900	0	0	0	325
Marti	Kalele	56390	25740	30650	10940	0	30650	14800	0	0	0
	Lokorkor	35600	9950	25650	9950	0	25650	0	0	0	0
	Moru-Akiring	10020	10020	0	10020	0	0	0	0	0	0
	Total (l/day):	102010	45710	56300	30910	0	56300	14800	0	0	0
Nachola	Nachola	54620	24770	29850	14720	0	29850	9750	0	0	300

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DISTRICT WATER DEMAND SUMMARY (1993) - Scenario 2

DIVISION: BARAGOI (Continued) **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Nachola	Terter	17380	10980	6400	10980	0	6400	0	0	0	0
	Total (l/day):	72000	35750	36250	25700	0	36250	9750	0	0	300
Ndoto	Latakweny	28920	27920	1000	25590	0	1000	455	0	0	1875
	Lesirikan	119530	75880	43650	42795	7810	43650	17600	5200	0	2475
	Total (l/day):	148450	103800	44650	68385	7810	44650	18055	5200	0	4350
Nyiro	Parkate	7150	7150	0	6990	0	0	160	0	0	0
	South Horr	68695	57295	11400	15385	31765	11400	2110	5460	0	2575
	Tum	17710	17710	0	4550	5770	0	765	5000	0	1625
	Uaso Rongai	36430	8730	27700	8330	0	27700	300	0	0	100
	Total (l/day):	129985	90885	39100	35255	37535	39100	3335	10460	0	4300
	Division Total (l/day):	959225	673825	285400	263555	227240	285400	120015	35840	0	27175

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DISTRICT WATER DEMAND SUMMARY (1993) - Scenario 2

DIVISION: LORROKI

DISTRICT: SAMBURU

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Angata Nanyukie	Angata Nanyukie	33415	30865	2550	21645	0	2550	9095	0	0	125
	Barsaloi	26550	21950	4600	3530	13420	4600	0	5000	0	0
	Loibashai	15245	5545	9700	5085	0	9700	460	0	0	0
	Total (l/day):	75210	58360	16850	30260	13420	16850	9555	5000	0	125
Kisima	Lkilorit	92470	45870	46600	29645	0	46600	15900	0	0	325
	Lmisigiyoi	38045	13045	25000	11885	0	25000	1160	0	0	0
	Mbaringon	118545	31395	87150	18180	11110	87150	2105	0	0	0
	Nauneri	88165	24465	63700	15430	0	63700	1210	0	0	7825
	Total (l/day):	337225	114775	222450	75140	11110	222450	20375	0	0	8150
Lodokojek	Kirimun	90495	38095	52400	16355	10480	52400	1600	5660	0	4000
	Lodokojek	89870	37120	52750	29400	4630	52750	1415	0	0	1675
	Moru	24260	17610	6650	17610	0	6650	0	0	0	0
	Nonkeek	16850	16850	0	16520	0	0	330	0	0	0
	Total (l/day):	221475	109675	111800	79885	15110	111800	3345	5660	0	5675
Loosuk	Loosuk	104735	48535	56200	6960	11440	56200	17310	5800	0	7025
	Malaso	65750	11500	54250	10805	0	54250	295	0	0	400
	Tinga	62400	17050	45350	16500	0	45350	250	0	0	300
	Total (l/day):	232885	77085	155800	34265	11440	155800	17855	5800	0	7725
Maralal	Ledero	816500	816500	0	21745	730290	0	58090	0	0	6375
	Lpartuk	75945	75945	0	37150	35830	0	2965	0	0	0

Continued on next page

DISTRICT WATER DEMAND SUMMARY (1993) - Scenario 2

DIVISION: LORROKI (Continued) **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Maralal	Township	1409245	1329245	80000	31835	1164890	0	1970	36100	80000	94450
	Total (l/day):	2301690	2221690	80000	90730	1931010	0	63025	36100	80000	100825
Opiroi	Mabati	6180	6180	0	6180	0	0	0	0	0	0
	Mbukoi	12365	11365	1000	11365	0	1000	0	0	0	0
	Opiroi	52310	52310	0	24085	17525	0	10075	0	0	625
	Total (l/day):	70855	69855	1000	41630	17525	1000	10075	0	0	625
Poro	Nkejemueny	25135	6085	19050	5410	0	19050	675	0	0	0
	Seketet	40845	10195	30650	8415	0	30650	1780	0	0	0
	Siambu	27990	27990	0	7405	13835	0	0	0	0	6750
	Sirata Oirobi	59740	36090	23650	16895	0	23650	13935	5260	0	0
	Total (l/day):	153710	80360	73350	38125	13835	73350	16390	5260	0	6750
Sukuta Marmar	Amaiya	20985	20985	0	5260	5750	0	9650	0	0	325
	Logorate	82220	19520	62700	18035	0	62700	1485	0	0	0
	Lolmolok	109085	28035	81050	25395	0	81050	2315	0	0	325
	Longewan	86375	19175	67200	9450	0	67200	9200	0	0	525
	Sukuta Marmar	240600	151250	89350	41000	49740	89350	35060	15800	0	9650
	Total (l/day):	539265	238965	300300	99140	55490	300300	57710	15800	0	10825
	Division Total (l/day):	3932315	2970765	961550	489175	2068940	881550	198330	73620	80000	140700

DISTRICT WATER DEMAND SUMMARY (1993) - Scenario 2

DIVISION: WAMBA **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Lodungokwe	Lpus	27260	27260	0	8990	13775	0	1020	0	0	3475
	Ltrimin	17135	17135	0	17135	0	0	0	0	0	0
	Nkaroni	6005	6005	0	5630	0	0	375	0	0	0
	Sesia	12600	10550	2050	10105	0	2050	145	0	0	300
	Total (l/day):	63000	60950	2050	41860	13775	2050	1540	0	0	3775
Ngilai	Lkisin	10920	10920	0	9625	0	0	870	0	0	425
	Ngare Narok	58595	18995	39600	18995	0	39600	0	0	0	0
	Ngilai	35780	28630	7150	18520	8240	7150	1245	0	0	625
	Ngogoltin	23095	13745	9350	13055	0	9350	690	0	0	0
	Swari	45485	42935	2550	19005	0	2550	21905	0	0	2025
	Total (l/day):	173875	115225	58650	79200	8240	58650	24710	0	0	3075
Wamba	Kolting	11765	11765	0	10985	0	0	355	0	0	425
	Matakwen	11505	3905	7600	3905	0	7600	0	0	0	0
	Wamba Town	270060	270060	0	18230	164870	0	41690	35120	0	10150
	Total (l/day):	293330	285730	7600	33120	164870	7600	42045	35120	0	10575
	Division Total (l/day):	530205	461905	68300	154180	186885	68300	68295	35120	0	17425

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

Printed: 04/07/90

DISTRICT WATER DEMAND SUMMARY (1993) - Scenario 2

DIVISION: WASO **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Serolipi	Donyo Uasin	23025	1625	21400	1320	0	21400	305	0	0	0
	Serolipi	96645	34995	61650	4060	16500	61650	5400	5260	0	3775
	Total (l/day):	119670	36620	83050	5380	16500	83050	5705	5260	0	3775
Waso	Archers Post	137910	108260	29650	7790	48380	29650	31300	15840	0	4950
	Lengusaka	16215	6265	9950	5690	0	9950	0	0	0	575
	Lerata	5365	5365	0	4700	0	0	665	0	0	0
	Losesia	33790	3940	29850	3940	0	29850	0	0	0	0
	Ngutuk Ongiron	39365	17865	21500	5400	6915	21500	490	5060	0	0
	Remote	7905	3955	3950	3630	0	3950	0	0	0	325
	Total (l/day):	240550	145650	94900	31150	55295	94900	32455	20900	0	5850
	Division Total (l/day):	360220	182270	177950	36530	71795	177950	38160	26160	0	9625

DISTRICT WATER DEMAND SUMMARY (2003) - Scenario 2

DIVISION: BARAGOI **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Arsim	Arsim	15870	7120	8750	7070	0	8750	0	0	0	50
	Illaut	22735	19985	2750	4575	0	2750	4150	10260	0	1000
	Ngurunoit	20150	10900	9250	10400	0	9250	0	0	0	500
	Total (l/day):	58755	38005	20750	22045	0	20750	4150	10260	0	1550
Baragoi	Baragoi	521590	521090	500	13450	355510	500	111670	17260	0	23200
	Total (l/day):	521590	521090	500	13450	355510	500	111670	17260	0	23200
Elbarta	Marti	68385	34485	33900	14130	6890	33900	0	10940	0	2525
	Masikita	18930	14080	4850	10850	0	4850	1130	0	0	2100
	Ngilai	11305	5955	5350	5230	0	5350	725	0	0	0
	Total (l/day):	98620	54520	44100	30210	6890	44100	1855	10940	0	4625
Kawop	Lonyangatan	44710	37110	7600	37110	0	7600	0	0	0	0
	Losurukoi	56310	14610	41700	14060	0	41700	0	0	0	550
	Total (l/day):	101020	51720	49300	51170	0	49300	0	0	0	550
Marti	Kalele	60585	28385	32200	12335	0	32200	16050	0	0	0
	Lokorkor	38240	11240	27000	11240	0	27000	0	0	0	0
	Moru-Akiring	11340	11340	0	11340	0	0	0	0	0	0
	Total (l/day):	110165	50965	59200	34915	0	59200	16050	0	0	0

Continued on next page

DISTRICT WATER DEMAND SUMMARY (2003) - Scenario 2

DIVISION: BARAGOI (Continued) **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Nachola	Nachola	64440	33040	31400	16640	0	31400	15900	0	0	500
	Terter	19120	12420	6700	12420	0	6700	0	0	0	0
	Total (l/day):	83560	45460	38100	29060	0	38100	15900	0	0	500
Ndoto	Latakweny	34450	33400	1050	29585	0	1050	740	0	0	3075
	Lesirikan	151015	105165	45850	50145	11975	45850	28650	10320	0	4075
	Total (l/day):	185465	138565	46900	79730	11975	46900	29390	10320	0	7150
Nyiro	Parkate	8190	8190	0	7930	0	0	260	0	0	0
	South Horr	90160	78160	12000	17910	41900	12000	3435	10740	0	4175
	Tum	28270	28270	0	5295	9225	0	1050	10000	0	2700
	Uaso Rongai	39325	10175	29150	9485	0	29150	490	0	0	200
	Total (l/day):	165945	124795	41150	40620	51125	41150	5235	20740	0	7075
	Division Total (l/day):	1325120	1025120	300000	301200	425500	300000	184250	69520	0	44650

Printed: 13/07/90

DISTRICT WATER DEMAND SUMMARY (2003) - Scenario 2

DIVISION: LORROKI

DISTRICT: SAMBURU

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Angata Nanyukie	Angata Nanyukie	39300	36600	2700	25740	0	2700	10610	0	0	250
	Barsaloi	40240	35390	4850	4125	21265	4850	0	10000	0	0
	Loibashai	16745	6545	10200	6000	0	10200	545	0	0	0
	Total (l/day):	96285	78535	17750	35865	21265	17750	11155	10000	0	250
Kisima	Lkilorit	110695	61695	49000	35245	0	49000	25900	0	0	550
	Lmisigiyoi	41585	15285	26300	14125	0	26300	1160	0	0	0
	Mbaringon	133330	41730	91600	21395	17690	91600	2645	0	0	0
	Nauneri	99600	32650	66950	18370	0	66950	1505	0	0	12775
	Total (l/day):	385210	151360	233850	89135	17690	233850	31210	0	0	13325
Lodokojek	Kirimun	110905	55805	55100	18900	16710	55100	2490	11080	0	6625
	Lodokojek	102335	46885	55450	34590	7065	55450	2305	0	0	2925
	Moru	27580	20580	7000	20580	0	7000	0	0	0	0
	Nonkeek	20090	20090	0	19550	0	0	540	0	0	0
	Total (l/day):	260910	143360	117550	93620	23775	117550	5335	11080	0	9550
Loosuk	Loosuk	126445	67395	59050	7950	18255	59050	18265	11300	0	11625
	Malaso	70665	13665	57000	12485	0	57000	480	0	0	700
	Tinga	67640	19990	47650	19085	0	47650	405	0	0	500
	Total (l/day):	264750	101050	163700	39520	18255	163700	19150	11300	0	12825
Maralal	Ledero	1426510	1426510	0	29845	1291685	0	94605	0	0	10375

Continued on next page

DISTRICT WATER DEMAND SUMMARY (2003) - Scenario 2

DIVISION: LORROKI (Continued) **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Maralal	Lpartuk	113400	113400	0	43505	65065	0	4830	0	0	0
	Township	2414880	2274880	140000	43700	2014650	0	3210	59420	140000	153900
	Total (l/day):	3954790	3814790	140000	117050	3371400	0	102645	59420	140000	164275
Opiroi	Mabati	7150	7150	0	7150	0	0	0	0	0	0
	Mbukoi	14085	13035	1050	13035	0	1050	0	0	0	0
	Opiroi	74325	74325	0	29020	27850	0	16405	0	0	1050
	Total (l/day):	95560	94510	1050	49205	27850	1050	16405	0	0	1050
Poro	Nkejemueny	27150	7100	20050	6425	0	20050	675	0	0	0
	Seketet	44005	11805	32200	10025	0	32200	1780	0	0	0
	Siambu	41180	41180	0	8100	22080	0	0	0	0	11000
	Sirata Oirobi	69335	44435	24900	20130	0	24900	13885	10420	0	0
	Total (l/day):	181670	104520	77150	44680	22080	77150	16340	10420	0	11000
Sukuta Marmar	Amaiya	26235	26235	0	6030	9205	0	10450	0	0	550
	Logorate	89125	23225	65900	21465	0	65900	1760	0	0	0
	Lolmolok	118440	33240	85200	30010	0	85200	2680	0	0	550
	Longewan	91935	21285	70650	11235	0	70650	9200	0	0	850
	Sukuta Marmar	354505	260605	93900	48825	112420	93900	57110	26300	0	15950
	Total (l/day):	680240	364590	315650	117565	121625	315650	81200	26300	0	17900
	Division Total (l/day):	5919415	4852715	1066700	586640	3623940	926700	283440	128520	140000	230175

Printed: 13/07/90

DISTRICT WATER DEMAND SUMMARY (2003) - Scenario 2

DIVISION: WAMBA

DISTRICT: SAMBURU

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Lodungokwe	Lpus	39405	39405	0	10370	21725	0	1660	0	0	5650
	Ltrimin	19675	19675	0	19675	0	0	0	0	0	0
	Nkaroni	6990	6990	0	6380	0	0	610	0	0	0
	Sesia	14230	12080	2150	11345	0	2150	235	0	0	500
	Total (l/day):	80300	78150	2150	47770	21725	2150	2505	0	0	6150
Ngilai	Lkisin	13000	13000	0	10990	0	0	1260	0	0	750
	Ngare Narok	63430	21830	41600	21830	0	41600	0	0	0	0
	Ngilai	46010	38510	7500	21295	14135	7500	2030	0	0	1050
	Ngogoltin	26025	16225	9800	15100	0	9800	1125	0	0	0
	Swari	51470	48770	2700	21375	0	2700	23945	0	0	3450
	Total (l/day):	199935	138335	61600	90590	14135	61600	28360	0	0	5250
Wamba	Kolting	13930	13930	0	12600	0	0	580	0	0	750
	Matakwen	12385	4385	8000	4385	0	8000	0	0	0	0
	Wamba Town	556590	556590	0	22495	390435	0	67920	59040	0	16700
	Total (l/day):	582905	574905	8000	39480	390435	8000	68500	59040	0	17450
	Division Total (l/day):	863140	791390	71750	177840	426295	71750	99365	59040	0	28850

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

Printed: 13/07/90

DISTRICT WATER DEMAND SUMMARY (2003) - Scenario 2

DIVISION: WASO **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Serolipi	Donyo Uasin	24305	1805	22500	1500	0	22500	305	0	0	0
	Serolipi	118065	53265	64800	4640	23180	64800	8800	10420	0	6225
	Total (l/day):	142370	55070	87300	6140	23180	87300	9105	10420	0	6225
Waso	Archers Post	171650	140500	31150	9060	63630	31150	33300	26360	0	8150
	Lengusaka	17815	7365	10450	6440	0	10450	0	0	0	925
	Lerata	6060	6060	0	5395	0	0	665	0	0	0
	Losesia	35800	4450	31350	4450	0	31350	0	0	0	0
	Ngutuk Ongiron	50080	27480	22600	6140	10440	22600	800	10100	0	0
	Remote	8810	4660	4150	4110	0	4150	0	0	0	550
	Total (l/day):	290215	190515	99700	35595	74070	99700	34765	36460	0	9625
	Division Total (l/day):	432585	245585	187000	41735	97250	187000	43870	46880	0	15850

DISTRICT WATER DEMAND SUMMARY (2013) - Scenario 2

DIVISION: BARAGOI

DISTRICT: SAMBURU

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Arsim	Arsim	18495	9295	9200	9220	0	9200	0	0	0	75
	Illaut	30040	27190	2850	6020	0	2850	4150	15420	0	1600
	Ngurunoit	23970	14270	9700	13470	0	9700	0	0	0	800
	Total (l/day):	72505	50755	21750	28710	0	21750	4150	15420	0	2475
Baragoi	Baragoi	955100	954550	550	18300	690005	550	181900	26820	0	37525
	Total (l/day):	955100	954550	550	18300	690005	550	181900	26820	0	37525
Elbarta	Marti	84480	48830	35650	18180	10010	35650	0	16540	0	4100
	Masikita	23375	18275	5100	13370	0	5100	1505	0	0	3400
	Ngilai	12805	7155	5650	6430	0	5650	725	0	0	0
	Total (l/day):	120660	74260	46400	37980	10010	46400	2230	16540	0	7500
Kawop	Lonyangatan	53690	45690	8000	45690	0	8000	0	0	0	0
	Losurukoi	62025	18175	43850	17300	0	43850	0	0	0	875
	Total (l/day):	115715	63865	51850	62990	0	51850	0	0	0	875
Marti	Kalele	65265	31415	33850	15365	0	33850	16050	0	0	0
	Lokorkor	42200	13850	28350	13850	0	28350	0	0	0	0
	Moru-Akiring	13950	13950	0	13950	0	0	0	0	0	0
	Total (l/day):	121415	59215	62200	43165	0	62200	16050	0	0	0

Continued on next page

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

Printed: 13/07/90

DISTRICT WATER DEMAND SUMMARY (2013) - Scenario 2

DIVISION: BARAGOI (Continued) **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Nachola	Nachola	77330	44330	33000	20480	0	33000	23050	0	0	800
	Terter	22350	15300	7050	15300	0	7050	0	0	0	0
	Total (l/day):	99680	59630	40050	35780	0	40050	23050	0	0	800
Ndoto	Latakweny	45355	44255	1100	38050	0	1100	1205	0	0	5000
	Lesirikan	198970	150770	48200	64045	17955	48200	46650	15520	0	6600
	Total (l/day):	244325	195025	49300	102095	17955	49300	47855	15520	0	11600
Nyiro	Parkate	10185	10185	0	9760	0	0	425	0	0	0
	South Horr	116620	103970	12650	22015	55295	12650	3660	16200	0	6800
	Tum	40090	40090	0	6520	13110	0	1085	15000	0	4375
	Uaso Rongai	43785	13135	30650	12035	0	30650	800	0	0	300
	Total (l/day):	210680	167380	43300	50330	68405	43300	5970	31200	0	11475
	Division Total (l/day):	1940080	1624680	315400	379350	786375	315400	281205	105500	0	72250

DISTRICT WATER DEMAND SUMMARY (2013) - Scenario 2

DIVISION: LORROKI

DISTRICT: SAMBURU

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Angata Nanyukie	Angata Nanyukie	47715	44915	2800	33930	0	2800	10610	0	0	375
	Barsaloi	56390	51290	5100	5480	30810	5100	0	15000	0	0
	Loibashai	19085	8335	10750	7790	0	10750	545	0	0	0
	Total (l/day):	123190	104540	18650	47200	30810	18650	11155	15000	0	375
Kisima	Lkilorit	127705	76205	51500	46480	0	51500	28850	0	0	875
	Lmisigiyoi	47450	19800	27650	18640	0	27650	1160	0	0	0
	Mbaringon	153250	56950	96300	28580	25635	96300	2735	0	0	0
	Nauneri	116820	46470	70350	24215	0	70350	1505	0	0	20750
	Total (l/day):	445225	199425	245800	117915	25635	245800	34250	0	0	21625
Lodokojek	Kirimun	137070	79170	57900	25025	24135	57900	2575	16760	0	10675
	Lodokojek	121995	63695	58300	45090	10640	58300	3365	0	0	4600
	Moru	34140	26790	7350	26790	0	7350	0	0	0	0
	Nonkeek	26425	26425	0	25545	0	0	880	0	0	0
	Total (l/day):	319630	196080	123550	122450	34775	123550	6820	16760	0	15275
Loosuk	Loosuk	153765	91665	62100	10755	25935	62100	19105	17120	0	18750
	Malaso	77915	17965	59950	16085	0	59950	780	0	0	1100
	Tinga	76110	26010	50100	24550	0	50100	660	0	0	800
	Total (l/day):	307790	135640	172150	51390	25935	172150	20545	17120	0	20650
Maralal	Ledero	2466950	2466950	0	36330	2259640	0	154080	0	0	16900

Continued on next page

DISTRICT WATER DEMAND SUMMARY (2013) - Scenario 2

DIVISION: LORROKI (Continued) **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Maralal	Lpartuk	181630	181630	0	57500	117635	0	6495	0	0	0
	Township	4094030	3874030	220000	52635	3469440	0	5230	96000	220000	250725
	Total (l/day):	6742610	6522610	220000	146465	5846715	0	165805	96000	220000	267625
Opiroi	Mabati	9170	9170	0	9170	0	0	0	0	0	0
	Mbukoi	17500	16400	1100	16400	0	1100	0	0	0	0
	Opiroi	106935	106935	0	38240	40275	0	26745	0	0	1675
	Total (l/day):	133605	132505	1100	63810	40275	1100	26745	0	0	1675
Poro	Nkejemueny	30215	9165	21050	8490	0	21050	675	0	0	0
	Seketet	48840	14990	33850	13210	0	33850	1780	0	0	0
	Siambu	59310	59310	0	10110	31350	0	0	0	0	17850
	Sirata Oirobi	82250	56100	26150	26535	0	26150	13885	15680	0	0
	Total (l/day):	220615	139565	81050	58345	31350	81050	16340	15680	0	17850
Sukuta Marmar	Amaiya	32765	32765	0	7980	13110	0	10800	0	0	875
	Logorate	99350	30050	69300	28290	0	69300	1760	0	0	0
	Lolmolok	132355	42805	89550	39250	0	89550	2680	0	0	875
	Longewan	99630	25380	74250	14805	0	74250	9200	0	0	1375
	Sukuta Marmar	566550	467850	98700	64830	242120	98700	93030	42120	0	25750
	Total (l/day):	930650	598850	331800	155155	255230	331800	117470	42120	0	28875
	Division Total (l/day):	9223315	8029215	1194100	762730	6290725	974100	399130	202680	220000	373950

Printed: 13/07/90

DISTRICT WATER DEMAND SUMMARY (2013) - Scenario 2

DIVISION: WAMBA

DISTRICT: SAMBURU

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Lodungokwe	Lpus	55710	55710	0	12720	31260	0	2605	0	0	9125
	Ltrimin	24735	24735	0	24735	0	0	0	0	0	0
	Nkaroni	8735	8735	0	7850	0	0	885	0	0	0
	Sesia	17560	15310	2250	14125	0	2250	385	0	0	800
	Total (l/day):	106740	104490	2250	59430	31260	2250	3875	0	0	9925
Ngilai	Lkisin	16365	16365	0	13930	0	0	1260	0	0	1175
	Ngare Narok	71185	27435	43750	27435	0	43750	0	0	0	0
	Ngilai	58905	51005	7900	26990	19285	7900	3055	0	0	1675
	Ngogoltin	31345	20995	10350	19435	0	10350	1560	0	0	0
	Swari	58415	55615	2800	26195	0	2800	23945	0	0	5475
	Total (l/day):	236215	171415	64800	113985	19285	64800	29820	0	0	8325
Wamba	Kolting	17940	17940	0	15820	0	0	945	0	0	1175
	Matakwen	13795	5345	8450	5345	0	8450	0	0	0	0
	Wamba Town	1089660	1089660	0	26040	831060	0	110625	94860	0	27075
	Total (l/day):	1121395	1112945	8450	47205	831060	8450	111570	94860	0	28250
	Division Total (l/day):	1464350	1388850	75500	220620	881605	75500	145265	94860	0	46500

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

Printed: 13/07/90

DISTRICT WATER DEMAND SUMMARY (2013) - Scenario 2

DIVISION: WASO

DISTRICT: SAMBURU

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Serolipi	Donyo Uasin	25815	2165	23650	1860	0	23650	305	0	0	0
	Serolipi	144970	76870	68100	5850	30890	68100	14350	15680	0	10100
	Total (l/day):	170785	79035	91750	7710	30890	91750	14655	15680	0	10100
Waso	Archers Post	216300	183550	32750	11040	81590	32750	35500	42220	0	13200
	Lengusaka	20440	9440	11000	7940	0	11000	0	0	0	1500
	Lerata	7495	7495	0	6830	0	0	665	0	0	0
	Losesia	38420	5470	32950	5470	0	32950	0	0	0	0
	Ngutuk Ongiron	63095	39345	23750	7680	15200	23750	1305	15160	0	0
	Remote	10295	5945	4350	5070	0	4350	0	0	0	875
	Total (l/day):	356045	251245	104800	44030	96790	104800	37470	57380	0	15575
	Division Total (l/day):	526830	330280	196550	51740	127680	196550	52125	73060	0	25675

DISTRICT WATER DEMAND SUMMARY (1993) - Scenario 3

DIVISION: BARAGOI **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Arsim	Arsim	13885	5785	8100	5760	0	8100	0	0	0	25
	Illaut	15935	13385	2550	3695	0	2550	3950	5140	0	600
	Ngurunoit	17215	8615	8600	8415	0	8600	0	0	0	200
	Total (l/day):	47035	27785	19250	17870	0	19250	3950	5140	0	825
Baragoi	Baragoi	231160	230660	500	11530	137145	500	60820	8940	0	12225
	Total (l/day):	231160	230660	500	11530	137145	500	60820	8940	0	12225
Elbarta	Marti	54345	22895	31450	11835	4140	31450	0	5520	0	1400
	Masikita	15385	10885	4500	9120	0	4500	615	0	0	1150
	Ngilai	9995	4995	5000	4400	0	5000	595	0	0	0
	Total (l/day):	79725	38775	40950	25355	4140	40950	1210	5520	0	2550
Kawop	Lonyangatan	38260	31210	7050	31210	0	7050	0	0	0	0
	Losurukoi	50695	12045	38650	11820	0	38650	0	0	0	225
	Total (l/day):	88955	43255	45700	43030	0	45700	0	0	0	225
Marti	Kalele	53420	23520	29900	10420	0	29900	13100	0	0	0
	Lokorkor	34470	9470	25000	9470	0	25000	0	0	0	0
	Moru-Akiring	9530	9530	0	9530	0	0	0	0	0	0
	Total (l/day):	97420	42520	54900	29420	0	54900	13100	0	0	0

Continued on next page

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

Printed: 13/07/90

DISTRICT WATER DEMAND SUMMARY (1993) - Scenario 3

DIVISION: BARAGOI (Continued) **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Nachola	Nachola	51920	22820	29100	13970	0	29100	8650	0	0	200
	Terter	16650	10450	6200	10450	0	6200	0	0	0	0
	Total (l/day):	68570	33270	35300	24420	0	35300	8650	0	0	200
Ndoto	Latakweny	27390	26390	1000	24340	0	1000	400	0	0	1650
	Lesirikan	113645	71095	42550	40710	7455	42550	15600	5180	0	2150
	Total (l/day):	141035	97485	43550	65050	7455	43550	16000	5180	0	3800
Nyiro	Parkate	6810	6810	0	6670	0	0	140	0	0	0
	South Horr	65515	54365	11150	14610	30135	11150	1870	5400	0	2350
	Tum	16985	16985	0	4285	5495	0	680	5000	0	1525
	Uaso Rongai	35285	8285	27000	7920	0	27000	265	0	0	100
	Total (l/day):	124595	86445	38150	33485	35630	38150	2955	10400	0	3975
	Division Total (l/day):	878495	600195	278300	250160	184370	278300	106685	35180	0	23800

DISTRICT WATER DEMAND SUMMARY (1993) - Scenario 3

DIVISION: LORROKI

DISTRICT: SAMBURU

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Angata Nanyukie	Angata Nanyukie	31285	28785	2500	20580	0	2500	8080	0	0	125
	Barsaloi	25645	21145	4500	3410	12735	4500	0	5000	0	0
	Loibashai	14670	5220	9450	4815	0	9450	405	0	0	0
	Total (l/day):	71600	55150	16450	28805	12735	16450	8485	5000	0	125
Kisima	Lkilorit	87955	42505	45450	28180	0	45450	14100	0	0	225
	Lmisigiyoi	36800	12400	24400	11300	0	24400	1100	0	0	0
	Mbaringon	114730	29730	85000	17285	10580	85000	1865	0	0	0
	Nauneri	84450	22350	62100	14675	0	62100	1075	0	0	6600
	Total (l/day):	323935	106985	216950	71440	10580	216950	18140	0	0	6825
Lodokojek	Kirimun	86790	35690	51100	15545	9970	51100	1420	5580	0	3175
	Lodokojek	86720	35220	51500	27970	4395	51500	1255	0	0	1600
	Moru	23290	16790	6500	16790	0	6500	0	0	0	0
	Nonkeek	16000	16000	0	15705	0	0	295	0	0	0
	Total (l/day):	212800	103700	109100	76010	14365	109100	2970	5580	0	4775
Loosuk	Loosuk	100565	45715	54850	6655	10890	54850	16470	5700	0	6000
	Malaso	63750	10850	52900	10290	0	52900	260	0	0	300
	Tinga	60360	16160	44200	15740	0	44200	220	0	0	200
	Total (l/day):	224675	72725	151950	32685	10890	151950	16950	5700	0	6500
Maralal	Ledero	729000	729000	0	20790	651060	0	51500	0	0	5650

Continued on next page

DISTRICT WATER DEMAND SUMMARY (1993) - Scenario 3

DIVISION: LORROKI (Continued) **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Maralal	Lpartuk	70845	70845	0	35150	33065	0	2630	0	0	0
	Township	1243780	1183780	60000	30435	1039140	0	1750	28680	60000	83775
	Total (l/day):	2043625	1983625	60000	86375	1723265	0	55880	28680	60000	89425
Opiroi	Mabati	5850	5850	0	5850	0	0	0	0	0	0
	Mbukoi	11735	10785	950	10785	0	950	0	0	0	0
	Opiroi	49060	49060	0	22865	16605	0	8965	0	0	625
	Total (l/day):	66645	65695	950	39500	16605	950	8965	0	0	625
Poro	Nkejemueny	24425	5825	18600	5180	0	18600	645	0	0	0
	Seketet	39610	9710	29900	8015	0	29900	1695	0	0	0
	Siambu	25895	25895	0	7040	13205	0	0	0	0	5650
	Sirata Oirobi	57680	34580	23100	16095	0	23100	13265	5220	0	0
	Total (l/day):	147610	76010	71600	36330	13205	71600	15605	5220	0	5650
Sukuta Marmar	Amaiya	19275	19275	0	5025	5475	0	8550	0	0	225
	Logorate	79610	18460	61150	17140	0	61150	1320	0	0	0
	Lolmolok	105540	26440	79100	24160	0	79100	2055	0	0	225
	Longewan	83795	18245	65550	8970	0	65550	8750	0	0	525
	Sukuta Marmar	219675	132525	87150	40270	42155	87150	31100	10700	0	8300
	Total (l/day):	507895	214945	292950	95565	47630	292950	51775	10700	0	9275
	Division Total (l/day):	3598785	2678835	919950	466710	1849275	859950	178770	60880	60000	123200

Printed: 13/07/90

DISTRICT WATER DEMAND SUMMARY (1993) - Scenario 3

DIVISION: WAMBA

DISTRICT: SAMBURU

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Lodungokwe	Lpus	25590	25590	0	8540	13070	0	905	0	0	3075
	Ltrimin	16300	16300	0	16300	0	0	0	0	0	0
	Nkaroni	5695	5695	0	5360	0	0	335	0	0	0
	Sesia	11920	9920	2000	9590	0	2000	130	0	0	200
	Total (l/day):	59505	57505	2000	39790	13070	2000	1370	0	0	3275
Ngilai	Lkisin	10160	10160	0	9065	0	0	770	0	0	325
	Ngare Narok	56740	18090	38650	18090	0	38650	0	0	0	0
	Ngilai	33855	26855	7000	17015	8110	7000	1105	0	0	625
	Ngogoltin	22140	13040	9100	12430	0	9100	610	0	0	0
	Swari	41975	39475	2500	18150	0	2500	19400	0	0	1925
	Total (l/day):	164870	107620	57250	74750	8110	57250	21885	0	0	2875
Wamba	Kolting	11055	11055	0	10415	0	0	315	0	0	325
	Matakwen	11160	3710	7450	3710	0	7450	0	0	0	0
	Wamba Town	226215	226215	0	19845	128620	0	36955	31720	0	9075
	Total (l/day):	248430	240980	7450	33970	128620	7450	37270	31720	0	9400
	Division Total (l/day):	472805	406105	66700	148510	149800	66700	60525	31720	0	15550

DISTRICT WATER DEMAND SUMMARY (1993) - Scenario 3

DIVISION: WASO **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Serolipi	Donyo Uasin	22450	1550	20900	1260	0	20900	290	0	0	0
	Serolipi	92720	32570	60150	3860	15690	60150	4800	5220	0	3000
	Total (l/day):	115170	34120	81050	5120	15690	81050	5090	5220	0	3000
Waso	Archers Post	127100	98200	28900	7440	46120	28900	29800	10740	0	4100
	Lengusaka	15670	5970	9700	5420	0	9700	0	0	0	550
	Lerata	5145	5145	0	4515	0	0	630	0	0	0
	Losesia	32840	3740	29100	3740	0	29100	0	0	0	0
	Ngutuk Ongiron	38165	17215	20950	5140	6600	20950	435	5040	0	0
	Remote	7545	3695	3850	3470	0	3850	0	0	0	225
	Total (l/day):	226465	133965	92500	29725	52720	92500	30865	15780	0	4875
	Division Total (l/day):	341635	168085	173550	34845	68410	173550	35955	21000	0	7875

DISTRICT WATER DEMAND SUMMARY (2003) - Scenario 3

DIVISION: BARAGOI

DISTRICT: SAMBURU

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Arsim	Arsim	14190	6090	8100	6065	0	8100	0	0	0	25
	Illaut	15990	13440	2550	3910	0	2550	3550	5180	0	800
	Ngurunoit	17820	9220	8600	8920	0	8600	0	0	0	300
	Total (l/day):	48000	28750	19250	18895	0	19250	3550	5180	0	1125
Baragoi	Baragoi	271695	271195	500	11690	165635	500	68105	10040	0	15725
	Total (l/day):	271695	271195	500	11690	165635	500	68105	10040	0	15725
Elbarta	Marti	57135	25685	31450	12185	5965	31450	0	5660	0	1875
	Masikita	16145	11645	4500	9360	0	4500	785	0	0	1500
	Ngilai	10105	5105	5000	4480	0	5000	625	0	0	0
	Total (l/day):	83385	42435	40950	26025	5965	40950	1410	5660	0	3375
Kawop	Lonyangatan	38960	31910	7050	31910	0	7050	0	0	0	0
	Losurukoi	51075	12425	38650	12100	0	38650	0	0	0	325
	Total (l/day):	90035	44335	45700	44010	0	45700	0	0	0	325
Marti	Kalele	54335	24435	29900	10635	0	29900	13800	0	0	0
	Lokorkor	34670	9670	25000	9670	0	25000	0	0	0	0
	Moru-Akiring	9760	9760	0	9760	0	0	0	0	0	0
	Total (l/day):	98765	43865	54900	30065	0	54900	13800	0	0	0

Continued on next page

DISTRICT WATER DEMAND SUMMARY (2003) - Scenario 3

DIVISION: BARAGOI (Continued) **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Nachola	Nachola	54760	25660	29100	14310	0	29100	11050	0	0	300
	Terter	16890	10690	6200	10690	0	6200	0	0	0	0
	Total (l/day):	71650	36350	35300	25000	0	35300	11050	0	0	300
Ndoto	Latakweny	29045	28045	1000	25410	0	1000	510	0	0	2125
	Lesirikan	123910	81360	42550	43145	10300	42550	19950	5240	0	2725
	Total (l/day):	152955	109405	43550	68555	10300	43550	20460	5240	0	4850
Nyiro	Parkate	6980	6980	0	6800	0	0	180	0	0	0
	South Horr	73505	62355	11150	15405	36010	11150	2395	5520	0	3025
	Tum	20395	20395	0	4575	7975	0	870	5000	0	1975
	Uaso Rongai	35595	8595	27000	8155	0	27000	340	0	0	100
	Total (l/day):	136475	98325	38150	34935	43985	38150	3785	10520	0	5100
	Division Total (l/day):	952960	674660	278300	259175	225885	278300	122160	36640	0	30800

DISTRICT WATER DEMAND SUMMARY (2003) - Scenario 3

DIVISION: LORROKI

DISTRICT: SAMBURU

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Angata Nanyukie	Angata Nanyukie	33895	31395	2500	22125	0	2500	9145	0	0	125
	Barsaloi	31425	26925	4500	3580	18345	4500	0	5000	0	0
	Loibashai	15060	5610	9450	5140	0	9450	470	0	0	0
	Total (l/day):	80380	63930	16450	30845	18345	16450	9615	5000	0	125
Kisima	Lkilorit	94120	48670	45450	30295	0	45450	18050	0	0	325
	Lmisigiyoi	37525	13125	24400	12130	0	24400	995	0	0	0
	Mbaringon	120970	35970	85000	18445	15250	85000	2275	0	0	0
	Nauneri	87845	25745	62100	15775	0	62100	1295	0	0	8675
	Total (l/day):	340460	123510	216950	76645	15250	216950	22615	0	0	9000
Lodokojek	Kirimun	93510	42410	51100	16215	14385	51100	1820	5740	0	4250
	Lodokojek	90890	39390	51500	29745	6065	51500	1605	0	0	1975
	Moru	24170	17670	6500	17670	0	6500	0	0	0	0
	Nonkeek	17165	17165	0	16785	0	0	380	0	0	0
	Total (l/day):	225735	116635	109100	80415	20450	109100	3805	5740	0	6225
Loosuk	Loosuk	106820	51970	54850	6880	15680	54850	15685	5900	0	7825
	Malaso	64345	11445	52900	10710	0	52900	335	0	0	400
	Tinga	61230	17030	44200	16450	0	44200	280	0	0	300
	Total (l/day):	232395	80445	151950	34040	15680	151950	16300	5900	0	8525
Maralal	Ledero	987970	987970	0	24465	890335	0	65945	0	0	7225

Continued on next page

DISTRICT WATER DEMAND SUMMARY (2003) - Scenario 3

DIVISION: LORROKI (Continued) **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Maralal	Lpartuk	89755	89755	0	37335	49055	0	3365	0	0	0
	Township	1655860	1575860	80000	35875	1391295	0	2240	39000	80000	107450
	Total (l/day):	2733585	2653585	80000	97675	2330685	0	71550	39000	80000	114675
Opiroi	Mabati	6125	6125	0	6125	0	0	0	0	0	0
	Mbukoi	12145	11195	950	11195	0	950	0	0	0	0
	Opiroi	61220	61220	0	24930	23970	0	11495	0	0	825
	Total (l/day):	79490	78540	950	42250	23970	950	11495	0	0	825
Poro	Nkejemueny	24710	6110	18600	5530	0	18600	580	0	0	0
	Seketet	40045	10145	29900	8610	0	29900	1535	0	0	0
	Siambu	33465	33465	0	7010	19005	0	0	0	0	7450
	Sirata Oirobi	57655	34555	23100	17285	0	23100	11990	5280	0	0
	Total (l/day):	155875	84275	71600	38435	19005	71600	14105	5280	0	7450
Sukuta Marmar	Amaiya	22550	22550	0	5250	7975	0	9000	0	0	325
	Logorate	81140	19990	61150	18480	0	61150	1510	0	0	0
	Lolmolok	107515	28415	79100	25785	0	79100	2305	0	0	325
	Longewan	83755	18205	65550	9680	0	65550	7900	0	0	625
	Sukuta Marmar	274935	187785	87150	41835	79560	87150	39790	15900	0	10700
	Total (l/day):	569895	276945	292950	101030	87535	292950	60505	15900	0	11975
	Division Total (l/day):	4417815	3477865	939950	501335	2530920	859950	209990	76820	80000	158800

Printed: 13/07/90

DISTRICT WATER DEMAND SUMMARY (2003) - Scenario 3

DIVISION: WAMBA

DISTRICT: SAMBURU

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Lodungokwe	Lpus	32725	32725	0	8900	18690	0	1160	0	0	3975
	Ltrimin	16885	16885	0	16885	0	0	0	0	0	0
	Nkaroni	5910	5910	0	5480	0	0	430	0	0	0
	Sesia	12245	10245	2000	9780	0	2000	165	0	0	300
	Total (l/day):	67765	65765	2000	41045	18690	2000	1755	0	0	4275
Ngilai	Lkisin	10840	10840	0	9430	0	0	985	0	0	425
	Ngare Narok	57375	18725	38650	18725	0	38650	0	0	0	0
	Ngilai	39450	32450	7000	18150	12060	7000	1415	0	0	825
	Ngogoltin	22880	13780	9100	13000	0	9100	780	0	0	0
	Swari	43840	41340	2500	18390	0	2500	20625	0	0	2325
	Total (l/day):	174385	117135	57250	77695	12060	57250	23805	0	0	3575
Wamba	Kolting	11635	11635	0	10805	0	0	405	0	0	425
	Matakwen	11165	3715	7450	3715	0	7450	0	0	0	0
	Wamba Town	306535	306535	0	20225	188370	0	47285	39180	0	11475
	Total (l/day):	329335	321885	7450	34745	188370	7450	47690	39180	0	11900
	Division Total (l/day):	571485	504785	66700	153485	219120	66700	73250	39180	0	19750

MINISTRY OF WATER DEVELOPMENT

Water Resources Assessment & Planning Project - Documentation Section

Printed: 13/07/90

DISTRICT WATER DEMAND SUMMARY (2003) - Scenario 3

DIVISION: WASO

DISTRICT: SAMBURU

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Serolipi	Donyo Uasin	22380	1480	20900	1300	0	20900	180	0	0	0
	Serolipi	99610	39460	60150	3980	19975	60150	6150	5280	0	4075
	Total (l/day):	121990	40940	81050	5280	19975	81050	6330	5280	0	4075
Waso	Archers Post	141575	112675	28900	7780	54755	28900	28700	15940	0	5500
	Lengusaka	15915	6215	9700	5540	0	9700	0	0	0	675
	Lerata	5200	5200	0	4630	0	0	570	0	0	0
	Losesia	32920	3820	29100	3820	0	29100	0	0	0	0
	Ngutuk Ongiron	40785	19835	20950	5260	8960	20950	555	5060	0	0
	Remote	7715	3865	3850	3540	0	3850	0	0	0	325
	Total (l/day):	244110	151610	92500	30570	63715	92500	29825	21000	0	6500
	Division Total (l/day):	366100	192550	173550	35850	83690	173550	36155	26280	0	10575

Printed: 13/07/90

DISTRICT WATER DEMAND SUMMARY (2013) - Scenario 3

DIVISION: BARAGOI

DISTRICT: SAMBURU

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Arsim	Arsim	15285	7185	8100	7160	0	8100	0	0	0	25
	Illaut	16675	14125	2550	4685	0	2550	3200	5240	0	1000
	Ngurunoit	19495	10895	8600	10495	0	8600	0	0	0	400
	Total (l/day):	51455	32205	19250	22340	0	19250	3200	5240	0	1425
Baragoi	Baragoi	309265	308765	500	13070	197580	500	66690	11400	0	20025
	Total (l/day):	309265	308765	500	13070	197580	500	66690	11400	0	20025
Elbarta	Marti	61630	30180	31450	14180	7810	31450	0	5840	0	2350
	Masikita	17855	13355	4500	10400	0	4500	1005	0	0	1950
	Ngilai	10555	5555	5000	4990	0	5000	565	0	0	0
	Total (l/day):	90040	49090	40950	29570	7810	40950	1570	5840	0	4300
Kawop	Lonyangatan	42580	35530	7050	35530	0	7050	0	0	0	0
	Losurukoi	52535	13885	38650	13460	0	38650	0	0	0	425
	Total (l/day):	95115	49415	45700	48990	0	45700	0	0	0	425
Marti	Kalele	54255	24355	29900	11905	0	29900	12450	0	0	0
	Lokorkor	35800	10800	25000	10800	0	25000	0	0	0	0
	Moru-Akiring	10880	10880	0	10880	0	0	0	0	0	0
	Total (l/day):	100935	46035	54900	33585	0	54900	12450	0	0	0

Continued on next page

DISTRICT WATER DEMAND SUMMARY (2013) - Scenario 3

DIVISION: BARAGOI (Continued) **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Nachola	Nachola	59580	30480	29100	15930	0	29100	14150	0	0	400
	Terter	18120	11920	6200	11920	0	6200	0	0	0	0
	Total (l/day):	77700	42400	35300	27850	0	35300	14150	0	0	400
Ndoto	Latakweny	33965	32965	1000	29560	0	1000	655	0	0	2750
	Lesirikan	140570	98020	42550	49755	13965	42550	25550	5300	0	3450
	Total (l/day):	174535	130985	43550	79315	13965	43550	26205	5300	0	6200
Nyiro	Parkate	7830	7830	0	7600	0	0	230	0	0	0
	South Horr	83705	72555	11150	17100	43090	11150	2855	5660	0	3850
	Tum	23835	23835	0	5070	10435	0	855	5000	0	2475
	Uaso Rongai	36890	9890	27000	9355	0	27000	435	0	0	100
	Total (l/day):	152260	114110	38150	39125	53525	38150	4375	10660	0	6425
	Division Total (l/day):	1051305	773005	278300	293845	272880	278300	128640	38440	0	39200

Printed: 13/07/90

DISTRICT WATER DEMAND SUMMARY (2013) - Scenario 3

DIVISION: LORROKI

DISTRICT: SAMBURU

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Angata Nanyukie	Angata Nanyukie	37315	34815	2500	26390	0	2500	8300	0	0	125
	Barsaloi	37735	33235	4500	4225	24010	4500	0	5000	0	0
	Loibashai	15875	6425	9450	6000	0	9450	425	0	0	0
	Total (l/day):	90925	74475	16450	36615	24010	16450	8725	5000	0	125
Kisima	Lkilorit	104445	58995	45450	36120	0	45450	22450	0	0	425
	Lmisigiyoi	39800	15400	24400	14500	0	24400	900	0	0	0
	Mbaringon	129390	44390	85000	22265	19995	85000	2130	0	0	0
	Nauneri	93320	31220	62100	18850	0	62100	1170	0	0	11200
	Total (l/day):	366955	150005	216950	91735	19995	216950	26650	0	0	11625
Lodokojek	Kirimun	102825	51725	51100	19525	18780	51100	2005	5940	0	5475
	Lodokojek	99285	47785	51500	35115	8265	51500	2055	0	0	2350
	Moru	27285	20785	6500	20785	0	6500	0	0	0	0
	Nonkeek	20350	20350	0	19865	0	0	485	0	0	0
	Total (l/day):	249745	140645	109100	95290	27045	109100	4545	5940	0	7825
Loosuk	Loosuk	114280	59430	54850	8340	20140	54850	14840	6160	0	9950
	Malaso	66315	13415	52900	12485	0	52900	430	0	0	500
	Tinga	64085	19885	44200	19125	0	44200	360	0	0	400
	Total (l/day):	244680	92730	151950	39950	20140	151950	15630	6160	0	10850
Maralal	Ledero	1346590	1346590	0	29045	1223885	0	84410	0	0	9250

Continued on next page

DISTRICT WATER DEMAND SUMMARY (2013) - Scenario 3

DIVISION: LORROKI (Continued) **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Maralal	Lpartuk	118525	118525	0	44545	69675	0	4305	0	0	0
	Township	2223460	2123460	100000	42550	1889915	0	2865	50780	100000	137350
	Total (l/day):	3688575	3588575	100000	116140	3183475	0	91580	50780	100000	146600
Opiroi	Mabati	7060	7060	0	7060	0	0	0	0	0	0
	Mbukoi	13730	12780	950	12780	0	950	0	0	0	0
	Opiroi	76715	76715	0	29705	31275	0	14710	0	0	1025
	Total (l/day):	97505	96555	950	49545	31275	950	14710	0	0	1025
Poro	Nkejemueny	25730	7130	18600	6605	0	18600	525	0	0	0
	Seketet	41580	11680	29900	10295	0	29900	1385	0	0	0
	Siambu	41900	41900	0	7835	24415	0	0	0	0	9650
	Sirata Oirobi	59930	36830	23100	20605	0	23100	10865	5360	0	0
	Total (l/day):	169140	97540	71600	45340	24415	71600	12775	5360	0	9650
Sukuta Marmar	Amaiya	25140	25140	0	6150	10165	0	8400	0	0	425
	Logorate	84560	23410	61150	22040	0	61150	1370	0	0	0
	Lolmolok	112125	33025	79100	30515	0	79100	2085	0	0	425
	Longewan	85045	19495	65550	11520	0	65550	7150	0	0	825
	Sukuta Marmar	357080	269930	87150	51815	132385	87150	50920	21160	0	13650
	Total (l/day):	663950	371000	292950	122040	142550	292950	69925	21160	0	15325
	Division Total (l/day):	5571475	4611525	959950	596655	3472905	859950	244540	94400	100000	203025

Printed: 13/07/90

DISTRICT WATER DEMAND SUMMARY (2013) - Scenario 3

DIVISION: WAMBA

DISTRICT: SAMBURU

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Lodungokwe	Lpus	40820	40820	0	9750	24510	0	1485	0	0	5075
	Ltrimin	19190	19190	0	19190	0	0	0	0	0	0
	Nkaroni	6650	6650	0	6100	0	0	550	0	0	0
	Sesia	13630	11630	2000	11020	0	2000	210	0	0	400
	Total (l/day):	80290	78290	2000	46060	24510	2000	2245	0	0	5475
Ngilai	Lkisin	12320	12320	0	10810	0	0	985	0	0	525
	Ngare Narok	59925	21275	38650	21275	0	38650	0	0	0	0
	Ngilai	46310	39310	7000	20415	16060	7000	1810	0	0	1025
	Ngogoltin	25200	16100	9100	15100	0	9100	1000	0	0	0
	Swari	44340	41840	2500	20380	0	2500	18635	0	0	2825
	Total (l/day):	188095	130845	57250	87980	16060	57250	22430	0	0	4375
Wamba	Kolting	13360	13360	0	12315	0	0	520	0	0	525
	Matakwen	11645	4195	7450	4195	0	7450	0	0	0	0
	Wamba Town	385255	385255	0	22365	245005	0	54620	48740	0	14525
	Total (l/day):	410260	402810	7450	38875	245005	7450	55140	48740	0	15050
	Division Total (l/day):	678645	611945	66700	172915	285575	66700	79815	48740	0	24900

DISTRICT WATER DEMAND SUMMARY (2013) - Scenario 3

DIVISION: WASO **DISTRICT: SAMBURU**

Location	Sub-Location	Total Demand	Total Domestic	Total Non Domestic	Population Rural	Population Urban	Livestock	Schools	Health	Industry	Others
Serolipi	Donyo Uasin	22570	1670	20900	1440	0	20900	230	0	0	0
	Serolipi	107185	47035	60150	4560	24015	60150	7850	5360	0	5250
	Total (l/day):	129755	48705	81050	6000	24015	81050	8080	5360	0	5250
Waso	Archers Post	156910	128010	28900	8580	63480	28900	27650	21200	0	7100
	Lengusaka	16780	7080	9700	6180	0	9700	0	0	0	900
	Lerata	5755	5755	0	5240	0	0	515	0	0	0
	Losesia	33360	4260	29100	4260	0	29100	0	0	0	0
	Ngutuk Ongiron	44470	23520	20950	5950	11780	20950	710	5080	0	0
	Remote	8215	4365	3850	3940	0	3850	0	0	0	425
	Total (l/day):	265490	172990	92500	34150	75260	92500	28875	26280	0	8425
	Division Total (l/day):	395245	221695	173550	40150	99275	173550	36955	31640	0	13675

APPENDIX 5

WATER RESOURCES SUMMARIES

APPENDIX 5

WATER RESOURCES SUMMARIES

DIVISION	LOCATION	SUB-LOCATION	PAGE
BARAGOI	Nyiro	South Horr	5-1
		Tuum	5-2
		Parkati	5-3
		Uaso Rongai	5-4
	Kawop	Losurukoi	5-5
		Lonyangaten	5-6
	Ndoto	Latakweny	5-7
		Lesirikan	5-8
	Arsim	Illaut	5-9
		Arsim	5-10
		Nguronit	5-11
	Nachola	Nachola	5-12
		Terter	5-13
	Baragoi	Baragoi	5-14
	Marti	Kalele	5-15
		Lokorkor	5-16
		Moru-Akiring	5-17
	Elbarta	Marti	5-18
		Ngilai	5-19
		Masikita	5-20
LORROKI	Poro	Siambu	5-21
		Seketet	5-22
		Sirata Oirobi	5-23
		Nkejemueny	5-24
	Angata Nanyukie	Angata Nanyukie	5-25
		Loibashai	5-26
		Barsaloi	5-27
	Opiroi	Opiroi	5-28
		Mabati	5-29
		Mbukoi	5-30
	Loosuk	Malaso	5-31
		Tinga	5-32
		Loosuk	5-33
	Maralal	Ledero	5-34
		Lpartuk	5-35
		Township	5-36

DIVISION	LOCATION	SUB-LOCATION	PAGE
LORROKI	Sukuta Marmar	Lolmolok	5-37
		Amaiya	5-38
		Longewan	5-39
		Logorate	5-40
		Sukuta Marmar	5-41
	Kisima	Nauneri	5-42
		Lmisigiyoi	5-43
		Lkilorit	5-44
		Mbaringon	5-45
	Lodokojek	Moru	5-46
		Nonkeek	5-47
		Lodokojek	5-48
		Kirimun	5-49
WAMBA	Ngilai	Swari	5-50
		Ngare Narok	5-51
		Ngilai	5-52
		Lkisin	5-53
		Ngogoltin	5-54
	Lodungokwe	Nkaroni	5-55
		Lpus	5-56
		Ltirimin	5-57
		Sesia	5-58
	Wamba	Matakwen	5-59
		Kolting	5-60
		Wamba	5-61
WASO	Waso	Lerata	5-62
		Lengusaka	5-63
		Remote	5-64
		Ngutuk Ongiron	5-65
		Archers Post	5-66
		Losesia	5-67
	Serolipi	Donyo Uasin	5-68
		Serolipi	5-69

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : SOUTH HORR
Location : Nyiro
Division : Baragoi

Area : 407 km^2
Elevation : 360-2700 m.

Main Centre(s) : South Horr

Geomorphology : Rugged terrain on eastern slopes of Mt. Nyiro. The major lagga flows in northern direction past South Horr centre.

Geology : The Nyiro Mts. are Basement rocks. In the north basalts are found

Vegetation : In the lower areas shrubs, in the higher areas forest. The northern part of the sub-location is very dry

Soils :

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	438			mm.
Main Season	210			mm.

Main Season: March-May, Oct-Dec

Evaporation: Average Annual 1880 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1. South Horr Spring	2,200	0.009

Remark: 1988 Data only, which was above average wet year in the area

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: None

QUALITY DATA

Groundwater : Spring South Horr: EC 150 µS/cm, pH 6.5, Hardness 48 mg/l, F 0.2 mg/l. Suitable for domestic use.
(Kurungu spring: EC 145 µS/cm, T 27°C)

Surfacewater: Lake Turkana: EC 4200 µS/cm, pH 9.8, Hardness 20 mg/l, F 11 mg/l. Unsuitable for domestic use

RESOURCES POTENTIAL

Groundwater : In the Basement area, sites for drilling should be in structures and near streams.

There has been no drilling in this sub-location.

Surfacewater :Rainfall in the Nyiru Mounts can reach >1000 mm in a year. Therefore surface runoff in streams originating on the mountains is significant. Data are not available. The springs feeding the stream at South Horr flow continuously. The minimum flow in the period October 1987-January 1989 was 9 l/s. Other springs exist at Kurungu, 6km north of South Horr.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : TUM
Location : Nyiro
Division : Baragoi

Area : 377 km^2.
Elevation : 360-2700 m.

Main Centre(s) : Tum

Geomorphology : Rugged terrain on western slopes of Mt. Nyiro. Spring at Tum centre. The northern part of the s/l is very dry.

Geology : The Nyiro Mts. are Basement rocks. In the north basalts are found, partly covered by ash.

Vegetation : Deciduous shrub annual grassland

Soils : Soils are variable and show severe erosion.

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	600			mm.
Main Season				mm.

Main Season: March-May, Oct-Dec

Evaporation: Average Annual 1880 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1. Tum spring	345	n.a
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: None

QUALITY DATA
Groundwater : No data

Surfacewater: Tum spring: EC 279 μS/m, T 17.4°C

RESOURCES POTENTIAL
Groundwater : In the Basement area sites for drilling should be in structures and near streams.

There has been no drilling in this sub-location

Surfacewater :Rainfall in the Nyiru Mounts can reach >1000 mm in a year. Therefore surface runoff in streams originating on the mountains is significant. However data are not available.

The springs at Tum flow continuously. The minimum flow in the period October 1987-March 1989 was 0.5 l/s (December 1987), the maximum flow was 80 l/s.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : PARKATI
Location : Nyiro
Division : Baragoi

Area : 151 km^2.
Elevation : 450-1350 m.

Main Centre(s) :

Geomorphology : Rugged terrain on eastern slopes of the Rift Valley.

Geology : Mainly basalts, in south-west some trachyte

Vegetation : Deciduous shrub annual grassland

Soils : Clay loam and has suffered from erosion.

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	450			mm.
Main Season				mm.

Main Season: March-May, Oct-Dec

Evaporation: Average Annual 2110 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: None

QUALITY DATA
Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : No data available

Surfacewater :No permanent surface water source available. Main lagga: Losergoi, along southern boundary.

No data on quality.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : UASO RONGAI
Location : Nyiro
Division : Baragoi

Area : 325 km^2.
Elevation : 1250-2400 m.

Main Centre(s) : Uaso Rongai

Geomorphology : Rugged terrain in southern part of the Nyiro Hills. Plains in southern part of the s/l

Geology : Basement system, in parts covered by colluvium

Vegetation : Evergreen forests and bushland.

Soils : Soils are sandy loam and severely eroded. Hillsides are rocky.

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	650			mm.
Main Season				mm.
Main Season:	March-May, Oct-Dec			

Evaporation: Average Annual 1780 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: Gordshi Dam - completely silted
Nasidan Goroshi - siltation; Bartakwet (same?) 70000 m^3 (1984)

QUALITY DATA
Groundwater : Naiseecho - wells with saline water

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : No data available

Surfacewater :No permanent surface water source available. Dams and pans constructed suffer from siltation

* Medium potential because of proximity to Nyiro Mounts.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : LOSURUKOI
Location : Kawop
Division : Baragoi

Area : 477 km^2
Elevation : 300-1800 m.

Main Centre(s) :

Geomorphology : Generally a plain area, with the Emurua Akirim volcanic plateau in the central part of s/l. Surface slopes down towards Sukuta valley in western part.

Geology : Basement system in the east (Mt. Kawop), Basalts and some trachyte in the west.

Vegetation : Deciduous shrub annual grassland + shrub grassland.

Soils : Soil are sandy clay loam, slightly eroded

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	450			mm.
Main Season				mm.
Main Season:	March-May, Oct-Dec			

Evaporation: Average Annual 2060 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes:	C1613	C4449	C7917
Total Depth (m)	68.59	83	160
Water Depth (m)	65.24		55.91
Yield (m^3/h)	3.18		
Present State	Blocked	Dry	Capped

Dams / Pans: Ngusita Dam: 16000 m^3 (1984)

QUALITY DATA

Groundwater : Check ministry files

Surfacewater:

RESOURCES POTENTIAL

Groundwater : The abandoned borehole C1613 had a reasonable yield. The new borehole C7917 was drilled at the same location, in the same structure.

Surfacewater :No permanent surface water source available
Ngusita Dam on the Lopur river contains water in the wet season only.

Main lagga: Losergoi, Akangbelai

Poor potential due to low rainfall.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : LONYANGATAN
Location : Kawop
Division : Baragoi

Area : 360 km^2.
Elevation : 300-1500 m.

Main Centre(s) :

Geomorphology : Generally plain in the east sloping towards Suguta valley in the west. The Baragoi lagga is located along the south-eastern boundary

Geology : Basement system in the east, trachytes and some basalt in the west.

Vegetation : Deciduous shrub annual grassland.

Soils : Soils are sandy clay, slightly eroded.

WATER RESOURCES DATA

Rainfall:

	Average	66%	90%	
Annual	450			mm.
Main Season				mm.

Main Season: March-May, Oct-Dec

Evaporation: Average Annual 2110 mm.

Discharge of Rivers & Springs:

	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: None

QUALITY DATA
Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : No data available

Surfacewater :No permanent surface water source available. Area is crossed by many small laggas.
Main lagga: Baragoi.

Poor potential due to low rainfall.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : LATAKWENY
Location : Ndoto
Division : Baragoi

Area : 735 km^2
Elevation: 700-2400 m.

Main Centre(s) : Latakweny

Geomorphology : Ndoto mountains in north-east. Very rugged terrain sloping towards the Milgis river in the south.

Geology : Basement system. Important alluvial sediments along Milgis river.

Vegetation : Deciduous shrub annual grassland.

Soils : Soils are variable and very rocky in the hills. Shows local severe erosion.

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	700			mm.
Main Season				mm.

Main Season: March-May, Oct-Dec

Evaporation: Average Annual 1880 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: None

QUALITY DATA
Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : In the Basement area sites for drilling should be in structures and near streams. Refer to s/l Masikita for data from borehole C7919. Sediments in the laggas usually have a shallow groundwater table.

Surfacewater :The area is transversed by many laggas which originate in the Ndoto Mounts. The major lagga is the Milgis along the southern boundary.

No data on flows available

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : LESIRIKAN
Location : Ndoto
Division : Baragoi

Area : 728 km^2.
Elevation: 800-2400 m.

Main Centre(s) : Lesirikan

Geomorphology : Plain area, apart from the Ndoto mountains

Geology : Basement system, covered by colluvium in the ElBarta plain

Vegetation : Dwarf shrub grassland, forest in the higher parts. Generally good grazing

Soils : Soils are mainly sandy clay.

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	600			mm.
Main Season				mm.

Main Season: March-May, Oct-Dec

Evaporation: Average Annual 1860 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes:	C3651
Total Depth (m)	54.90
Water Depth (m)	44.80
Yield (m^3/h)	5.50
Present State	Working

Dams / Pans: Lesepe dam: seasonal; Nkoriche pans: seasonal
Ngomeni dam: not protected, 60000 m^3 (1982)

QUALITY DATA
Groundwater : C3651 - saline - Check ministry files

Surfacewater: No data available

RESOURCES POTENTIAL
Groundwater : The borehole at Lesirikan has a good yield.

Surfacewater :Area is suitable for construction of dams and pans. But the dams and pans contain water during the wet season only.
Main laggas: Sachati, Mpatpat.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : ILLAUT
Location : Arsim
Division : Baragoi

Area : 125 km^2
Elevation : 700-2600 m.

Main Centre(s) : Illaut, Arsim

Geomorphology : Rugged terrain on eastern slopes of Ndoto Mounts.

Geology : Basement system. Lava front across boundary in Marsabit.

Vegetation : Evergreen bushland, forest in high parts.

Soils : Sandy soils, slightly eroded, hillsides are rocky.

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	650			mm.
Main Season				mm.

Main Season: March-May, Oct-Dec

Evaporation: Average Annual 1840 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: None

QUALITY DATA

Groundwater : Waterholes in Illaut lagga: EC 1502 µS/cm, T28°C

Surfacewater: No data

RESOURCES POTENTIAL

Groundwater : Shallow wells in the sediments of the Illaut lagga are found at Illaut. Springs in mountains, but no data on flows.

Surfacewater : In the mountain surface water is usually found in small quantities. In the lowlands permanent water sources are not found.

Main laggas: Arsim, Illaut

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : ARSIM
Location : Arsim
Division : Baragoi

Area : 119 km^2.
Elevation: 780-2400 m.

Main Centre(s) :

Geomorphology : Rugged terrain on eastern slopes of Ndoto Mounts

Geology : Basement system

Vegetation : Dwarf shrubgrassland, forest in higher parts. Area dry in lower parts.

Soils : Sandy soils, rocky hillsides. Slight erosion.

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	700			mm.
Main Season				mm

Main Season: March-May, Oct-Dec

Evaporation: Average Annual 1860 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1. Arsim Spring	n.a	n.a
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: None

QUALITY DATA
Groundwater : No data

Surfacewater: Arsim spring: EC 220 μS/cm, T27°C. In Illaut sublocation.

RESOURCES POTENTIAL
Groundwater : No data

Surfacewater :In the mountains surface water is usually found in small quantities. In the lowlands permanent water sources are not found
Main lagga: Arsim

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : NGORONOT
Location : Arsim
Division : Baragoi

Area : 273 km²
Elevation: 650-2500 m.

Main Centre(s) : Ngoronot

Geomorphology : Rugged terrain on eastern slopes of Ndoto Mounts. Area slopes in eastern and in southern direction to the Milgis River.

Geology : Basement system, covered by colluvial and alluvial sediments in the south.

Vegetation : Shrubs, forest in higher parts. Good conditions (fruits) around centre.

Soils : Sandy soils, with rock hillsides. Local severe gully erosion

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	700			mm.
Main Season				mm.
Main Season:	March-May, Oct-Dec			

Evaporation: Average Annual 1870 mm.

Discharge of Rivers & Springs:	Average Annual (m³/day)	96% Flow (m³/s)
1. Ngoronot spring	n.a	n.a
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m³/h)
Present State

Dams / Pans: None

QUALITY DATA
Groundwater : No data

Surfacewater: Ngoronot spring: EC 169 µS/cm, T26°C data

RESOURCES POTENTIAL
Groundwater : Shallow groundwater table is found in the lagga sediments (e.g at Ngoronot)

Surfacewater :In the mountains surface water is usually found in small quantities. In the lowland permanent water sources are not found.

Main laggas: Saangani, Ngoronot, Milgis

Perennial surface water flow fed by springs.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : NACHOLA
Location : Nachola
Division : Baragoi

Area : 254 km^2.
Elevation : 1100-1500 m.

Main Centre(s) : Nachola

Geomorphology : Plain area with undulating hills. Baragoi lagga along western boundary.

Geology : Basement system.
Phonolite plateau in south-west

Vegetation : Dwarf shrub grassland, but also wooded parts, especially near the laggas.

Soils : Soils are variable (sandy clay loam), very much eroded.

WATER RESOURCES DATA

Rainfall:

	Average	66%	90%	
Annual	450			mm.
Main Season				mm.

Main Season: March-May, Oct-Dec

Evaporation: Average Annual 1970 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: Soito Elkokoyo - Seasonal (Same as Ntipaku - 13000 m^3 (1982))
Lamerok Dam - 18000 m^3 (1983))

QUALITY DATA
Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : No data available

Surfacewater :The dams and pans only contain water during the wet season.
Main laggas: Baragoi, Lamerok.

Baragoi lagga: 17% days with flow, poor potential

Dams often do not fill

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : TERTER
Location : Nachola
Division : Baragoi

Area : 311 km^2
Elevation : 600-1300 m.

Main Centre(s) :

Geomorphology : Hilly, rugged area with rolling topography, sloping towards Suguta Valley.

Geology : Phonolites, Basalts and trachytes

Vegetation : Mainly Deciduous shrub, annual grassland

Soils : Soils are clay loam

WATER RESOURCES DATA

Rainfall:

	Average	66%	90%	
Annual	450			mm.
Main Season				mm.
Main Season:	March-May, Oct-Dec			

Evaporation: Average Annual 2090 mm.

Discharge of Rivers & Springs:

	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: None

QUALITY DATA
Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : No data
Drilling will be problematic, due to bad accessibility for a rig.

Surfacewater :Main lagga: Baragoi, Ayena Aturkan.
Poor potential

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : BARAGOI
Location : Baragoi
Division : Baragoi

Area : 14 km^2.
Elevation: 1200-1300 m.

Main Centre(s) : Baragoi

Geomorphology : Plain area, intersected by west flowing laggas

Geology : Basement system

Vegetation : Shrubs and woodland

Soils :

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	531	474	381	mm.
Main Season				mm.

Main Season: March-May, Oct-Dec

Evaporation: Average Annual 1980 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes:	C3456	C3855	C3869	C4417
Total Depth (m)	97.54	21.60	12.20	66.00
Water Depth (m)	14.02	10.70	10.00	31.30
Yield (m^3/h)	3.55	0.90	1.40	1.7
Present State	Abandoned	Working	Abandoned	Windmill

Dams / Pans: None

QUALITY DATA

Groundwater : C3855: pH 7.6, EC 715 μS/cm, Hardness 229 mg/l, F 1.1 mg/l. Suitable for domestic use
C3869: saline

Surfacewater: No data

RESOURCES POTENTIAL

Groundwater : The yields of the boreholes are generally low. Borehole C3855 is located next to Baragoi lagga and is threatened by bank erosion. Best prospects for new boreholes is in structures near laggas.

Surfacewater :Main lagga: Baragoi,
Flow days 17% - poor potential

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : KALELE
Location : Marti
Division : Baragoi

Area : 359 km^2
Elevation : 400-1600 m.

Main Centre(s) :

Geomorphology : Volcanic plateaus in the east, area slopes west towards Suguta valley. Rugged in the west.

Geology : Basalts and phonolytes, Basement outcropping in area west of Sharda dam.

Vegetation : Deciduous shrub annual grassland

Soils : Soils are sandy and rocky. End stage sheet erosion

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	450			mm.
Main Season				mm.

Main Season: March-May, Oct-Dec

Evaporation: Average Annual 2070 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes:	C1639	C1553
Total Depth (m)	102	135.65
Water Depth (m)	65	59.44
Yield (m^3/h)	4.3	0.68
Present State	Working	In use???

Dams / Pans: Sharda, see s/l Lokorkor

QUALITY DATA

Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL

Groundwater : No data.
Drilling will be problematic in western part of s/l, because of access.

Surfacewater : Has very limited potential. Rainfall is low and evaporation high.
No significant laggas exist.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : LOKORKOR
Location : Marti
Division : Baragoi

Area : 173 km^2.
Elevation: 700-1500 m.

Main Centre(s) :

Geomorphology : Volcanic plateaus in the western part. Rugged in eastern part.

Geology : Basalts and phonolites

Vegetation : Deciduous shrub annual grassland + Dwarf shrub grassland. Area generally very dry.

Soils : Soils are sandy and rocky. Sheet erosion evident

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	550			mm.
Main Season				mm.
Main Season:	March-May, Oct-Dec			

Evaporation: Average Annual 2040 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: Sharda dam - 56000 m^3 (1984)

QUALITY DATA
Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : No data available

There is an abandoned borehole at Sharda, reasons for abandonment are said to be low yield and saline water.

Surfacewater :Main water source is Sharda dam

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : MORU-AKIRING
Location : Marti
Division : Baragoi

Area : 691 km^2.
Elevation: 400-2060 m.

Main Centre(s) :

Geomorphology : Generally rugged with steep slopes in parts, also small volcanic plateaus.

Geology : Trachytes (Kangemonginole plateau), basalts and phonolytes. Basement system in the eastern part.

Vegetation : Deciduous shrub annual grassland. Area generally dry.

Soils : Soils are clay loam and rocky

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	450			mm.
Main Season				mm.
Main Season:	June-August			

Evaporation: Average Annual 1990 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: None

QUALITY DATA
Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : No data

Drilling will be problematic, due to access.

Surfacewater : Low rainfall, High evaporation, No significant lagga. Very limited potential.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : MARTI
Location : El Barta
Division : Baragoi

Area : 301 km^2.
Elevation : 1240-1800 m.

Main Centre(s) : Marti

Geomorphology : Extensive volcanic plateaus in the west, undulating plains in the east

Geology : Phonolites on Marti plateau. Basement system in the east.

Vegetation : Shrubs and woodlands.

Soils : Soils sandy and rocky generally

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	400			mm.
Main Season				mm.

Main Season: March-May, Oct-Dec

Evaporation: Average Annual 1890 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: Sikira Dam

QUALITY DATA
Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : In Basement potential in structures near laggas.

Surfacewater : Low rainfall. A few laggas in the southern part exist - no flow data. In the North there is the Sikira pan. Due to low rainfall and high evaporation, pans and dams may be unreliable in very dry months.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : NGILAI
Location : El Barta
Division : Baragoi

Area : 200 km^2
Elevation : 1260-1440 m.

Main Centre(s) : Ngilai

Geomorphology : Plain area on El Barta plains

Geology : Basement system, largely covered by colluvial sediments.

Vegetation : Mainly dwarf grassland shrub and accacia. Range condition fair.

Soils : Sandy clay soils, shows moderate sheet erosion.

WATER RESOURCES DATA

Rainfall:

	Average	66%	90%	
Annual	450			mm.
Main Season				mm

Main Season: March-May, Oct-Dec

Evaporation: Average Annual 1950 mm.

Discharge of Rivers & Springs:

	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None

Total Depth (m)	
Water Depth (m)	
Yield (m^3/h)	
Present State	

Dams / Pans: Ngilai dam: good condition, 8000 m^3 (1982)

QUALITY DATA

Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL

Groundwater : Potential in structures and near laggas.

Surfacewater :Good opportunities exist for pans and dams along laggas, due to the flatness of the area.

Medium potential, also because of relatively higher rainfall.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : MASIKITA
Location : El Barta
Division : Baragoi

Area : 642 km^2.
Elevation: 900-1500 m.

Main Centre(s) : Masikita

Geomorphology : Rugged terrain, intersected by laggas, are sloping towards Milgis river in the south.

Geology : Basement system

Vegetation : Mainly dwarf grassland shrubs, generally very dry.

Soils : Soils are mainly sandy and rocky. Sheet erosion moderate

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	400			mm.
Main Season				mm.
Main Season:	March-May, Oct-Dec			

Evaporation: Average Annual 2000 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes:	C7919
Total Depth (m)	100
Water Depth (m)	5.45
Yield (m^3/h)	
Present State	Capped

Dams / Pans: Pari Ngiro dam: seasonal, 28000 m^3 (1982)
Soit Nabor dam: seasonal

QUALITY DATA
Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : Shallow groundwater table in lagga sediments (e.g at Masikita). In the Basement area sites for drilling should be in structures and near streams.

Surfacewater :Main laggas: Masikita, Milgis
No permanent surface water sources

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : SEKETET
Location : Poro
Division : Lorroki

Area : 60 km^2
Elevation : 2100-2400 m.

Main Centre(s) : Seketet

Geomorphology : Ridge between deep N-S trending valleys with steep slopes (Nundoto and Nkare Nkare Narok river)

Geology : Phonolites, but small Basement area near Poro

Vegetation : Evergreen bushland and grassland

Soils : Type of soil is clay, clay loam, slight erosion.

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	800			mm.
Main Season				mm.
Main Season:	June-Aug			

Evaporation: Average Annual 1630 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: Poro Dam (ALDEV)

QUALITY DATA
Groundwater : No data

Surfacewater: Water from Poro Dam turns blackish on boiling. This may be caused by floating water plants (polygonum pulchrum), which cover more than half of the reservoir.

RESOURCES POTENTIAL
Groundwater : No data

Surfacewater :Poro Dam: permanent surface water source. The laggas contain water during part of the year only.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : SIAMBU
Location : Poro
Division : Lorroki

Area : 421 km^2.
Elevation : 900-2400 m.

Main Centre(s) : Poro

Geomorphology : Rugged terrain with steep slopes in places.

Geology : Phonolites. Basalts and Trachytes. Some Basement in eastern part.

Vegetation : Deciduous shrub annual grassland - Deciduous shrub grassland

Soils : Clay, clayloam, local moderate erosion.

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	600			mm.
Main Season				mm.

Main Season: March-May, June-Aug

Evaporation: Average Annual 1250 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: Siambu Dam (ALDEV)

QUALITY DATA
Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : No data
Drilling will be problematic due to bad access
Some springs at bottom of escarpment inside the rift valley.

Surfacewater :Poro Dam: Permanent surface water source. (but this dam mainly benefits Seketet sub-location)

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : SIRATA OIROBI
Location : Poro
Division : Lorroki

Area : 48 km^2
Elevation : 1900-2200 m.

Main Centre(s) : Sirata Oirobi, Lemisigiyoi

Geomorphology : Hilly area between two river valleys (Nundoto and Nkare Narok)

Geology : Phonolites

Vegetation : Grassland + Evergreen bushland.

Soils : Clay, clay loan

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	650			mm.
Main Season				mm.
Main Season:	March-May, June-Aug			

Evaporation: Average Annual 1700 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes:	C3833
Total Depth (m)	122.5
Water Depth (m)	12.16
Yield (m^3/h)	2.20
Present State	In use

Dams / Pans: Nundoto Dam (see s/l Lpartuk)

QUALITY DATA

Groundwater : C3833: EC 645 μS/cm

Surfacewater: No data

RESOURCES POTENTIAL

Groundwater : The aquifers in the volcanic rocks are related to old landsurfaces. The depth at which water was struck in C3833 was 38 m.

Surfacewater :The laggas contain water during part of the year only. Has moderate annual rainfall and a relatively lower evaporation. If suitable dam sites exist, dams can be relied on for water supply. However, in prolonged drought, such dams are likely to be unreliable.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : NKEJEMUENY
Location : Poro
Division : Lorroki

Area : 20 km^2.
Elevation : 1800-1900 m.

Main Centre(s) : Sere

Geomorphology : Generally plain area, traversed by small valleys

Geology : Phonolites, partly covered by colluvial deposits

Vegetation : Evergreen shrubland

Soils : Clay, clayloam

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	650			mm.
Main Season				mm.
Main Season:	March-May, June-Aug			

Evaporation: Average Annual 1770 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: None

QUALITY DATA
Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : The aquifers in the volcanic rocks are related to old landsurfaces. Conditions for groundwater are expected to be similar to those at Sirata Oirobi.

Surfacewater :The laggas contain water during part of the year only. Main laggas: Nundoto, Enkeju Muny, Ngare Narok

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : ANGATA NANYUKIE
Location : Angata Nanyukie
Division : Lorroki

Area :185 km^2.
Elevation : 1600-2580 m.

Main Centre(s) : Angata Nanyukie, Nkorika, Morijo

Geomorphology : Rugged terrain, with steep slopes in places. Flat area in eastern part of s/l

Geology : Mainly Basement, some phonolites in the for north.

Vegetation : Evergreen bushland and shrubland. Forest in valleys and higher parts

Soils : Soils variable and stony.

WATER RESOURCES DATA

Rainfall:

	Average	66%	90%	
Annual	550			mm.
Main Season				mm.
Main Season:	Jun-Aug			

Evaporation: Average Annual 1680 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Annual Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: Old dam at Morijo

Ndoldol Dam, Nakabai Dam at Angata Nanyukie

Morijo Pan, 5000 m^3 (1981)

QUALITY DATA
Groundwater : No data

Surfacewater: Morijo spring: pH 6.3, EC 494 µS/cm, T 21°C

RESOURCES POTENTIAL
Groundwater : Shallow groundwater table in lagga sediments. Handpumps at Morijo lagga. Water table reportedly never falls below 8-9 m.
No information on Angata Nanyukie, because it was inaccessible by car.
Generally accessibility is a problem for drilling operations.

Surfacewater :No permanent water source. Stagnant water in pools in Morijo lagga during part of year.
There is no data on the small dams in the area.
High rainfall, therefore good surface water potential.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : LOIBASHAI
Location : Angata Nanyukie
Division : Lorroki

Area :168 km^2.
Elevation :1200-2400 m.

Main Centre(s) :

Geomorphology : Rugged terrain with steep slopes in places. Plain area at western boundary and at eastern part.

Geology : Mainly Basement.
Phonolites on plateau in the northern part

Vegetation : Evergreen shrubland - Decidous bush - grassland.

Soils : Soils variable moderate sheet erosion

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	550			mm.
Main Season				mm.

Main Season: March-May, Oct-Dec

Evaporation: Average Annual 1790 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: None

QUALITY DATA
Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : No data. Accessibility is very difficult

Surfacewater :No permanent water sources. No data available.
Medium potential because of rainfall in southern part.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : BARSALOI
Location : Angata Nanyukie
Division : Lorroki

Area :237 km^2.
Elevation: 1100-2200 m.

Main Centre(s) : Barsaloi

Geomorphology : Hilly area between Suiyia and Barsaloi lagga.

Geology : Basement. Intrusive complex west of Barsaloi centre

Vegetation : Evergreen bushland - Decidous bush grassland.

Soils : Sandy loam soils with severe sheet erosion.

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	500			mm.
Main Season				mm.

Main Season: March-May, Oct-Dec

Evaporation: Average Annual 1840 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1. Barsaloi spring	n.a	n.a
2.		
3.		
4.		
5.		

Boreholes:	C4530	C7918
Total Depth (m)	120.0	40
Water Depth (m)	6.0	9.45
Yield (m^3/h)	11.87	7.2
Present State	Blocked	Capped

Dams / Pans: None

QUALITY DATA

Groundwater : C4530: pH 7.6, EC 450 µS/cm, F 1.3 mg/l, suitable

Surfacewater: Barsaloi lagga: EC <1000 µS/cm
Barsaloi spring: pH 7.3, EC 510 µS/cm, T 28°C

RESOURCES POTENTIAL

Groundwater : Shallow water table in lagga sediments of Barsaloi and Suiyian. Boreholes with good yields were drilled near the Barsaloi lagga.

Surfacewater :Barsaloi lagga at Barsaloi seems to flow during longer periods than other laggas. No exact data at present are available.

Spring near Barsaloi, flow measured February '89: 0.1 l/s

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : OPIROI
Location : Opiroi
Division : Lorroki

Area : 323 km^2.
Elevation : 1100-2200 m.

Main Centre(s) : Opiroi

Geomorphology : Hilly area

Geology : Basement. Area with colluvial sediments in central part

Vegetation : Evergreen forests and Decidous bush grassland

Soils : Sandy loam to variable. Severe sheet + gully erosion

WATER RESOURCES DATA

Rainfall:

	Average	66%	90%	
Annual	650			mm.
Main Season				mm.
Main Season:	March-May, Oct-Dec			

Evaporation: Average Annual 1840 mm.

Discharge of Rivers & Springs:

	Average Annual (m^3/day)	96% Flow (m^3/s)
1. Opiroi spring	n.a	n.a

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: None

QUALITY DATA
Groundwater : No data

Surfacewater: Opiroi spring: pH 7.6, EC 1063 µS/cm, T 25°C

RESOURCES POTENTIAL
Groundwater : Data from survey

Surfacewater :Barsaloi lagga: see Barsaloi s/l

Quality: Medium potential due to EC of spring water.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : MABATI
Location : Opiroi
Division : Lorroki

Area : 129 km²
Elevation: 1100-2200 m.

Main Centre(s) :

Geomorphology : Hilly area, with steep slopes in Karissia Hills. Many small river valleys

Geology : Basement

Vegetation : Decidous bush grasslands, forest in higher parts.

Soils : Sandy clay to clay.

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	550			mm.
Main Season				mm.
Main Season:	March-May, Oct-Dec			

Evaporation: Average Annual 1840 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: None

QUALITY DATA
Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : No data

Surfacewater :No data

Potential similar to Opiroi, because rainfall is the same.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : MBUKOI
Location : Opiroi
Division : Lorroki

Area :119 km^2.
Elevation :1050-2200 m.

Main Centre(s) :

Geomorphology : Hilly area, with steep slopes in Karissia Hills. Many streams intersect area.

Geology : Basement

Vegetation : Mainly Deciduous bush grassland with, forest in higher areas

Soils : Variable. Severe erosion evident.

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	500			mm.
Main Season				mm.
Main Season:	March-May, Oct-Dec			

Evaporation: Average Annual 1850 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: None

QUALITY DATA
Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : No data

Surfacewater : Has some laggas originating from east of Karisia Hills. They are tributaries to the larger Seiyia lagga. Due to high evaporation and severe erosion mentioned above, surface water dams may not hold water for long in dry periods.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : LOOSUK
Location : Loosuk
Division : Lorroki

Area : 133 km^2
Elevation : 1400-2050 m.

Main Centre(s) : Loosuk

Geomorphology : Plain area in the east, sloping down to Suguta valley in the west.

Geology : Phonolites

Vegetation : Bushlands and shrub grassland on flat areas.

Soils : Clay clayloam, moderate sheet erosion.

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	650			mm.
Main Season				mm.

Main Season: March-May, June-Aug

Evaporation: Average Annual 1810 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1. Lesodo springs	n.a	n.a
2. Loosuk springs	n.a	n.a
3.		
4.		
5.		

Boreholes:	C7921
Total Depth (m)	100
Water Depth (m)	-
Yield (m^3/h)	12
Present State	Not in use

Dams / Pans: None

QUALITY DATA
Groundwater : No data

Surfacewater: Lesodo spring: pH 7.1, EC 545 µS/cm, T 20°C
Loosuk spring: pH 7.1, EC 689 µS/cm, T 28°C

RESOURCES POTENTIAL
Groundwater :

Surfacewater :Loosuk Springs near Loosuk centre, very dirty water,
Lesodo springs have good potential for development

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : TINGA
Location : Loosuk
Division : Lorroki

Area : 147 km^2.
Elevation : 1200-2200 m.

Main Centre(s) :

Geomorphology : Rugged terrain with steep slopes

Geology : Phonolites

Vegetation : Decidous shrub annual grassland + Evergreen shrubland.

Soils : Clay clayloam. Moderate sheet erosion

WATER RESOURCES DATA

Rainfall:

	Average	66%	90%	
Annual	650			mm.
Main Season				mm.

Main Season: March-May, June-Aug.

Evaporation: Average Annual 1820 mm.

Discharge of Rivers & Springs:

	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: Loibor Ngare (Location?)

QUALITY DATA
Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : The aquifers in the volcanic rocks are related to old landsurfaces
No data

Surfacewater : Moderate annual rainfall. A few laggas in the central part exist but flow duration unknown.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : MALASO
Location : Loosuk
Division : Lorroki

Area : 205 km²
Elevation : 900-2400 m.

Main Centre(s) : Pura

Geomorphology : Rugged terrain with steep slopes in places

Geology : Mainly phonolites. Some trachytes on Rift Valley slopes

Vegetation : Decidous shrub annual grassland

Soils : Clay clayloam. Sheet erosion moderate

WATER RESOURCES DATA

Rainfall:

	Average	66%	90%	
Annual	650			mm.
Main Season				mm.
Main Season:	March-May, June-August			

Evaporation: Average Annual 1840 mm.

Discharge of Rivers & Springs:

	Average Annual (m³/day)	96% Flow (m³/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m³/h)
Present State

Dams / Pans: Nkapune Dam (ALDEV)

QUALITY DATA
Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : The aquifers in the volcanic rocks are related to old landsurfaces. No data available.

Surfacewater :The laggas contain water during part of the year only.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : LPARTUK
Location : Maralal
Division : Lorroki

Area : 63 km^2.
Elevation : 1840-2350 m.

Main Centre(s) : Nomotio

Geomorphology : Ridge on eastern side of Nundoto river

Geology : Mainly phonolites. Some Basement in eastern and southern part.

Vegetation : Woodlands and grass areas. Forest mainly in steeper parts.

Soils : Clay-clay loam

WATER RESOURCES DATA

Rainfall:

	Average	66%	90%	
Annual	700	544		mm.
Main Season				mm.

Main Season: March-May, June-Aug.

Evaporation: Average Annual 1680 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes:	C1723
Total Depth (m)	121.9
Water Depth (m)	30.2
Yield (m^3/h)	0.5
Present State	Not used

Dams / Pans: Nundoto Dam: 230000 m^3 (1986) Muramar Dam: 68000 m^3 (1984)
Lemisigiyo Dam: 150000 m^3 (silted)

QUALITY DATA
Groundwater : No data

Surfacewater: Nundoto River: pH 7.1, TDS 80, Hardness 31 mg/l, F 0.1 mg/l: Suitable except for organic pollution
Pollution has occured from herbicides

RESOURCES POTENTIAL
Groundwater : Refer to Township s/l for Basement area.

Surfacewater :Nundoto catchment
Estimated average annual discharge from the catchment upstream of the dam is in the range of 400,000 - 600,000 cubic metres.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : LEDERO
Location : Maralal
Division : Lorroki

Area : 66 km^2.
Elevation: 1850-2100 m.

Main Centre(s) : Maralal

Geomorphology : Hilly area on foothills of Kirisia Hills.

Geology : Basement, locally covered by colluvial and alluvial sediments

Vegetation : Woodlands and open grass areas

Soils :

WATER RESOURCES DATA

Rainfall:

	Average	66%	90%	
Annual	750			mm.
Main Season				mm.

Main Season: March-May, June-Aug

Evaporation: Average Annual 1725 mm.

Discharge of Rivers & Springs:

	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes:

	C7908	C3609	C4895
Total Depth (m)	80	71.0	83.0
Water Depth (m)	24	35.4	18.75
Yield (m^3/h)	1.2	6.1	1.5
Present State		In use	Not used

Dams / Pans: Maralal Prison Dam: 48000 m^3 (1981)

QUALITY DATA

Groundwater : C7908: pH 7.0. EC 648 µS/cm, Hardness 38 mg/l, F 0.68 mg/l: suitable

Surfacewater: No data

RESOURCES POTENTIAL

Groundwater : Best sites for drilling is in strucutures. C3609 had a good yield, but presently the yield is reported to be lower. C4895 was not used, because of low yield, due to incorrect borehole completion.

Surfacewater :The area is crossed by small laggas, originating from the Karissia Hills. Some small dams were constructed on these in the past.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : TOWNSHIP
Location : Maralal
Division : Lorroki

Area : 53 km^2.
Elevation : 1900-2350 m.

Main Centre(s) : Maralal

Geomorphology : Hilly area, sloping up in northern direction

Geology : Mainly Basement, with phonolites in the western part. Alluvial sediments along Loikas valley.

Vegetation : Forest in higher areas, woodlands and grass areas in lower parts

Soils :

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	601	544	459	mm.
Main Season				mm.

Main Season: March-May, June-Aug

Evaporation: Average Annual 1790 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1. Loikas spring	n.a	n.a
2.		
3.		
4.		
5.		

Boreholes:	C444	C1505	C5898	C6021	C6022	C6023
Total Depth (m)	121.9	105	24	31.5	25.6	no
Water Depth (m)	28.4	22	4.7	4.4	3	data
Yield (m^3/h)	0.38	0.7	2.5	3.6	7.9	
Present State	Aband.	Aband.	Not used	Not used	Not used	

Dams / Pans: None

QUALITY DATA

Groundwater : No data

Surfacewater: Loikas spring: pH 6.4, EC 431 μS/cm. T 21°C

RESOURCES POTENTIAL

Groundwater : The weathered zone of the Basement can be up to 30 m in the town area, but yields are poor probably due to high clay contents and poor recharge.
Generally boreholes should be drilled in structures near laggas.
The boreholes at Loikas were drilled in coarse sediments. The ones in the eastern tributary have better yields.

Geophysical surveys around the town showed several sites for drilling.

Surfacewater :Loikas springs

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : LOLMOLOK
Location : Sukuta Marmar
Division : Lorroki

Area :214 km^2
Elevation :1400-2000 m.

Main Centre(s) : Lolmolok

Geomorphology : Generally plain area, intersected by streams, sloping down towards Suguta valley in the west.

Geology : Phonolites on the Leroghi Plateau, Basalts on the slopes of the Rift valley

Vegetation : Evergreen shrubland + Bushland + Grassland, wooded on valley slopes.

Soils : Clay, clayloam. Slight sheet erosion

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	600			mm.
Main Season				mm.

Main Season: June-August

Evaporation: Average Annual 1820 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes:	C2847
Total Depth (m)	179.9
Water Depth (m)	70.7
Yield (m^3/h)	2.09
Present State	Not used

Dams / Pans: Lariak Ngiroin waterholes

QUALITY DATA

Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL

Groundwater : The aquifers in the volcanic rocks are related to old landsurfaces. At C2847 depth of water struck was 109.7 m. The yield of the borehole seems low.

Surfacewater : Moderate annual rainfall. Dams may be a possible surface water source. If suitable sites exist.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : AMAIYA
Location : Sukuta Marmar
Division : Lorroki

Area : 100 km^2.
Elevation: 1400-2000 m.

Main Centre(s) : Amaiya

Geomorphology : Hilly area, with steep slopes in parts on eastern side of the rift valley

Geology : Mainly basalts, which are covered by colluvium in the Amayia valley. In the east some phonolites.

Vegetation : Deciduous shrub grassland.

Soils : Fine sandy clay loam. Sheet erosion.

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	650			mm.
Main Season				mm.

Main Season: June-August

Evaporation: Average Annual 1820 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1. Amaiya River (based on October 1987-December 1988 data, which was a wet period)	9,200	0.001

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: Small dam for intake of water supply at Amaiyia.

QUALITY DATA
Groundwater : No data

Surfacewater: Amaiya spring: pH 7.5, TDS 381 mg/l, Hardness 60 mg/l, F 1.6 mg/l: suitable

RESOURCES POTENTIAL
Groundwater : No data

Surfacewater :Amaiya stream is perennial. Minimum observed: 10.8 l/s (Dec '87)

Quality medium potential because of fluoride content

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : LONGEWAN
Location : Sukuta Marmar
Division : Lorroki

Area : 90 km^2
Elevation: 1400-2080 m.

Main Centre(s) : Longewan

Geomorphology : Generally plain area, sloping down in the west

Geology : Phonolites of the Leroghi Plateau

Vegetation : Evergreen shrubland

Soils : Clay-clay loam. Slight sheet erosion

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	650			mm.
Main Season				mm.
Main Season:	June-August			

Evaporation: Average Annual 1810 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes:	C2434
Total Depth (m)	182.9
Water Depth (m)	146.3
Yield (m^3/h)	2.5
Present State	In use

Dams / Pans: Lairarai waterhole-perennial

QUALITY DATA

Groundwater : C2434: pH 7.0, EC 910 μS/cm, Hardness 11 mg/l, F 0.54 mg/l: suitable for domestic use

Surfacewater: Lairarai: pH 7.3, EC 675 μS/cm, T 18°C

RESOURCES POTENTIAL

Groundwater : The aquifers in the volcanics rocks are related to old landsurfaces. At C2434 depth of water struck was 168.9 m. The yield seems low.

Surfacewater :The Lairarai waterhole never dries

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : LOGORATE
Location : Sukuta Marmar
Division : Lorroki

Area : 67 km^2.
Elevation: 1850-2000 m.

Main Centre(s) : Logorate

Geomorphology : Generally plain area

Geology : Phonolites of the Leroghi Plateau

Vegetation : Evergreen shrublands.

Soils : Clay - clay loam. Sheet erosion.

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	550			mm.
Main Season				mm.

Main Season: June-August

Evaporation: Average Annual 1740 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes:	C2972
Total Depth (m)	259
Water Depth (m)	49.3
Yield (m^3/h)	3.18
Present State	Blocked

Dams / Pans: Logorate Dam: 22000 m^3 (1980)

QUALITY DATA
Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : The aquifers in the volcanic rocks are related to old landsurfaces. At C2972 depth of water struck was 173.7 m. The yield is similar to other boreholes in the area.

Surfacewater :Logorate Dam contains water for about 8 months/year

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : SUKUTA MARMAR
Location : Sukuta Marmar
Division : Lorroki

Area : 103 km^2.
Elevation: 1800-1980 m.

Main Centre(s) : Sukuta Marmar

Geomorphology : Generally plain area, steep slopes on edges of volcanic plateaus. Drainage not well developed, swamp (springs) near Sukuta Marmar centre.
Geology : Phonolites, covered by alluvium along Ngare Narok

Vegetation : Evergreen shrubland. Dryland scrub, some trees along streams, grass patch near springs

Soils : Clay - clayloam, slight sheet erosion

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	500			mm.
Main Season				mm.
Main Season:	June-August			

Evaporation: Average Annual 1760 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1. Sukuta Marmar spring	n.a.	n.a

(Remark: total flow cannot be measured, because there is no clear outflow point)

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: Enkare Narok - refer to Nauneri s/l

QUALITY DATA
Groundwater : No data

Surfacewater: Sukuta Marmar spring: pH 7.0, EC 660 µS/cm, T 24.5°C

RESOURCES POTENTIAL
Groundwater :

Surfacewater :Apart from the springs there is no permanent surface water. The Enkare Narok flows during the rain season, after the upstream reservoirs have filled.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : LKILORIT
Location : Kisima
Division : Lorroki

Area :143 km^2.
Elevation :1800-2200 m.

Main Centre(s) : Bauwa

Geomorphology : Hilly area with plains in southern part and steep high hills in eastern part

Geology : Basement, covered by sediments in the southern part.

Vegetation : Deciduous bush grassland + shrubland on plains, woodlands changing to forest in the hills

Soils : Mainly clays

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	800			mm.
Main Season				mm.
Main Season:	March-May, June-August			

Evaporation: Average Annual 1790 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1. Bauwa spring	n.a	n.a
2.		
3.		
4.		
5.		

Boreholes:	C4485	C4316
Total Depth (m)	No	101
Water Depth (m)	record	25
Yield (m^3/h)		-
Present State		Operational

Dams / Pans: Bauwa Dam: 24000 m^3 (1984) Kingong Dam: 18000 m^3 (1986)
Malungoi Dam: 4500 m^3 (1984)

QUALITY DATA
Groundwater : No data

Surfacewater: Bauwa spring: pH 7.7, EC 430 μS/cm, T 16°C

RESOURCES POTENTIAL
Groundwater : C4485 at Bauwa has no record.
No data

Surfacewater :Bauwa springs cease to flow during dry periods. Discharge measurements carried out from 1970 to 1975 show flows between 0 and 3.58 l/s; WRAP measurements during 1988 show flows between 9 and 15.4 l/s.

Potential: medium to good because of rainfall quantity.

Update: 11 February 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : LMISIGIYOI
Location : Kisima
Division : Lorroki

Area : 45 km^2
Elevation : 1750-1800 m.

Main Centre(s) : Lmisigiyoi

Geomorphology : Generally a plain area, crossed by Nkare Narok river and Seiya river.

Geology : Phonolites

Vegetation : Semi-deciduous shrubland

Soils : Variable (clay clayloam - sandy loam)

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	550			mm.
Main Season				mm.
Main Season:	June-August			

Evaporation: Average Annual 1800 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: Lariakorok Dam

QUALITY DATA
Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : No data

Surfacewater :Main laggas: Seiyia, Nkare Narok. No data on flow.
Lariakorok Dam: breached, but still contains little water.
Good potential due to flow from springs at Sukuta Marmar.
Water quality is good (refer to Sukuta Marmar springs).

Update: 11 February 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : NAUNERI
Location : Kisima
Division : Lorroki

Area : 90 km^2.
Elevation : 1780-1860 m.

Main Centre(s) :

Geomorphology : Generally a plain area, crossed by several rivers.

Geology : Mainly phonolites, covered by sediments in the Nundoto valley.

Vegetation : Semi - deciduous shrubland.

Soils : Clay - clay loam. Slight sheet erosion

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	600			mm.
Main Season				mm.
Main Season:	June-August			

Evaporation: Average Annual 1780 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: Enkare Narok dam
Nontoto Dam

QUALITY DATA
Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : No data

Surfacewater :Enkare Narok Dam is partly covered by reeds (cyprus rotendus, mariscus sieberanus) Ways of controlling the reeds should be considered so as to reduce water loss through evapotranspiration.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : MBARINGON
Location : Kisima
Division : Lorroki

Area : 150 km^2.
Elevation : 1750-2200 m.

Main Centre(s) : Kisima

Geomorphology : Plain area, sloping up to the Kirissia hills in the east. Lake Kisima in the west

Geology : Mainly Basement, phonolites on plateau in the south-western part. Sediments in central part of the s/l

Vegetation : Deciduous shrubland + bushland in the plains, forest in the higher parts/

Soils : Variable (clay clayloam - sandy loam)

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	700			mm.
Main Season				mm.
Main Season:	June-August			

Evaporation: Average Annual 1730 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1. Mbaringon spring?		
2. Lake Kisima spring?		

Boreholes:	C1806
Total Depth (m)	76
Water Depth (m)	14
Yield (m^3/h)	0.91
Present State	Not in Use

Dams / Pans: Kiyaingok Dam
Miyai Dam: 40000 m^3 (1980)
Lake Mbaringon
Lake Kisima

QUALITY DATA

Groundwater : None

Surfacewater: Lake Kisima: pH 9.0, EC 860 µS/cm, T 28°C
Kisima spring: pH 8.1, EC 960 µS/cm, F 4.2 mg/l, not suitable

RESOURCES POTENTIAL

Groundwater : The volcanics around lake Kisima are probably fairly thin. Evidence of faulting in the Basement underneath is masked by the lava.
Potential?

Surfacewater :There are several surface water sources which generally hold water during part of the of the year only.

Lake Kisima dries after long dry spells, but wells (springs?) in the middle of the lake are perennial.

Quality: spring has too high fluoride content

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : MORU
Location : Lodokojek
Division : Lorroki

Area : 243 km^2.
Elevation : 1050-2200 m.

Main Centre(s) :

Geomorphology : Hilly area, intersected by many streams

Geology : Basement

Vegetation : Decidous bushland. Evergreen Forest in western higher parts.

Soils : Variable - sand clay loam - clay. Local severe erosion.

WATER RESOURCES DATA

Rainfall:

	Average	66%	90%	
Annual	550			mm.
Main Season				mm.

Main Season: March-May, Oct-Dec

Evaporation: Average Annual 1850 mm.

Discharge of Rivers & Springs:

	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: None

QUALITY DATA
Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : No data

Surfacewater :Main lagga: Seiya river
Due to the low rainfall, high evaporation and severe erosion, surface water dams in the area may not be reliable for water supply in dry periods.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : LODOKOJEK
Location : Lodokojek
Division : Lorroki

Area :153 km^2.
Elevation :1250-2200 m.

Main Centre(s) : Lodo Kojek

Geomorphology : Plains in south-western parts, rugged steep areas in the rest of the s/l.

Geology : Basement mainly. Phonolites on the plateau in the south-west.

Vegetation : Decidous bushland, changing to forest in higher areas. Grasslands on plains.

Soils : Sandy-clay loam. Sheet erosion

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	550			mm.
Main Season				mm.

Main Season: March-May, Oct-Dec

Evaporation: Average Annual 1810 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes:	C1805? (mission)	C7191
Total Depth (m)		60
Water Depth (m)		7
Yield (m^3/h)		1.2
Present State		In use

Dams / Pans: None?
Lake Kalele

QUALITY DATA
Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : No data?

Surfacewater :Lake Kalele: no information
Seiyia lagga: 45% flow days - medium potential

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : NONKEEK
Location : Lodokojek
Division : Lorroki

Area : 110 km^2.
Elevation: 1200-2200 m.

Main Centre(s) : Nonkeek

Geomorphology : Hilly area with steep slopes in the west

Geology : Basement

Vegetation : Decidous bushland, changing to forest in the higher areas.

Soils : Variable

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	500			mm.
Main Season				mm.
Main Season:	March-May, Oct-Dec			

Evaporation: Average Annual 1820 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans:

QUALITY DATA
Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : No data

Surfacewater :Seiyia river crosses the sub-location and there are many small laggas feeding into it. No data on flows

Update: 12 February 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : KIRIMUN
Location : Lodokojek
Division : Lorroki

Area :124 km^2.
Elevation :1100-1750 m.

Main Centre(s) : Kirimun

Geomorphology : Hilly area with steep slopes plain area in south-west. Deep valley of Ewaso Ngiro along southern boundary.

Geology : Mainly Basement, but phonolites on the plateau in the south-west.

Vegetation : Decidous shrubland in hilly area. Grassland on plain, which may be swampy.

Soils : Variable (clay-loam-sandy), Erosion evident

WATER RESOURCES DATA

Rainfall:

	Average	66%	90%	
Annual	450			mm.
Main Season				mm.

Main Season: March-May, Oct-Dec

Evaporation: Average Annual 1920 mm.

Discharge of Rivers & Springs:

	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans:

QUALITY DATA

Groundwater : No data, but for Basement area, refer to Litrimin s/l,

Surfacewater: Kirimun spring: 738 μS/cm, T=25.5°C

RESOURCES POTENTIAL

Groundwater : No data

Surfacewater :Kirimun centre has a permanent spring. According to assistant chief there is a time lag of about 2 weeks between onset of rains and increase in spring discharge.

Update: 11 February 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : SWARI
Location : Ngilai
Division : Wamba

Area : 803 km^2.
Elevation : 800-1700 m.

Main Centre(s) : Swari, Nairimirimo, Raraita

Geomorphology : Generally rugged terrain, with many laggas flowing to the Seiyia or Barsaloi lagga.

Geology : Basement.
Alluvial sediments along laggas

Vegetation : Decidous shrub grassland

Soils : Sandy loam - sandy clayloam. Sheet erosion

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	400			mm.
Main Season				mm.

Main Season: March-May, Oct-Dec

Evaporation: Average Annual 1985 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2		
3.		
4.		
5.		

Boreholes:	C3114	C7916
Total Depth (m)	121.94	130
Water Depth (m)	24.39	70
Yield (m^3/h)	4.07	2.8
Present State	Blocked capped	

Dams / Pans: Nairimirimo Pan?

QUALITY DATA

Groundwater : C7916: pH 7.1, TDS 5184, Hardness 4360 mg/l, F 0.8 mg/l: not suitable (very salty)

Surfacewater: No data

RESOURCES POTENTIAL

Groundwater : Swuari: Two sites for drilling were selected and one near the school was drilled (C7916). The yield of this borehole is reasonable, but the water quality is very poor. The second site seems more promising, but it is difficult to access.
Nairimirimo: One borehole site was selected, at a point where several faults intersect.

Surfacewater :The sub-location is traversed by many laggas. It needs to be investigated, whether suitable sites for sub-surface dams exist.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : NGARE NAROK
Location : Ngilai
Division : Wamba

Area : 911 km^2
Elevation : 640-2200 m.

Main Centre(s) :

Geomorphology : Very rugged terrain at the northern end of the Mathew's Range

Geology : Basement.
Colluvial cover in eastern part of s/l.

Vegetation : Evergreen forests - Decidous Bushland - Shrublands

Soils : Variable (sandy clay - sandy clay loam - sandy loam). Erosion evident.

WATER RESOURCES DATA

Rainfall:

	Average	66%	90%	
Annual	650			mm.
Main Season				mm.

Main Season: March-May, Oct-Dec

Evaporation: Average Annual 1920 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: None

QUALITY DATA
Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : No data

Surfacewater :Main lagga: Milgis
Due to moderate rainfall in the area, dams may be a possible surface water source. Erosion and high evaporation may limit their reliability in dry periods.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : NGILAI
Location : Ngilai
Division : Wamba

Area :1002 km^2.
Elevation:800-2240 m.

Main Centre(s) : Ngilai, Oromodei

Geomorphology : Rugged terrain on western side of Mathews Range

Geology : Basement.

Vegetation : Decidous shrubgrassland - Evergreen forest - Evergreen Bushland

Soils : Sandy and Rocky

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	500			mm.
Main Season				mm.

Main Season: March-May, Oct-Dec

Evaporation: Average Annual 1890 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1. Oromodei spring	n.a	n.a
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: None

QUALITY DATA
Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : Ngilai Centre: A borehole site was selected near the Ngeng lagga, where several faults seem to intersect.

Surfacewater :Main laggas, Ngeng, Seiyia, Enkare Narok

The sub-location is traversed by many laggas. It needs to be investigated, whether suitable sites for sub-surface dams exist.

Oromodei spring is said to be perennial, but the spring was not visited.
Medium surfacewater potential because of rainfall in Matthews range

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : LKISIN
Location : Ngilai
Division : Wamba

Area : 177 km^2
Elevation : 1000-1500 m.

Main Centre(s) : Noolkuniyani, Lkisin

Geomorphology : Rugged terrain, intersected by many north flowing laggas

Geology : Basement, covered by colluvial sediments in the east. Much faulting?

Vegetation : Decidous bush grassland

Soils : Sandy clay loam - sandy loam. Severe erosion evident.

WATER RESOURCES DATA

Rainfall:

	Average	66%	90%	
Annual	500			mm.
Main Season				mm.
Main Season:	March-May, Oct-Dec			

Evaporation: Average Annual 1985 mm.

Discharge of Rivers & Springs:

	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: Lesiteti pan: 4800 m^3 (1985)

QUALITY DATA
Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : Noolkuniyani: The geophysical investigations along the Wamba-Barsaloi road did not reveal any good locations for drilling.

Surfacewater :Main lagga: Ngeng (along northern boundary)
Due to high erosion and evaporation, any surface water dams are liable to high water loss and therefore may be unreliable in dry periods.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : NGOGOLT
Location : Ngilai
Division : Wamba

Area : 468 km^2.
Elevation: 750-2160 m.

Main Centre(s) : Ngogoltin, Kichich

Geomorphology : Area combines mountains of the Mathew's Range and relatively flat areas on either side of the mountains.

Geology : Basement
Colluvial cover in eastern part of the s/l

Vegetation : Bushes, woodlands, and forest.

Soils : Sandy loam - sandy clayloam. Sheet erosion

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	600			mm.
Main Season				mm.

Main Season: March-May, Oct-Dec

Evaporation: Average Annual 1910 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1. Kichich spring	n.a	n.a
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: None

QUALITY DATA
Groundwater : No data

Surfacewater: Kichich spring: EC 65 µS/cm, T 20°C

RESOURCES POTENTIAL
Groundwater :

Surfacewater : Kichich spring: miscellaneous discharge measurements indicate a minimum flow of about 20 l/s. Many springs converging into a stream.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : NKARONI
Location : Lodungokwe
Division : Wamba

Area : 325 km²
Elevation: 1050-1420 m.

Main Centre(s) :

Geomorphology : Relatively flat area

Geology : Basement
Alluvial sediments along laggas

Vegetation : Decidous bush Grassland.

Soils : Generally sandy. Sandy clay - sandy clay loam. Sheet erosion evident.

WATER RESOURCES DATA

Rainfall:

	Average	66%	90%	
Annual	500			mm.
Main Season				mm.

Main Season: March-May, Oct-Dec

Evaporation: Average Annual 1990 mm.

Discharge of Rivers & Springs:

	Average Annual (m³/day)	96% Flow (m³/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m³/h)
Present State

Dams / Pans: Werikoi Dam: Nkaroni Dam:
Leseteti Dam: Noolkuniyani Dam:?

QUALITY DATA
Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : The geophysical investigations along the Wamba-Barsaloi road did not reveal any good locations for drilling.

Surfacewater :The area is suitable for construction of pans: due to the flat land surface.

Annual Rainfall is moderate: 500 mm

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : LPUS
Location : Lodungokwe
Division : Wamba

Area : 130 km^2
Elevation: 1120-1420 m.

Main Centre(s) : Lodungokwe

Geomorphology : Area with flat plains and narrow volcanic plateaus, which rise between 100-200m above the normal elevation.

Geology : Basement
Narrow elongated phonolitic plateaus in west and north of s/l. Along laggas clayey sedimentary deposits are found.

Vegetation : Decidous bush grassland

Soils : Clayey near laggas, otherwise sandy

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	550			mm.
Main Season				mm.

Main Season: March-May, Oct-Dec

Evaporation: Average Annual 1980 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes:	C3832
Total Depth (m)	128
Water Depth (m)	8.4
Yield (m^3/h)	4.05
Present State	In use

Dams / Pans: Lowarak pan: 12000 m^3 (1982)
Lpus Dam

QUALITY DATA
Groundwater : C3832: pH 8.1, EC 1560 μS/cm, Hardness 367 mg/l, F 0.85 mg/l: suitable

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : The borehole at Lodungokwe is located near the Seiyia river and has a reasonable yield. The water is saline, but still suitable for domestic use.
Otherwise no data available on groundwater potential.

Surfacewater :No information on dams available, but the topography and soils in the area indicate favourable conditions for pans and dams.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : LITRIMIN
Location : Lodungokwe
Division : Wamba

Area : 167 km^2.
Elevation: 1100-1600 m.

Main Centre(s) : Lengei

Geomorphology : Undulating area, with steep hills in SW. Several Basement inselbergs

Geology : Basement
Some alluvial sediments in the north. At Lengei depth to bedrock is 30 m

Vegetation : Decidous shrubland

Soils : Generally sandy, but also clayey at places = sandy clay - sandy clay loam
Severe sheet erosion.

WATER RESOURCES DATA

Rainfall:	Average	66%	90%
Annual	450		mm.
Main Season			mm.

Main Season: March-May, Oct-Dec

Evaporation: Average Annual 2130 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes:	C7915
Total Depth (m)	100
Water Depth (m)	39.2
Yield (m^3/h)	1.84
Present State	Capped

Dams / Pans: Ngorok Pan: 22000m^3 (1982)
Lekupe Dam:

QUALITY DATA
Groundwater : C7915: pH 7.1, TDS 1200, Hardness 800 mg/l, F 0.85 mg/l: suitable

Surfacewater: No data (for Ewaso Ngiro refer to Archer's Post)

RESOURCES POTENTIAL
Groundwater : The geology of the area shows many structures, which means relatively favourable conditions for boreholes.

Borehole C7915 was drilled in an anomaly and struck water at 63 m. The yield of the borehole is reasonable.

The salinity of the water from C7915 is high but acceptable.

Surfacewater :Main laggas, Ngorok, Ewaso Ngiro

For Ewaso Ngiro refer to Archer's Post.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : SESIA
Location : Lodungokwe
Division : Wamba

Area : 420 km^2.
Elevation: 960-1400 m.

Main Centre(s) : Barsalinga

Geomorphology : Undulating area, north of the Ewaso Ngiro, crossed by many small laggas. Basement inselbergs are found in the s/l.

Geology : Basement, at some places covered by alluvial sediments. In the north there is a volcanic (phonolites) ridge

Vegetation : Decidous bush Grassland

Soils : Sandy clay - sandy clay loam. Sheet erosion.

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	500			mm.
Main Season				mm.

Main Season: March-May, Oct-Dec

Evaporation: Average Annual 2010 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes:	C7914	C1776
Total Depth (m)	70	107
Water Depth (m)	2.9	46
Yield (m^3/h)	1.1	4
Present State	Capped	Abandoned

Dams / Pans: None

QUALITY DATA
Groundwater : C7914: pH 7.3, TDS 1740, Hardness 778 mg/l, F 2.5 mg/l: not suitable

Surfacewater: No data (for Ewaso Ngiro, refer to Archer's Post s/l)

RESOURCES POTENTIAL
Groundwater : Borehole C7914 at Lengusaka: refer to Lengusaka s/l.
C1776: no record

Surfacewater :Main laggas: Sesia, Nagoruworu, Lengusaka, Ewaso Ngiro.
For Ewaso Ngiro, refer to Archer's Post

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : MATAKWEN
Location : Wamba
Division : Wamba

Area : 306 km^2.
Elevation : 750-2200 m.

Main Centre(s) :

Geomorphology : Mountains of the Mathew's Range in the west. Relatively flat in the east
Geology : Basement, extensively covered by colluvium.

Vegetation : Decidous bushland.

Soils : Variable (clay-clay loam - sandy loam) rock out crops to the east. Sheet erosion evident.

WATER RESOURCES DATA

Rainfall:

	Average	66%	90%	
Annual	600			mm.
Main Season				mm.
Main Season:	March-May, Oct-Dec			

Evaporation: Average Annual 1900 mm.

Discharge of Rivers & Springs:

	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: Mitumi Pan: 15000 m^3 (1981)

QUALITY DATA
Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : No data

Surfacewater : Has moderate annual rainfall. Has many small laggas most of which drain towards the main one which flows north eastwards.
Flow duration in the laggas not known.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : KOITING
Location : Wamba
Division : Wamba

Area :409 km^2.
Elevation : 900-2688 m.

Main Centre(s) :

Geomorphology : Mountaineous area, covering both western and eastern valleys of the Mathews Range.

Geology : Basement, on hill sides covered with colluvium. At Ol Kimaniki pass thick sedimentary deposits.

Vegetation : Decidous shrubland

Soils : Variable (clay-andy loam). Local severe erosion

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	700	553	379	mm.
Main Season				mm.

Main Season: March-May, Oct-Dec

Evaporation: Average Annual 1790 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes:	C7913B
Total Depth (m)	92
Water Depth (m)	dry
Yield (m^3/h)	-
Present State	Abandoned

Dams / Pans: Loidikidiko Dam

QUALITY DATA

Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL

Groundwater : The area near the Ol Kimaniki pass was investigated with geophysics. It showed a thick sedimentary overburden at the pass, which was confirmed by drilling. The depth water is large.

Surfacewater :Main laggas: Lengusaka, Lerata
Rainfall is substantial in the mountains and large floods can be expected in laggas.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : WAMBA
Location : Wamba
Division : Wamba

Area : 45 km^2.
Elevation : 1240-1800 m.

Main Centre(s) : Wamba

Geomorphology : Wamba Town is situated on a relatively high west-east ridge. Between the ridge and the Mathew's range there is a flat south north valley.
Geology : Basement. The area around the town appears to be affected by tectonic activity. The valley structure east of town is filled by thick (200-300 m) sedimentary deposits.

Vegetation : Bushes and woodlands

Soils : Generally sandy

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	714	553	379	mm.
Main Season				mm.

Main Season: March-May, Oct-Dec

Evaporation: Average Annual 1890 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1. Wamba spring		
2.		
3.		
4.		
5.		

Boreholes:	C3808	C3827	C4296	C4297	C4513	C4315	C7910	C7911
Total Depth (m)	61	73.15	129	104	120	94.5	120	80
Water Depth (m)	15.2	14.3	29	23	7.7	21	25.2	27.4
Yield (m^3/h)	1.4	2.4	0.2	1.0	6.8	4.8	0.7	3.2
Present State	Not in use	Not work.	In use	Abandoned	In use	In use	Capped	Capped

Dams / Pans: Dalambo pan: 4000 m^3 (1985)
Wamba Dam: 10000 m^3 (1987)

QUALITY DATA

Groundwater : C4513: pH 7.0, TDS 592, Hardness 339 mg/l, F 0.3 mg/l: suitable
C7911: pH 6.3, TDS 2100, Hardness 1156 mg/l, F 2.0 mg/l: not acceptable

Surfacewater: Wamba spring: pH 6.7, TDS 194, Hardness 86 mg/l, F 0.47mg/l: suitable

RESOURCES POTENTIAL

Groundwater : The most promising area for borehole near Wamba is to the east of the town. Here three main SE-NW tectonic structures were discovered with potential for groundwater abstraction.
Two boreholes drilled in this area however show low yields and poor water qualities.

Surfacewater :Main lagga: Wamba. The lagga flows during wet periods, but it generally dries quickly after the rains stopped. At the game camp it flows 60% of the days
Two small pans provide water for most of the year.
A spring in the Mathews Range is used for water supply of Wamba. It is reported to flow continuously, but flows have not been measured.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : LERATA
Location : Waso
Division : Waso

Area : 319 km^2.
Elevation: 850-1750 m.

Main Centre(s) : Lerata

Geomorphology : Area with plains and with isolated but high mountains

Geology : Basement, in the plains covered with colluvial sediments

Vegetation : Anything from bushes to forest

Soils : Generally sandy, heavily eroded at places

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	650			mm.
Main Season				mm.
Main Season:	March-May, Oct-Dec			

Evaporation: Average Annual 1970 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes:	C3505	C3556	C1519	C1520	C1552	C1533	C3557	C3558	C3560
Total Depth (m)	40.54	42.98	152.4	106	49	118	21	-	44
Water Depth (m)	15.6	14.5							
Yield (m^3/h)	2.27	0.68	0.32						
Present State	In use	In use		Dry	Dry	Dry	Dry		Dry

Dams / Pans: Naisunyai Dam: 60000 m^3 (1981)

QUALITY DATA

Groundwater : BH?: pH 7.8, EC 3510 µS/cm, Hardness 731 mg/l, F 1.4 mg/l, saline

Surfacewater: No data

RESOURCES POTENTIAL

Groundwater : Many boreholes were drilled at Lerata, but only 2 are in use. The yield appears low and waterquality is generally saline.

Surfacewater :Naisunyai Dam normally has water all year around.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : LENGUSAKA
Location : Waso
Division : Waso

Area : 98 km^2.
Elevation: 980-1200 m.

Main Centre(s) : Namanyarobo

Geomorphology : Slightly undulating land surface, with few inselbergs, main drainage Lengusaka river

Geology : Basement, partly covered by colluvium. Thick sedimentary deposits (100 m) exist in places (Namanyarobo Dam)

Vegetation : Decidous shrubland and grassland.

Soils : Sandy clayloam. Erosion evident

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	500			mm.
Main Season				mm.

Main Season: March-May, Oct-Dec

Evaporation: Average Annual 2040 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes:	C7912	C7914 (in Sesia s/l)
Total Depth (m)	100	70
Water Depth (m)	-	2.9
Yield (m^3/h)	dry	1.1
Present State	Aband.	Capped

Dams / Pans: Namanyarobo pan: 4000 m^3 (1985) - silted
Naisunyai Dam: refer to Lerata s/l.

QUALITY DATA

Groundwater : C7914: pH 7.3, TDS 1740, Hardness 778 mg/l, F 2.5 mg/l : not suitable

Surfacewater: No data

RESOURCES POTENTIAL

Groundwater : Sites for drilling should be in structures and near streams. Borehole C7912 drilled near Namanyorobo pan was dry until 100 m.
Borehole C7914 drilled near Lengusaka River, 0.5 km from main road, struck water at 18 m.
Generally yields from boreholes will be small.
Lagga sediments contain water at shallow depths.

Surfacewater :Lagga are normally dry except during and after rainstorms. The Lengusaka river dries long before the Wamba lagga ceases flow at Wamba.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : NGUTUK ONGIRON
Location : Waso
Division : Waso

Area : 239 km^2.
Elevation: 900-1500 m.

Main Centre(s) : Ngutuk Ongiron

Geomorphology : Undulating area, north of the Ewaso Ngiro, crossed by many small laggas. Some Basement inselbergs are located in the northern part. Loijok swamp in the north.

Geology : Basement, in the north covered by colluvium

Vegetation : Decidous bush grassland

Soils : Sandy clay loam, rocky in places; sheet erosion

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	500			mm.
Main Season				mm.

Main Season: March-May, Oct-Dec.

Evaporation: Average Annual 2000 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes:	C3604	C3586
Total Depth (m)	123.9	92.0
Water Depth (m)	36.0	38.4
Yield (m^3/h)	2.5	4.8
Present State	Blocked	Blocked

Dams / Pans: None

QUALITY DATA

Groundwater : No data

Surfacewater: For Ewaso Ngiro, refer to Archer's Post

RESOURCES POTENTIAL

Groundwater : Two boreholes were drilled in Loijok swamp. The depth of water struck was 67.4 and 82 m.
The geology near Ngutuk Ongiron shows NE-SW structures along laggas.

The potential of these for groundwater recovery is not known.

Surfacewater :The Ewaso Ngiro is perennial, but the flow can be very small, especially after long drought periods (e.g as in 1985).

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : REMOTE
Location : Waso
Division : Waso

Area : 76 km^2.
Elevation: 940-1120 m.

Main Centre(s) :

Geomorphology : Generally flat area, with dense drainage pattern in direction of the Ewaso Ngiro

Geology : Basement

Vegetation : Decidous bush grassland

Soils : Sandy clay loam. Severe gully erosion

WATER RESOURCES DATA

Rainfall:

	Average	66%	90%	
Annual	450			mm.
Main Season				mm.

Main Season: March-May, Oct-Dec.

Evaporation: Average Annual 2060 mm.

Discharge of Rivers & Springs:

	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: None

QUALITY DATA
Groundwater : No data

Surfacewater: For Ewaso Ngiro refer to Archer's Post

RESOURCES POTENTIAL
Groundwater : Refer to Lengusaka s/l, as conditions are similar

Surfacewater :The Ewaso Ngiro is perennial, but the flow can be very small, especially after long drought periods (e.g as in 1985)

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : ARCHER'S POST
Location : Waso
Division : Waso

Area : 325 km^2.
Elevation : 800-1300 m.

Main Centre(s) : Archer's Post

Geomorphology : Generally flat area with some isolated hills

Geology : Basement
Basalt is found in the centre of the s/l.

Vegetation : Decidous Shrubs and bushes mainly. Woodlands along the Ewaso Ngiro.

Soils : Sandy Loam - sandy clay loam. Severe sheet and gully erosion.

WATER RESOURCES DATA

Rainfall:

	Average	66%	90%	
Annual	355		170	mm.
Main Season				mm.

Main Season: March-May, Oct-Dec

Evaporation: Average Annual 2490 mm.

Discharge of Rivers & Springs:

	Average Annual (m^3/day)	96% Flow (m^3/s)
1. Ewaso Ngiro	1.8 x 10^6	1.120
2.		
3.		
4.		
5.		

Boreholes:

	C3810
Total Depth (m)	198.45
Water Depth (m)	8.8
Yield (m^3/h)	1.55
Present State	In use

Dams / Pans: None

QUALITY DATA

Groundwater : No data

Surfacewater: 5E3: pH 7.8, TDS 161 mg/l, Hardness 140 mg/l, F 0.28 mg/l: water needs treatment due to presence of sediments and organic matter.

RESOURCES POTENTIAL

Groundwater :

Surfacewater :Ewaso Ngiro; the river discharge fluctuates in relation with the rainfall in the catchment area. Annual low flows have been decreasing in recent years, due to an increase of water use upstream.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : LOSESIA
Location : Waso
Division : Waso

Area : 1463 km^2
Elevation: 650-1590 m.

Main Centre(s) : Losesia, Larisoro, Sera, Kom

Geomorphology : Generally a flat area, crossed by many small laggas

Geology : Basement,
Alluvial sediments along laggas

Vegetation : Decidous bushland and shrubland

Soils : Clay - Sandy clayloam. Moderate sheet erosion.

WATER RESOURCES DATA

Rainfall:

	Average	66%	90%	
Annual	350			mm.
Main Season				mm.
Main Season:	March-May, Oct-Dec			

Evaporation: Average Annual 2030 mm.

Discharge of Rivers & Springs:

	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes: None
Total Depth (m)
Water Depth (m)
Yield (m^3/h)
Present State

Dams / Pans: None

QUALITY DATA
Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : Losesia: Three sites near Losesia lagga were identified suitable for drilling. They represent faultlines or deep weathered zones.

Larisoro: Apparently only thin weathered zones. No sites for drilling selected.

Chapulo: A drilling site was selected near Chapulo lagga, at which the weathered zone has sufficient thickness.

Surfacewater :Main laggas: Larisoro, Kauro, Sera

Investigations need to be carried out to identify sites for subsurface dams.

Ewaso Ngiro: No data on flows beyond Archer's Post

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : DONYO UASIN
Location : Serolipi
Division : Waso

Area :574 km^2.
Elevation :600-900 m.

Main Centre(s) : Lodosoit, Donyo Uasin

Geomorphology : Undulating area

Geology : Basement
Basalt in the north

Vegetation : Deciduous shrubland

Soils : Sandy clay - sandy clay loam. Moderate sheet erosion

WATER RESOURCES DATA

Rainfall:	Average	66%	90%	
Annual	550			mm.
Main Season				mm.
Main Season:	March-May, Oct-Dec			

Evaporation: Average Annual 2160 mm.

Discharge of Rivers & Springs:	Average Annual (m^3/day)	96% Flow (m^3/s)
1.		
2.		
3.		
4.		
5.		

Boreholes:
Total Depth (m)
Water Depth (m) No
Yield (m^3/h) record
Present State

Dams / Pans: None

QUALITY DATA
Groundwater : No data

Surfacewater: No data

RESOURCES POTENTIAL
Groundwater : Abandoned borehole at Donyo Uasin: no data
Only reconnaissance survey carried out: structures indicate some potential

Surfacewater :Main laggas: Merille, Lodosoit.
Low potential due to possible high evaporation losses likely to affect any surface water dams.

Update: 11 Feb. 1991

SUB-LOCATION WATER RESOURCES SUMMARY

Samburu District

Sub-location : SEROLIPI
Location : Serolipi
Division : Waso

Area : 1514 km²
Elevation : 550-900 m.

Main Centre(s) : Serolipi, Merille

Geomorphology : Undulating area

Geology : Basement,
In the north and south of Serolevi Basalt Plateaus: Marti Serteta. Marti Nkangos

Vegetation : Deciduous shrubland

Soils : Generally sandy clay - sandy clay loam. Moderate sheet erosion.

WATER RESOURCES DATA

Rainfall:

	Average	66%	90%	
Annual	350			mm.
Main Season				mm.
Main Season:	March-May, Oct-Dec			

Evaporation: Average Annual 2170 mm.

Discharge of Rivers & Springs:

	Average Annual (m³/day)	96% Flow (m³/s)
1.		
2.		
3.		
4.		
5.		

Boreholes:

	C3575	C3599	C3600	Catholic Mission	C3556	C3565	C3624
Total Depth (m)	13.41	24.08	16.76	n.a	43	16	51.7
Water Depth (m)	6.09	10.60	9.14	n.a	14	3.0	2.1
Yield (m³/h)	3.57	21.82?	6.18	n.a	0.7	18.2	1.82
Present State	In use	Not used	Blocked	Not equipped	Operational	Not used	Blocked

Dams / Pans: Serolevi pan: 16000m³ (1981)

QUALITY DATA

Groundwater : C3599: pH 7.8, EC 20500 μS/cm, Saline water
C3565: pH 8.0, EC 1750 μS/cm, F 0.8 mg/l, Hardness 312 mg/l: Suitable
Boreholes at Merille (C3624) are reported to be saline.

Surfacewater: No data

RESOURCES POTENTIAL

Groundwater : The Serolipi boreholes show good yields, but they have a poor water quality
The Merille boreholes are reported to be saline.

Kauro: No site for drilling was selected. Potential for groundwater best in lagga sediments.

Surfacewater :Main lagga: Kauro
Due to very low rainfall and high evaporation, dams may not be reliable in dry periods.

Update: 11 Feb. 1991

APPENDIX 6

RANGELAND VEGETATION OF SAMBURU DISTRICT

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RANGELAND VEGETATION OF SAMBURU DISTRICT

BY

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This appendix contains parts of the above mentioned report, which was prepared in 1989 on a mission to the water Resources Assessment and Planning Project, Samburu District, Kenya.

APPENDIX 6

TABLE OF CONTENTS

1. INTRODUCTION

2. DESCRIPTION OF RANGE UNITS OF SAMBURU DISTRICT

3. VEGETATION

   3.1 Vegetation Communities
   3.2 Vegetation Changes
   3.3 Forage Quality

      3.3.1 Woody Plants
      3.3.2 Herbs
      3.3.3 Preferred Forage Species

4. RANGE CONDITION

   4.1 Good Range Condition
   4.2 Poor Range Condition
   4.3 Fair Range Condition
   4.4 Very Poor Range Condition

5. RANGELAND USE

   5.1 Traditional
   5.2 Past trends influencing use
   5.3 Move Recent Trends
   5.4 Present Situation

      5.4.1 Central Plateau
      5.4.2 Leroghi Plateau and Mountain Masses
      5.4.3 Eastern Lowlands
      5.4.4 Rift Valley and Escarpment

6. RECOMMENDATIONS

   6.1 Objectives
   6.2 Approach
   6.3 Methods

LIST OF FIGURES

A6.1 Vegetation Types
A6.2 Range Condition
A6.3 Range Units

1. INTRODUCTION

Samburu District occupies the northernmost extension of the Kenya Highlands east of the Rift Valley. The district is topographically varied consisting of an extensive eastern lowland, two plateaus, four distinct mountain masses and the Rift Valley escarpment on the west. Elevation ranges from approximately 600 to 2700 meters. Rainfall varies with elevation and aspect. It is highest, most reliable and effective at higher elevations and on eastern aspects and lowest, least reliable and effective at lower elevations and western aspects. The effectiveness of the rainfall is shown in the physical and compositional nature of the associated vegetation, potential rangeland productivity, degree of nomadism and agricultural potential. With greater effectivity of rainfall the woody vegetation becomes taller, denser and more evergreen; grasses more perennial; vegetation in general more productive; pastoralists less nomadic and agricultural potential greater. Grass fires are more apt to occur on properly stocked rangelands.

The principal economy of the district is a subsistence pastoralism, which ranges from nearly sedentary on highly productive rangelands at higher elevations to semi-nomadic at lower elevations and on less productive rangelands. The poor condition of much of the district's rangelands is a major constraint to range and livestock productivity. This has been brought about by at least two to three decades of overstocking.

Other aspects of the districts economy are tourism, based primarily on the Samburu-Isiolo Game Reserve, and wheat farming on the Leroghi Plateau and Karisia Hills. There is some subsistence farming by both Samburu and Turkana.

Several factors have strongly influenced the physical, compositional and qualitative aspects of the district's rangelands over the past three to four decades. These are:

(a) increases in the human and livestock populations with the former, at least, still continuing;
(b) security problems (shifta raids) in the eastern lowlands since Independence;
(c) grazing schemes imposed by the colonial government in the El Barta and Leroghi areas;
(d) increase in the number and distribution of water points;
(e) ongoing division of parts of the district into group and individual ranches;
(f) leasing of large areas of group and individual ranches out to wheat farmers and
(g) a trend toward sedentarization brought about by the need of manyattas to remain near their childrens' schools.

The principal result in terms of range production has been:

(a) an increase in tree and shrub vegetation and a decrease in grassland vegetation;
(b) a strong deterioration in the condition of rangeland on the central plateau;
(c) a probable slow improvement in condition of rangeland in the east of the district;
(d) an increase in habitat favourable to browsers (camels and goats) and a decrease in that favourable to grazers (cattle and sheep);
(e) a reduction of the area of high potential dry season grazing in the Leroghi-Karisia Hills area (because of the new wheat farms there as well as restrictions on the use by non-owner stock of group and individual ranches) and
(f) a probable overall reduction in range and livestock productivity of the district as a whole.

2. DESCRIPTION OF RANGE UNITS OF SAMBURU DISTRICT

A range unit integrates the relatively complex patterns of vegetation, soil and climatic units (presented in this report as separate maps) into a single land unit useable by the range manager for practical planning, research, monitoring and development activities.

A range unit, which is a level plain, may be very uniform throughout as to vegetation, soils and climate whereas one with considerable topographic differentiation may contain significant variation in one or more of these attributes. However, in both cases, a range unit differs from other range units in one or more characteristics that are likely to significantly influence range planning and development. The range units of Samburu District (Figure A6.3) are presented below together with their differentiating features and some subsequent implications regarding range management, that follow from these features.

The Karisia (1), Ndoto (2), Nyiru (3) and Oldoinyo Lenkiyio (Mathews) (4) Range Units are individual mountain masses with very similar ecological potentials, land uses and range management possibilities and problems. They are presented here as independent range units because they are geographically separated and are likely to come under the jurisdiction of different range managers. The basic characteristics that differentiate this group of range units from other range units are:

- High elevations and rainfall
- Frequently steep slopes and high potential for erosion
- Original and potential vegetation that is primarily evergreen forest and evergreen bushland
- Susceptibility of the vegetation to fire.

Range Management implications:

(a) Principal value is for watershed protection
(b) Also valuable for dry season and drought grazing (most for cattle)
(c) Very important to control impact of fire and grazing because of the potential for soil erosion on steep slopes and the destruction of the original forest which would reduce the watershed value of these range units.
(d) Thus, use by livestock should be kept to a minimum and then only for short periods of time.

The differentiating characteristics of the Rift Escarpment Range Unit (5) are:

- Low rainfall,
- Shrub annual grassland vegetation,
- Low potential rangeland productivity,
- Poor availability of water for livestock and
- Poor accessibility - at least for the rangeland manager.

Management implications are:

(a) Low carrying capacity for livestock
(b) Primarily best for wet season grazing
(c) For mixed stock

(d) Should not be expected to sustain year long grazing but should be used seasonally in tandem with other better watered range units,
(e) Little basis for intensive range development inputs including stock water interventions
(f) Little potentials for conflict with other types of land use
(g) Large managements units

The Marti Range Unit (6)

- Supports a shrub grassland vegetation of
- Moderate potential productivity

Management implications are:

(a) A potentially moderate carrying capacity for livestock
(b) The possibility that controlled burning can be used to reduce the cover of existing shrubs (Acacia reficiens, A. Nilotica and A. Meltitues),

The Leroghi Range Unit (7) is:

- The highest plateau in the district,
- Has the potentially most productive rangelands
- Supports evergreen bushland/shrubland, semi-deciduous shrubland and grassland (most of which is fire-derived).

Management implications are:

(a) Highest potential stocking rates in the district
(b) Range management units (paddocks ranches, administrative units), potentially the smallest in the district because of the high productive potential
(c) Greater chance of supporting livestock/people year round than elsewhere in the district,
(d) Valuable dry season grazing for stock from lower elevations
(e) Higher potential for competition with other land uses (such as agriculture)
(f) Potentially fast recovery of degraded rangeland once managed properly
(g) Fire (controlled burning) a potentially valuable tool (when used with controlled/deferred grazing) in opening up woody vegetation and increasing grass cover
(h) Cattle (and) sheep best stock for this area.

The El Barta Range Unit (8) is:

- Primarily a dwarf shrub grassland
- Of moderate productive potential
- On erodible soils
- Duosperma eromophilum, a dwarf shrub of low palatability, is a major invader following overgrazing.

Management implications are:

(a) A moderate potential carrying capacity (under proper range management)
(b) Probably capable of supporting year round use by livestock when rangeland is properly managed although occasional shifts (at least of cattle) will have to be

made to mountains and rift valley during droughts

(c) A major management objective should be to reduce cover of Duosperma eremophilum

(d) This probably possible using deferred/controlled grazing and burning

(e) This area potentially cattle/sheep habitat

The Upper Milgis Range Unit (9)

- Occupies a rain shadow position immediately west of the Ndoto and Oldoinyo Lenkiyio (Matthews) Ranges
- Has low rainfall
- Supports shrub grassland
- Of low productive potential and
- Has rocky soils.

Management implications are:

(a) Low potential carrying capacity for livestock

(b) Probably best for seasonal (wet season) use

(c) Poor habitat for cattle because of rocky soil

(d) Good goat habitat

The Barsaloi - Barsalinga Range Range Unit (10)

- Supports primarily bush grassland;
- With a moderate potential for rangeland productivity;
- Has soils which are very easily eroded and;
- Is invaded following overgrazing by the tree Acacia tortilis.

Management implications are:

(a) A moderate potential carrying capacity under proper range managements,

(b) Probably capable of supporting year round use by stock when properly managed although stock (or cattle at least) will occasionally have to be shifted to nearby mountains or eastern lowland during drought

(c) A major management objective would be to maintain a favourable balance between tree (acacia tortilis) and grass cover so as to provide for the optimal mixture for grazeland browser stock species (acacia tortilis can be a valuable browse but especially its pods in the dry season)

(d) Controlled grazing is a potentially valuable tool to achieve the above objective,

(e) A second major objective is to guard against soil erosion which is so widespread in this range unit.

The Lower Milgis and Southern Foot Hills Range Units (11 & 12)

- Occupy the eastern and southern footslopes and outlying hills of the Ndoto and Oldoinyo Lenkiyio (Mathews) Ranges,
- Support bushland
- With woodland on valley floors of seasonal streams
- Of low to moderate potential rangeland productivity
- On soils that are highly susceptible to erosion

Management implications are:

(a) Low to moderate potential carrying capacity
(b) Best to use only seasonally because of extreme susceptibility to soil erosion
(c) Valley bottoms potentially good dry season grazing,
(d) Controlled burning possibly locally possible to control woody/herbaceous vegetation
(e) A major management objective would be to reduce the present ongoing accelerated erosion that occurs scattered throughout these range units
(f) This probably only practical through controlled/deferred grazing. These two range units are ecologically similar but are geographically separated and will probably be administered by different range management officers.

The Eastern Lowlands Range Unit (13)

- Is an exclusive lowland plain east of the Oldoinyo Lenkeyio (Matthews) range,
- Has a low rainfall
- Supports shrubland and bush grassland
- The grass layer which has both annual and perennial species
- Has a low potential rangeland productivity and
- Appears to be fairly well watered (although with relatively low yielding water points)

Management implications are:

(a) Low potential carrying capacity
(b) Year round use probably possible under proper management i.e. as long as stocking rates are relatively low, stock move frequently and there is no significant increase in water supplies
(c) However, shifts of stock to other areas because of drought will still be common
(d) Fire probably not a reliable tool for modifying woody plant density because usually too little fuel to burn well
(e) Shrub density may be controllable once resident manyattas can move around the area again as many shrubs will need to be cut for fuel/fencing
(f) Improved security from raiding is essential to increasing the use of this range unit.

3 VEGETATION

3.1 Vegetation Communities

As a result of its topographic and climatic (effective rainfall) diversity, Samburu District supports a wide range of physiognomically and compositionally defined vegetation types (Fig. A6.1). The highest elevations (Karisia Hills, Ndoto and Oldoinyo Lenkiyio/Matthews Ranges and Mount Nyiru) support evergreen forest, evergreen bushland, evergreen shrubland and semi-deciduous shrubland. These communities are both elevationally and often also, successionally related. Decidious bush, shrub and dwarf shrub annual grassland dominate the central plateau, deciduous bushland the eastern footslopes and foot hills of the mountain masses, deciduous shrubland and shrub grassland the eastern lowlands and shrub annual grassland the Rift Valley

escarpment. Evergreen to semi-deciduous bushland/thicket and deciduous woodland occur as riverine strips along the Milgis and Seya Rivers and smaller seasonally flowing streams, such as the Muran, Arsim and Ngurunit, respectively. There are also some small areas of perennial grassland at medium to high elevations, most of which are maintained by grass fires. The grass layer is perennial throughout most of the district although the potential composition of grasses on the eastern lowlands is probably a mixture of perennials-both long and short lived-and annuals and annual grasses dominate the grass layer-where it exists-on the Rift Valley escarpment.

3.2 Vegetation Changes

Roughly 80% of the district has seen changes in the cover and composition of its vegetation over the past 30-40 years. Tree, shrub and dwarf shrub cover has increased whereas grass cover has decreased. Above about 1,000 meters elevation grass species have changed from large, robust, valuable perennial bunch grasses to less valuable and generally smaller, fine leaved and/or short lived perennial grasses; perennial forbs and annual grasses and forbs. This has been brought about by overgrazing. At lower elevations (eastern lowlands) grass cover has decreased because of increased competition from shrubs brought about by reduction in grazing pressure.

3.3 Forage Quality

The quality of forage was estimated on the basis of

(a) palatability to livestock;
(b) livestock forage preferences and
(c) species considered by pastoralists to best maintain the health and productivity of their stock.

3.3.1 Woody Plants

The rangeland plants of the district are divided roughly equally into herbaceous and woody (mostly shrub) species. Most woody species (66%) are palatable to highly palatable; 10% are of low palatability (but will be browsed if necessary) and 24% are unpalatable and will either never be browsed or only under the most extreme circumstances. These are usually species of the genera Aloe, Sansevieria and Euphoria. One species, Capparis tomentosa, is highly poisonous to livestock.

Woody plants are primarily forage for browsers (camels and goats) but are also used to some extent by grazers (sheep and cattle-but mostly cattle). Only 15% of all woody species are palatable to cattle; principally Cordia, Grewia and Indigofera species and primarily in the dry season. Only 3% of all woody species were considered to be palatable to cattle in the wet season. Use by browsers is primarily in the wet season but a large number (84%) of woody plant species also provide forage to browsers (and 26% to grazers) for varying lengths of time into (and sometimes through) the dry season. Most woody species contribute to dry season forage in the form of fallen leaves, 52% of all palatable species were specifically mentioned in this regard by local

informants. Other forms of dry season forage are seed pods and fruit (mostly Acacia, Boswellia and Grewia species) and persistent green leaves and fresh twigs (Acacia and Grewia species and Indigofera spinose and Sericocomopsis hildebrandtii). This is most apt to occur at higher elevations where higher and more effective rainfall allows deciduous species to persist for longer periods of time in leaf. Even bark is sometimes a dry season forage, especially that of Boswellia hilderbrandtii and some of the Commiphora species.

Evergreen plants that are at least of low palatability comprise 16% of all woody species but considerable less cover. These can be browsed throughout the year but are most heavily used in the dry season. Despite their usually low palatability, they also provide an important source of dry season forage for browsers.

3.3.2 Herbs

The herb layer is composed approximately half and half of grass and forb species. Most grass and forb species are palatable year round. They are palatable in roughly equal amounts to both browsers and grazers in the dry season although grasses are relatively more so than forbs. Only two grass species were found to be of low palatability: Pennisetum mezianum and P. schimperi. Forb species are more likely to be palatable only in the wet season and tend to be more so to browsers at that time than to grazers.

3.3.3 Preferred Forage Species

The most highly preferred forage species in the district are: Indigofera spinose, Blepharis linariifolia, Chrysopogon plumulosus, an unknown perennial Eragrostis species, Aristida spp, and Barleria spp. Preferences vary between range units (i.e., different types of habitat). Indigofera spinose, Blepharis linariifolia, Aristida spp. and Barleria spp. are preferred in most range units. Preference for Chrysopogon plumulosus and the perennial Eragrostis is restricted to the El Barta Plains and Leroghi Range Units respectively.

Preference also reflects availability. Thus, Chrysopogon plumulosus is not preferred on the higher elevation grasslands of the Leroghi Plateau because it does not grow there. Different species would probably be preferred on the central plateau (El Barta and Barsaloi-Barsalinga Range Units) if the rangeland was in good, rather than poor, range condition because different species would then be dominant.
Given the existing availability of plant species the few species considered by herders to be best for their livestock in terms of maintaining health and productivity are: Indigofera spinose, Blepharis linariifolia, Brachiaria spp. and Aristida spp.

4. RANGE CONDITION

4.1 Good Range Condition

Good condition rangeland comprises 12% of the district area, primarily along the Rift Valley Escarpment but also to a limited degree on the Leroghi Plateau (Fig. A6.2).

Except for the possibility of locally well watered areas near and/or on the valley floor, most of the escarpment is poorly watered. It is also very dry, of low potential productivity, and poorly accessible. Thus, use by livestock has probably seldom been excessive for prolonged periods of time.

The Leroghi Plateau, however, is potentially highly productive rangeland, easily accessible and, although primarily in fair condition, is fairly heavily grazed. The small area of good condition rangeland found in this area may then reflect deferred grazing practices on some of the group/individual ranches.

4.2 Poor Range Condition

Poor condition rangelands comprise 23% of the total area of the district (Fig. A6.2). Almost all poor condition rangeland is on the central plateau (El Barta, Barsaloi-Barsalinga-Upper Milgis Range Units) (Fig. A6.3). Most of the central plateau is in poor range condition; the result of at least 30-40 years of overgrazing. The district as a whole has probably been overstocked for some time but unevenly. Excessive numbers of livestock have probably been concentrated on the central plateau by shifts of stock first from the Leroghi area to escape the colonial grazing scheme and then from the eastern lowlands to escape shifta raids which began about the time of Independence and possibly now of excess stock from the group/individual ranches on the Leroghi Plateau.

Grass cover has decreased strongly. Grass fires are no longer possible over most o the area because of the lack of dry grass to fuel them. Trees (principally Acacia tortillas), shrubs, such as Acacia senegal, A. mellifera and Cissus sp. have greatly increased in number and cover. Duosperma eremophilum, a dwarf shrub, has invaded and now dominates large areas in the northern half of the central plateau. Small dwarf shrubs and forbs, once hidden within a dense cover of grass, are now obvious to the eye.

The major dominant of the original vegetation, Chrysopogon plumulosus, and its associated sub-dominants Digitaria macroblephara, Chloris rhoxburghiana and Cynodon dactylion, have generally disappeared from the southern half of the plateau and have strongly decreased in the northern half. They have been replaced in the herbaceous layer by smaller, often fine leaved perennials, such as Leptothrium senegalese, Microchloa kunthii, and Sporobolus pellucidus; annuals, such as Aristida and Tetrapogon spp. and forbs, such as Pupalea lapacea and Blepharis linariifolia. Erosion is widespread and there is evidence of continued heavy grazing and browsing pressure.

Relatively small areas of poor range condition also occur centred on the villages of Archers Post, Serolevi and Lerata along the Isiolo-Marsabit road where permanent water and protection from raiding are available.

4.3 Fair Range Condition

This is the most extensive range condition in the district (65% of the total area) (Fig. A6.2). Fair condition rangeland generally shows the effects of use (grazing, browsing,

trampling, shrub cutting) and there may be some erosion, surface sealing, litter reduction and trails. However, this is not to the extent that the ability of the rangeland to support livestock has been seriously impaired.

However, in the case of Samburu District, this does not necessarily mean that the existing usage is proper and should be continued. For instance, overgrazing has brought about an inversion of Croton dichogamous, an unpalatable shrub, on the Leroghi Plateau and Duosperma eremophilum, a dwarf shrub of low palatability, and Heliotropism steudnerii, an unpalatable forb, on the central plateau. This has significantly lowered the quality and forage productivity of these rangelands.

Erosion is common along the eastern footslopes of the Oldoinyo Lenkiyio (Matthews) Range although it is too spotty to be adequately mapped as poor condition rangeland at the prevailing scale of 1:500,000. Instead, the area is shown as fair condition rangeland. Erosion is associated here with seasonal streams (luggas), drainage lines, old manyatta sites and wells. This erosion probably began prior to Independence when the area was used year round by stock and manyattas were resident. Once started, however, it has not been stopped, even by the reduced use the area has seen over the past 20 years or more. This is a good example of why these rangelands should not have been misused in the first place.

Elsewhere within this same area, where the grass layer was apparently heavily degraded prior to Independence, recovery may take many years or may never happen at all unless assisted by range rehabilitation efforts including range reseeding (FA0, 1977). The herb layer of such areas now supports mostly forbs despite over 20 years of reduced grazing intensity, primarily carried out during the dry season.

4.4 Very Poor Range Condition

Those areas classified as in very poor range condition were too few and too scattered to allow the delination of a separate mapping unit for this condition category.

5. RANGELAND USE

5.1 Traditional

Cattle, small stock and camels are important in decreasing order of importance. Camels form a fairly small percentage of the overall number of livestock within the district although their relative importance may presently be increasing in response to the increasing abundance of trees and shrubs.

Samburu herdsmen have traditionally tended to graze all of their stock fairly close to water until forage and/or water are used up. Some or all of the stock were then moved elsewhere to areas where forage and/or water are available. Given the opportunity, this is the present approach as well.

Livestock had to be moved more frequently and over wide areas on the less productive rangelands (lower elevations and rainfalls) than at higher elevations and rainfalls

because forage production was lower, forage dried up sooner and water was usually less available. Stock were less likely to be moved on highly productive rangelands and were usually moved for shorter distances.

5.2 Past Trends Influencing Use

Until about 30-40 years ago much, if not all of the district appears to have supported relatively low to moderate numbers of livestock. Stock water points were probably limited. There was a sufficient amount of grass, therefore, to support frequent grass fires which suppressed the growth of woody plants. Woody plants were further suppressed by cutting of trees and shrubs for fuel and for the construction of frequently moving manyattas and by competition for water and nutrients with a vigorous grass component which was relatively fire tolerant.

Subsequently, the livestock population increased in response to an improvement in stock water supplies and an increase in the human population. Grazing was also intensified over a wider area because of a wider distribution of water points.

Overgrazing was apparently perceived by the colonial government in the Leroghi area in the 1930's. Initial attempts at controlled grazing in this area, begun in 1936, resulted in movements of large numbers of livestock elsewhere in the district, such as onto the El Barta Plains, to escape these controls. These areas were subsequently overgrazed.

Further attempts during the 1950's to carry out controlled grazing within the area of the Leroghi and El Barta Plains caused excess livestock to be shifted elsewhere in the district. This concentrated more stock on smaller areas of land and added to the overgrazing of the rangelands of these latter areas.

Although the controlled grazing schemes were eventually discontinued, further inequalities in livestock distribution have occurred since Independence because security problems caused by shifta raids have forced the withdrawal of resident Samburu herds from most of the district east of the Oldoinyo Lenykiyio (Matthews) Range and-for a time-even from the mountains themselves. These stock are now based on permanent settlements along the Isiolo-Marsabit road, and on the central and Leroghi plateaus. This situation, which still exists, must have significantly added to the overuse of these rangelands. Livestock primarily now use the eastern part of the district during the dry season when the area is most secure from raiding.

5.3 More Recent Trends

An even more recent occurrence is the subdivision of part of the district into group and individual ranches-so far primarily in Leroghi Division-which has the most productive rangelands in the district. In order to improve rangeland productivity, some of these ranches are restricting access by non-owner stock as well as carrying out deferred grazing. Others, however, have leased out large areas to outsiders for wheat farming. Given the large average number of owners per group ranch, the perceived tendency of Samburu to continue to emphasize the keeping of large herds for the sake of status, the apparent tendency for group ranches to carry out some form of grazing control and for others to remove large areas from use by stock for wheat farming, it is probable

that there will be excess stock and that these will be sent elsewhere in the district where controls are not yet in place. Thus, although range condition and productivity may possibly improve within the Leroghi area, it will be worsened even further elsewhere in the district.

There is also a tendency now for elders within the district to select sites for concentrations of permanently placed manyattas so that schools can be built for the children. This strongly influences grazing patterns in that they become more fixed so that certain areas are grazed at the same time each year (those near manyattas first in the wet season and those further away later on in the dry season). There is an even stronger reluctance now to send stock far away in the dry season because the children must be left behind.

5.4 Present Situation

The rangelands over most of the central plateau are highly degraded, in poor condition and producing far below their potential; approximately one fourth of the district (eastern lowlands) is useable only by dry season fora herds due to poor security during the wet season; significant areas of high potential rangeland have been lost to wheat farms in the Leroghi area; the growth of group/individual ranches in the Leroghi area may eventually improve range productivity in this area but is probably causing excess livestock to be sent elsewhere in the district and increased sedentarization of manyattas is reducing interest in moving stock over large distances.

5.4.1 Central Plateau

All stock are grazed near water in the dry season or until water/forage fail. Because there is seldom sufficient grass any more in the dry season, cattle are then moved elsewhere while the other stock often remain behind and subsist on dwarf shrubs, persistent green shrubs and shrub leaf drop. There are several areas where cattle may be sent:

(a) A further distance from water within the same vegetation type (where rangelands are in fairly good condition).
(b) Into nearby hills and mountains. Dry season and drought grazing is officially allowed under permit within gazetted forest reserves but, in theory, not within actual stands of forest.
(c) Rift Valley where dry season grazing is shared with the Pokot and Turkana.
(d) Milgis/Seya River bottoms.
(e) Lower lying areas east of the Ndoto and Oldoinyo Lenkiyio (Matthews) Ranges (eastern lowlands).

5.4.2 Leroghi Plateau and Mountain Masses

Rangelands on the mountains are used mostly during the dry season and during drought although there are some permanent manyattas on most of the mountains. The Leroghi Plateau is useable year round by resident stock and makes valuable dry season grazing for non resident stock. Group/individual ranches are beginning to restrict access by non-owner stock, begin deferred grazing practices and lease land to wheat farmers.

5.4.3 Eastern Lowlands

This area is used mostly by fora herds in the dry season because of the risk of raiding in the area in the wet season. The exception is near permanent settlements which provide greater security.

5.4.4 Rift Valley and Escarpment

The Pokot and Turkana use the escarpment in the wet season (3-4 months). The Samburu use it for 3-4 days while passing on their way through to the valley floor for dry season grazing which they share with the Pokot and Turkana. All three tribes use the valley floor and lower escarpment during the dry season. Water is obtained in the valley.

6. RECOMMENDATIONS

6.1 Objectives

The major recommended objectives of range management in Samburu District are given below in order of their relative importance.

(a) Reduce accelerated erosion presently underway on poor condition rangelands.

(b) Attain a more optimal balance between woody and herbaceous vegetation on rangelands which have been invaded by shrubs.

(c) Improve the cover, vigor and composition of the grass layer.

(d) Conserve/improve the value of mountainous range units for watershed and emergency drought grazing.

6.2 Approach

Over 20% of the district's rangelands are in poor condition and subject to accelerated soil erosion. If this erosion is not soon halted or significantly slowed there is a real danger -especially on shallower and steeper soils- of a irreversible decline in the potential of these rangelands to support a productive livestock system.

Erosion is best slowed by increasing perennial grass cover which is a better soil stabilizer than shrub cover. To do this requires some form of deferred grazing. Simple protection from grazing is probably adequate to bring about vegetative recovery on most of the existing poor condition rangelands although it is not known how long it will take to bring about this recovery. The only evidence to this effect is found on three year old fenced plots of the Ministry of Livestock Wamba Food Security Project which support a grass layer of significantly greater cover and vigour (both perennial and annual) than on unfenced land but which has changed little in actual composition. Annual grasses and forbes still dominate most of these plots. These fenced plots

should continue to be maintained over the long term to provide information on the period of time and compositional patterns involved in secondary succession on degraded rangelands of the district.

Soils, the surface of which have become sealed as a part of the degradational process inhibit the germination, establishment and growth of plant seedlings. Recovery of the vegetation on such soils will be slower than elsewhere. The only alternative to a long period of recovery will be expensive range improvement measures involving soil preparation, seeding, and/or planting.

Protection from grazing probably will eventually cause the return of a grassland community similar to that existing before overgrazing took place, i.e., with the highly palatable Chrysopogon plumulosus a principal dominant throughout the central plateau. However, where erosion has irreversibly changed the nature of the soils, it is probable that a different, and as yet unknown, vegetation community will result from protection from grazing.

A more optimal balance between woody and herbaceous vegetation is needed on much of the district's rangelands. In practice this means a decrease in the cover and density of woody plants and an increase in the cover of grasses (especially perennial grasses), primarily on those areas that have been invaded by woody plants over the past few decades. Thus, for instance, it would be useful to decrease the abundance of the dwarf shrub Duosperma eremophilum in the El Barta Range Unit (8), the tree Acacia tortilis in the Barsaloi-Barsalinga Range Unit (10), the shrub Croton dischogamus in part of the Leroghi Range Unit (7) and shrubs and trees in general in vegetation type 9.3 of the Eastern Lowlands Range Unit (13).. This would be in favour of an increase in the valuable perennial grasses, such as chrysopogon plumulosus (range units 8 and 10), Themeda triandra (range unit 7) and Leptothrium senegalense (v.t. 9.3, r.u. 13), that these rangelands potentially support. A certain amount of Duosperma and Acacia tortilis would be worth retaining because of their value as dry season forage and, in the case of A. tortilis shade and building materials. However, there seems to be little use for the unpalatable shrub Croton dichogamous.

Improvement of grass cover is especially important on the Central and Leroghi Plateaus which have the potential to support vigorous and productive perennial grasslands and the cattle and sheep populations that are dependant on them. Improved perennial grass cover will increase forage and livestock productivity and reduce soil erosion in these areas. Although the grass layer of the rangelands of the Eastern Lowlands Range Unit (13) is potentially a mixture of annual and perennial species, an improvement in the grass/woody plant ratio here would insure continued use by grazers as well as browsers and probably also increase overall livestock productivity.

Improvement of the cover of the grass layer is needed to reduce soil erosion and reduce woody plant cover. Subsequently, improvement of grassland vigour and composition is required to attain optimal range and livestock productivity of grassland communities. To achieve this, the annuals and low quality perennial found on the degraded perennial grasslands of the district need to be replaced with high quality perennial grasses which are then kept vigorous and healthy through proper range management practices.

The mountainous areas of the district combine their highly valuable functions of water shed protection and emergency drought grazing reserves with a particular vulnerability to incorrect usage in the form of uncontrolled burning and grazing. Steep slopes

increase the susceptibility of soils to irreversible degradation through erosion. It is extremely important to minimize the impact of both fires and grazing in these range units.

6.3 Methods

The most important means by which to attain most of the objectives discussed above is through some form of deferred/controlled grazing. This includes an eventual reduction of livestock numbers. Only in this way will it be possible to improve the cover, vigour and composition of the grass layer to the point where soil erosion can be reduced, controlled burning supported and the production of perennial grasses and livestock optimized.

Once an adequate amount of grass has been built up by a deferred grazing program, there will be enough fuel to support controlled burning carried out to reduce the cover and density of shrubs and, on the Leroghi plateau, of the unpalatable perennial grass Pennisetum schimperii. As the original and potential vegetation of most of the district's rangelands is some form of woody vegetation, it will be necessary to include periodic/controlled grazing, of range management programs in those areas capable of supporting perennial grasslands.

On properly stocked rangelands with a vigorous, healthy grass layer, livestock assist in controlling the amount of successful woody regeneration by eating and trampling it. Where such rangelands are also occupied by mobile manyattas, woody growth is controlled even further by cutting for fuel and fencing. This aspect of range management is applicable throughout most of the district but is probably especially so in the drier rangelands, such as in the eastern lowlands, because of their lessened potential for supporting perennial grasses and, subsequently, fire.

Range improvement measures, such as seeding and planting of highly, gully plugging, building of erosion check dams, shrub cutting etc. are feasible only locally where extreme need, availability of labour and funds justify the expense. A good example is the erosion control work at Wamba being carried out by the Wamba Food Security Project. Otherwise, these measures are too expensive, labour intensive and time consuming to be practical.

7. REFERENCES

FAO. 1977. Vegetation and land use survey of Samburu District. Rangeland Surveys, Kenya. UNDP/FAO Technical Report AGP:SF/Ken 11.

APPENDIX 7

LANDFORMS AND SOILS OF SAMBURU DISTRICT

APPENDIX 7

LANDFORMS AND SOILS OF SAMBURU DISTRICT

A site evaluation for rangeland use

by

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This appendix contains part of the above mentioned report, which was prepared in 1989 as volume II, Technical Report, on a soil survey and land evaluation mission to the Water Resources Assessment and Planning Project, Samburu District, Kenya.

APPENDIX 7

TABLE OF CONTENTS

1. INTRODUCTION

2. SUMMARY OF LANDFORMS, ROCKTYPES AND SOILS

3. EVALUATION OF SOIL PROPERTIES RELEVANT TO PRIMARY PRODUCTION AND RANGE MANAGEMENT ASPECTS

   3.1 General
   3.2 Soil Moisture Availability
   3.3 Soil Chemical Fertility
   3.4 Erosion
   3.5 Accessibility
   3.6 Possibilities for Construction of Dams and Waterpans

LIST OF TABLES

A7.1 Ratings of Soil Characteristics, Relevant to Productive Capacity of Rangelands
A7.2 Ratings of Erosion, and Possibilities for Recuperation of the Natural Vegetation Towards Productive Grazing.
A7.3 Map Unit Ratings of Limitations to Accessibility

LIST OF FIGURES

A7.1 *Not in this appendix*
A7.2 Summary of Landforms, Geology and Soils
A7.3 Distribution of Map Unit Ratings of Soil Moisture Availability
A7.4 Distribution of Map Unit Ratings of Soil Chemical Fertility
A7.5 Distribution of Map Unit Ratings of Erosion Status
A7.6 Distribution of Map Unit Ratings of Limitations to Accessibility A: Permanent, Year round constraints
A7.7 Distribution of Map Unit Ratings of Limitations to Accessibility B: Wet Season Constraints

1 INTRODUCTION

For the realisation of a water development plan for Samburu District, Kenya, the Water Resources Assessment and Planning Project (WRAP), requested the Range Management Handbook Project (RMHP) for information regarding the potential of rangeland in that District.

The Range Management Handbook Project is a collaboration project between the Ministry of Livestock Development of Kenya and the German Organisation for Technical Cooperation (GTZ). It aims at the inventory of the potential for extensive rangeland use of the dry Northern and Northeastern regions of Kenya, through studies on climate, landforms, vegetation, soils and hydrological and socio-economic aspects.

It is the purpose to present the results of these inventories per District in the form of 1 : 1 million scale maps and their interpretation. Maps and reports should be easily intelligible to staff of the extension services and planning division of the Ministry of Livestock Development.

The Wind Starting Centre for Integrated Land, Soil and Water Research*) already participated in the inventory of landforms and soils of Marsabit and Wajir District. The present report deals with the landforms and soils of Samburu District, scheduled earlier than originally planned in the Range Management Handbook Project, at the request of the Water Resources Assessment and planning Project (WRAP) of the Ministry of Water Development. As was the case with former district surveys, the present one is based on satellite image interpretation of a 1:500,000 scale map. This is for presentation purpose only. The survey intensity does not justify a publication scale, larger than 1:1,000,000, as is the case with the former surveys. Field checks were directed towards the assessment of range potential rather than towards the execution of a conventional "multi-purpose" soil survey. Hence it is preferred to use the term "Site evaluation for rangeland use" as subtitle for these land inventories.

2. SUMMARY OF LANDFORMS, ROCKTYPES AND SOILS

Samburu District is characterized by strongly contrasting landforms at various altitudes and of very different rock types. As a consequence the variation in climate, soil and vegetation types is also wide. An attempt is made here to give a brief description of the landscape features in a sequence from "high" to "low" and "old" to "young".

Most prominent is the NNW-SSE-stretching range of mountains and hills that dominate the North and Central/Eastern part of the District. It is formed by the Nyiru Range, Ndoto Mountains and Matthews Range. A similar range is formed by the Karisia Hills near Maralal. All consist of Precambrian Basement system rocks (mainly gneisses and granites) (mapping unit 1 : MU). Most of this unit is covered by forests, that are degraded to a greater or lesser extent. Soils vary with altitude and steepness of the terrain. Thick humus rich topsoils over deeply weathered rock are thought to be common at higher altitudes, where the forest has not been removed.

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* Continuing the research of the former Soil Survey Institute (STIBOKA)

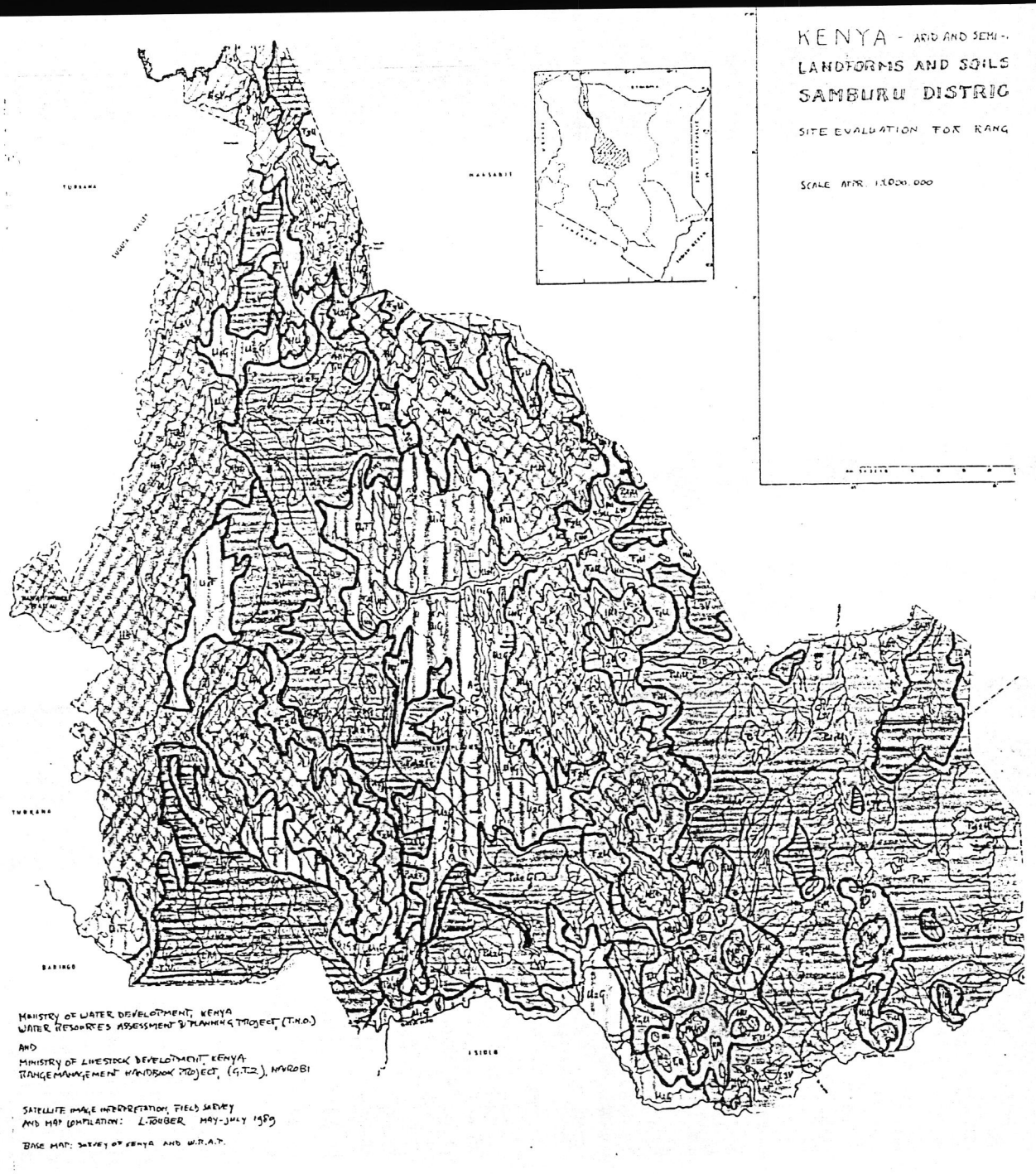

fig. 2 SUMMARY of LANDFORMS, GEOLOGY AND SOILS

- MOUNTAINS AND HILLS; PRECAMBRIAN BASEMENT SYSTEM ROCKS
- FOOTSLOPES
- UPLANDS, DEVELOPED ON BASEMENT SYSTEM ROCKS
- PLAINS, DEVELOPED ON BASEMENT SYSTEM ROCKS
- RIFT VALLEY ESCARPMENT; PLEISTOCENE VOLCANIC ROCKS
- PLATEAUS; PLEISTOCENE VOLCANIC ROCKS.

Fig. A7.2 Summary of Landforms, Geology and Soils

The Mountains and Hills are surrounded by long, straight, sedimentary footslopes (mapping units 10-12 : FU). These have deep, well drained sandy loam soils in the upslope parts, merging towards sandy clay textures downslope. Footslopes are subject to widespread gully erosion, often of dramatic dimensions. This is due to the pastoralists preference to establish manyatta's at the upslope side of footslopes.

Apart from the Mountains, Hills and Footslopes, the main topography consists of lesser to stronger undulating Plains and Uplands (also developed on Basement System rocks), that gradually rise from 700 m (2200 ft) in the East to 1300 m (4500 ft) in the Northwest and 2500 m (8000 ft) in the Southwest, when reaching the upper edge of the Rift Valley escarpment.

The Uplands (mapping units 13-15: U1G-U2G) are formed by a network of deeply incised valleys of tributaries to the Seya, Milgis and Ewaso Ngiro rivers. The resulting topography of short, moderate to steep slopes is under attack of sheet erosion, so that shallow, gravelly and stony soils prevail.

The less dissected Peneplains (mapping units 17-23: Pn and Pd) bear deeper, sandy clay loam soils, which in some areas are also heavily degraded by sheet erosion.

The whole western edge of Samburu District is marked by the spectacular Rift Valley escarpment. It stretches from north of Tum, near Lake Turkana to West of Suguta Marmar. It is built up of pleistocene volcanic Plateaus that have been broken and tilted ("step-faulted") by the movements of the earth's crust during the Rift Valley formation. It concerns a 20-30 km wide strip of stepfaulted hills and plateaus, volcanic footbridges and uplands (mapping units 3, 4, 9 and 16: HsV, RV, LsV and UV). These landforms are generally marked by flat and sloping plateau tops and precipitous scarps and gorges. Inaccessibility is a major constraint to the use of this land. Soils are mostly very rocky and stony in the steeper parts, while gravelly clays are common on the flat-topped plateau remnants.

Volcanic Plateaus (LV) are also common, along the Rift Valley, as well as in the East of the District. They are almost flat to very gently undulating surfaces, their edges being marked by a rocky and bouldery minor escarpment. Three types have been identified, separated largely on the basis of the altitude at which they occur (mapping units 5-8: LV). At the highest levels (the Leroghi plateau) imperfectly drained shallow clay loams with ironstone gravel are characteristic; at the lowest levels (under much drier climatic conditions) stony and bouldery clay soils prevail.

3. EVALUATION OF SOIL PROPERTIES RELEVANT TO PRIMARY PRODUCTION AND RANGE MANAGEMENT ASPECTS

3.1 General

Methods of data gathering and interpretation is contained in volume I of the Range Management Handbook (Touber, 1988). The system followed is based on the Framework for Land Evaluation (FAO, 1976). This Framework was, among others, discussed by Zonneveld (1984) as to its applicability for extensive grazing.

Within a given climatic zone the availability of soil moisture and of nutrients are the land qualities that have a prevailing influence to the primary production of rangelands. Land

qualities that are related to aspects of management, are erosion hazard, accessibility for livestock and possibilities for the construction of pans and dams.

In reality more parameters are of influence of course, but data on these were not obtainable in the context of the present site evaluation, or are judged of less importance in Samburu District. The landqualities are rated in the following sections, in order to establish a comparison among the various mapping units identified. The figures given do not pretend to have any absolute value or quantitative connotation.

3.2 Soil Moisture Availability

Soil moisture availability depends on the course of the rainfall/evaporation ratio through the seasons; the infiltration capacity of the surface soil; the water holding capacity of the soil material and the depth of the rooting zone.

Infiltration capacity depends on the porosity of the surface soil, which in turn is influenced by such parameters as vegetation cover, soil texture, soil structure and organic matter content. Important is that the surface soil is not "sealed". This is the case on "overutilized" soils, where due to too frequent grazing and trampling the vegetation cover, the organic matter content and hence structure stability and porosity have diminished. A low infiltration capacity causes (part of) the rainwater to run off along the surface. This water will not become available to the vegetation on the soil where the rain falls.

Water holding capacity is estimated according to its connection with the soil texture. The depth of the rooting zone may be limited by shallow rocks or an abrupt change in texture or a change in chemical composition, such as a strong increase with depth in salinity or sodicity.

Table A7.1 gives a comparison among the mapping units concerning effective soil depth, available water capacity and eventual runoff losses. A combination of these is given as "final rating", of soil moisture availability in a separate column. These ratings are expressed on the map of figure A7.3.

Constraints to the productivity of standing crop in grazing land due to limited soil moisture availability are found on shallow stony soils.

These concern mostly the Hills (mapping unit 2: HU) and steep components of the Rift Valley escarpment (mapping unit 3: HsV). Also the Uplands (mapping units 13-16: U1G, U1F, U2G and UV) score low, mainly due to shallowness of the soil.

Dissected Plains (most of the Pd-units) are rated low as well, mainly due to low infiltration capacity, causing run-off losses.

A good performance is expected on the Plains in the Southeast, the Leroghi plateau, the El Barta Plains, and the Footslopes, as far as these are not affected by erosion (mapping units 5: L1V1; 10 and 11: FU; 20: Pd2F2; 22: PnF and 23; PnU).

3.3 Soil Chemical Fertility

In addition to rainfall and water holding capacity, the productivity of soils depends on their chemical richness.

Table A7.1 Ratings of Soil Characteristics, Relevant to Productive Capacity of Rangelands

Unit No.	Mapping Unit	Effective Soil Depth 1: v. deep 5: v. shallow	Available Water Capacity 1: v. high 5: v. low	Run-off losses 1: negligible 5: v. high	Final Rating Soil Moisture Availability 1: high 5: low	Rating Relative Chemical Fertility 1: v. high 5: v. low
1	MU	1-5	2-4	1-3	2-4	2-1
2	HU	3-5	3-5	3-5	4-5	2-3
3	HsV	5	2	3	4	2
4	RV	3-5	2-4	2-4	2-5	3
5	L1V1	4	2-1	1	2	2
6	L1V2	3	2	3	3	3
7	L2V	3	2	2	3	2
8	L3V	4	3	2	3	3
9	LsV	4(3)	2	2	3	3
10	F1U	1	3	2/5	2/4	2/4
11	F2U	1/4	2	2/4	1/4	1/3
12	F3U	2	2	4-5	4	2
13	U1G	5	3	4	5	4
14	U1F	5	1	3	4	1
15	U2G	4	3	5	5	4
16	UV	5	2	3	3-4	2-3
17	Pd1U	3	4	4	4	3
18	Pd2G	2-3	3	4-5	4	4-5
19	Pd2F1	2	2	4-5	4	4-3
20	Pd2F2	3	2	2	2	2-1
21	Pd2F3	4	2-3	2	3	2-1
22	PnF	2	2	2	2	4
23	PnU	1	3	1	1	4
24	A	1	4	1	2	1
25	B	2	3-5	1	2(-1)	2
26	CX	2	3	4	3	3

Note: Soil moisture availability = Climate (rainfall, evaporation), infiltration + waterholding capacity

Water holding capacity = Effective soil depth + available water capacity

Available water capacity = Property of soil material (pF2-pF4.2), mainly texture, organic matter and porosity/structure

Note:

1. If the rating for effective soil depth and run-off losses both score unfavourable, i.e 4 or 5, the final rating is downgraded. Loss of rainwater due to run-off has been given most weight in the final rating; AWC least.

2. Soil moisture availability according to soil properties only. Climate is not taken into account.

The mapping units have been rated according to the content of "dark minerals" (ferromagnesian minerals) of the rock type on which the soils have developed, as well as to the amount of "primary weatherable minerals" observed in the soil profile**).

The latter parameter depends on the "age" of the soil mantle, i.e on how intensive or for how long minerals have been weathered and leached out of the soil.

** Laboratory analyses of top soil fertility samples were not yet available at the time of report writing.

Table A7.1 last column, lists the ratings of chemical fertility. They are expressed on the map of figure A7.4. Generally speaking, the more shallow soils in "younger" relief rich landforms have a higher amount of weatherable primary minerals. These concern the Mountains, Hills and Footslopes. High ratings have been assigned to the Uplands and dissected Peneplains developed on gneisses, rich in ferromagnesian minerals (mapping units 14: U1F; 20 and 21: Pd2F2 and Pd2F3) and in general also to mapping units in volcanic areas. Lower ratings have been given to units developed on granitoid gneisses (mapping units 13, 15 and 18: U1G, U2G and Pd2G) and the "old" landforms (mapping units 22 and 23: PnF and PnU).

Chemical toxicities are not expected to play a significant role. Deeply weathered, strongly leached tropical soils may have problems of aluminium toxicity. If this is at all present in Samburu District, it might be encountered in unit 22: PnF. This is an agricultural problem rather than one in rangeland, however.

Salinity and sodicity is found in river valleys and bottomlands (units 24 and 25: A and B), but only at greater soil depths.

3.4 Erosion

Erosion is a widespread and very prominent feature in Samburu District. Therefore it is preferable to report on the statues of accelerated soil erosion as presently found in the field, rather than giving the more theoretical prognosis of "erosion hazard" in case of (future) overutilization of the rangeland.

Table A7.2 summarizes the map unit ratings of erosion status. The erosion observed is proof of an alarming degradation of the rangelands of rather large parts of the district.

The table includes an estimation of the possibilities for recuperation. The ratings of these possibilities are largely based on the factors of infiltration capacity (or degree of sealing of the surface soil) and soil fertility, assuming a proper management and sufficient rainfall (i.e. no "failing" rainy seasons). These ratings could be considered indicating an amount of time needed for the land to recuperate (e.g. 1: two or three seasons; 4: eight to ten years).

Mountains and Hills have been left without rating, partly due to lack of data, partly due to the difficulty to discern man-induced accelerated erosion from natural geomorphological processes. It is from large distances observable, however, that the original cover of forest vegetation has strongly diminished. One may hold this partly responsible of the dramatic gully erosion that takes place on the surrounding footslopes, especially mapping unit 11: F2U.

Footslopes are badly affected by both sheet erosion and locally serious gully development. This is in part due to the relative high density of manyatta's. The gully development is concentrated locally, but very common on the footslopes of the large mountain ranges. It is much less severely present on footslopes around the more individual hills towards the Southeast and Northeast.

The Uplands (mapping units 13-15: U1G-U2G) have mostly developed around the valley incisions of Ewaso Ngiro, Seya and Milgis rivers and their tributaries. This

Table A7.2 Ratings of Erosion, and Possibilities for Recuperation of the Natural Vegetation Towards Productive Grazing.

Unit No.	Mapping Unit	Status of Erosion 1: none; 5: extreme			Possibilities for Recuperation 1: good; 5: none	Final Rating Present Degradation 1: none, slight; 5: severe
		Sheet	Rill	Gully		
1	MU	-	-	-	-	-
2	HU	-	-	-	-	-
3	HsV	-	-	-	-	-
4	RV	-	-	-	-	-
5	L1V1	1	1	1	1	1
6	L1V2	2	2	1	1	2
7	L2V	2	1	1	1	1
8	L3V	2	1	1	1	2
9	LsV	2	1	(5)	1	2
10	F1U	1/4	3/5	5/1	3/5	5/3
11	F2U	1	1/3	1/5	1/3	3/5
12	F3U	4	3	1	4	3
13	U1G	5*	1	1	3	4
14	U1F	4*	1	1	3	4-3
15	U2G	5*	3	1	3	5
16	UV	4*	1	1	1	3
17	Pd1U	3	3	1	3	3
18	Pd2G	5	3	1	4	4
19	Pd2F1	5	4	2	3	5
20	Pd2F2	3	2	1	1	2
21	Pd2F3	4	1	1	2	3
22	PnF	2-3	1	1	2	1-2
23	PnU	2	1	1	1	1
24	A	2	1	1	3	1
25	B	1	1	(5)	(5)	1/(5)
26	CX	5	3	(5)	4	4

topography is favourable to rainwater run-off. Soils show a concentrated gravelly surface layer over weathered rock. This points to an "end" stage in sheet erosion where a protective, erosion resistant surface layer has developed. The present strong deepening of water courses is accompanied by gully development in upstream direction, attacking the surrounding units.

The Plains (mapping units 17-19: Pd) in the central parts of the district, between Wamba and Barsaloi, bear soils that are heavily degraded by severe sheet erosion, which locally has developed into rills and gullies. Remnants of vegetation (e.g. stands of sansevieria) are found on pedestals of 20-30 cm high above the surrounding, strongly sealed, bare soil. Downslope the rills deepen into gullies towards the valleys of the adjoining uplands. These gullies are in the process of developing backwards, gaining terrain in the higher ground of the Plains.

The plains in the Southeast, between Archers post and Kom (mapping unit 22: PnF) and the El Barta Plains near Baragoi (mapping unit 20: Pd2F2) are relatively unaffected by accelerated erosion.

The mapping units of the Rift Valley escarpment (mapping units 3 and 4: HsV and RV) have not been rated as to their present status of erosion. From the very few amount of observations it should be concluded that most of the steep components (the numerous escarpments, faultlines and gorges) have a thin, extremely gravelly and bouldery type of soil, from which there is little to be eroded. Whatever soil mantle is present, is, however, very vulnerable to degradation.

Volcanic Plateaus are generally unaffected by sheet or gully erosion, due to their flat topography. Wind erosion could play an increasing role towards the drier areas. The

surroundings of Marti, with a relatively high population pressure, seem affected by this type of erosion, exposing an increasing concentration of stones and gravel at the surface.

Figure A7.5 gives the distribution of the ratings contained in Table A7.2.

3.5 Accessibility

Limitations in accessibility are determined by steepness of terrain forms and surface ruggedness, due to gullies and/or stones and boulders. Such conditions restrict livestock movements, limiting the daily "action radius" of herds and thus the actually available rangeland.

Apart from such permanent, year round restrictions additional limitations to accessibility are posed during the wet season by flooding/ponding of areas and/or stickiness/muddiness of the surface in certain areas. Results for Samburu District are summarized in Table A7.3. The first two columns give subratings for steepness and terrain ruggedness. The final ratings express a combination of these, and are specified according to animal type.

Table A7.3 Map Unit Ratings of Limitations to Accessibility

Unit No.	Mapping Unit	Subrating Constraints due to Slope, Topography 1: none,slight 3: severe	Subrating Constraints due to Surface Rocks Stoniness etc. 1: none, slight; 3: severe	Final Rating Permanent, year round Constraints: 1: none, slight 5: severe			Additional wet season Constraints -: none 5: severe*)
				Sheep Goats	Camel	Cattle	
1	MU	3	2	3	4	5	-
2	HU	3	3	3	4	5	-
3	HsV	3	3	3	4	5	-
4	RV	3	2	4	5	5	-
5	L1V1	1	1	1	1	1	2
6	L1V2	1	1	1	1	1	-
7	L2V	1	1	1	1	1	2(5)
8	L3V	1	1	1	1	1	5
9	LsV	3	3	2	3	5	5
10	F1U	1/2	1	1	1/3	1/5	-
11	F2U	1	1	1	1	1/3	-
12	F3U	1	1	1	1	1	-
13	U1G	3	2	2	3	5	-
14	U1F	2	2	1	2	4	-
15	U2G	2	2	1	2	4	-
16	UV	2	1	1	1	2	-
17	Pd1U	2	1	1	1	2	-
18	Pd2G	1	1	1	1	1	-
19	Pd2F1	1-2	1	1	1	2	-
20	Pd2F2	1	1	1	1	1	-
21	Pd2F3	1-2	1	1	1	1	-
22	PnF	1	1	1	1	1	(3)
23	PnU	1	1	1	1	1	-
24	A	1	1	1	1	1	(2)
25	B	1	1	1	1	1	5
26	CX	1	1	1	1	1	-

* Figures between brackets reflect conditions expected in years of "above average" rainfall.

Obviously the areas of high relief energy such as mountains, hills and the rift valley escarpment, pose strong restrictions.

To a lesser extent also the uplands are of a limited accessibility. Figure A7.6 gives these ratings in map form, expressing accessibility for cattle in dry season conditions.

Ratings for additional wet season constraints are contained in the last column of Table A7.3. Only some units with relative flat topography and heavy clay soils are expected to be inaccessible during the rains. These concern mainly the volcanic plateaus (mapping units 8 and 9: L3V and LsV) and bottomlands (mapping unit 25:B). See Figure A7.7.

3.6 Possibilities for the Constructions of Dams and Waterpans

Landforms and soils are compared in respect of the opportunity for the collection of surface water in pans and dams. Such possibilities are largely contained in the landcharacteristics slope length and steepness, the density of the drainage network and permeability of the subsoil. Factors as rainfall, evaporation, availability of construction material and the abilities of the local people to maintain these constructions, are not considered here.

Samburu District has only few areas where conditions are unsuitable for surface water collection. Only the volcanic plateaus are judged unfavourable, due to their generally flat topography, in combination with the swell-shrink properties of their clay soils. Further, the rugged terrain of the rift valley escarpment, where valleys are too ravine-like to be accessible at all, is possibly less suited. Within the uplands and plains, however, (mapping units 13-23), it seems possible at any given point to construct a dam or pan within a distance of ± 20 km.

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APPENDIX 8

LIVESTOCK WATER DEMAND AND PROPOSED SUPPLY DEVELOPMENT

SAMBURU DISTRICT

APPENDIX 8

LIVESTOCK WATER DEMAND AND PROPOSED SUPPLY DEVELOPMENT

SAMBURU DISTRICT

1. Introduction

2. Actual Livestock Numbers

3. Potential Livestock Numbers

4. Calculation of Livestock Water Demand

5. Livestock Water Supply Development

8.1 Summary of Range Unit Properties

8.2 Livestock Numbers per Sub-location, Samburu District, 1988

8.3 Stocking Rates

APPENDIX 8: LIVESTOCK WATER DEMAND AND PROPOSED SUPPLY DEVELOPMENT - SAMBURU DISTRICT

1. INTRODUCTION

To carry out planning of water supply development for livestock it is important to understand the specific character of livestock water demand in a pastoralist ASAL district like Samburu. Especially the balance between livestock numbers and range potential (grazing and water) is very important to maintain. Therefore the planning of water supply cannot be separated from other aspects like grazing and livestock movement, and thus should not be done from the viewpoint of water availability and water demand alone.

The development of ASAL districts should be achieved through an integrated approach in which all sectors should play a role: water, livestock, agriculture, tourism, wildlife, etc. In this study for the District Water Development Plan of Samburu District the livestock water supply development was analysed in close cooperation with the Ministry of Livestock Development, Rangemanagement Handbook Project. Studies of soils, vegetation, climate and water resources were done by WRAP under the methodology developed for the Rangemanagement Handbook Project and these studies are used here to determine the possible livestock water supply development.

A proposal for the livestock water supply development is contained in the investment packages in Part 3. This proposal should be considered as a guideline. A guideline which indicates the number of livestock supplies needed and their associated costs.

It is considered that subsequent more detailed proposals, feasibility studies and implementation activities cannot be done by the MoWD alone. It is the MoLD which should carry the responsibility for the actual planning of water supply for livestock. This might be contained in a District Livestock Development Plan, which could be more specific on the location of livestock supplies, the operation and maintenance, etc. The Rangemanagement Handbook may be considered as a first step to the preparation of such a Plan.

2. ACTUAL LIVESTOCK NUMBERS

Estimates of the livestock population in the district are available from two sources (Table 5.3):

1. From census carried out annually by the Ministry of Livestock Development (MoLD) in the district.
2. From the "Livestock and Wildlife Data Summary 1987-1988 for Kenya Rangelands" published by DRSRS (1989).

The 1987-1988 data summary provides livestock (and wildlife) numbers from an aerial count carried out from 18 October - 22 November 1987. It is the most complete and most accurate count available, but the information applies only to one month in one particular year. The count was done at the beginning of the second (short) rain season, thus the count probably reflects the situation where the herds are returning from dry season grazing areas.
The annual census data are published in the District Development Plans and in the Annual Reports of the Department of Livestock Production and Range Management in Samburu District.

The number of livestock in the district is counted annually during vaccination campaigns. The estimate of the district livestock population is based on this count, but it's accuracy is unclear, because it is not known what percentage of animals are brought to be vaccinated.

In fact there is a very big conflict between data obtained from the livestock personnel and that obtained in the field from chiefs and their assistants. Baragoi Division illustrates this point as shown by the case study below.

Baragoi Division - Case Study

During a survey carried out by WRAP in October 1988 in Baragoi Division, the figures obtained from the chiefs and their assistants gave a total figure for the division which was far much higher than the estimate used by the MoLD. In the survey no actual physical counting was carried out. The estimate for the livestock was based on the number of manyattas per sub-location and the average number of livestock per manyatta. Officers from the Ministry of Livestock Development believe the figures given by the chief's

and their assistants were grossly exaggerated. Perhaps their intention was that by inflating the figures, water would be made readily available for them.

Method of Obtaining the Livestock Data

Discussions were held with the various divisional livestock officers and the district livestock production officer and it was generally agreed that the figures obtained from the vaccination campaign could be adopted after suitable corrections had been made. (The counts from DRSRS were not yet available at that time). For instance for Wamba Division, appropriate correction factors for the large stock and the small stock were taken as 25% and 10% respectively. When the figures obtained from the vaccination campaigns are increased by the above factors, the final figure reflects what the situation is like in the division.

The livestock population in Baragoi Division was estimated according the counts made by the MoLD. The final 1988 figures adopted for the three divisions differ slightly with the figures presented in the 1988 Annual Report of the MoLD. But this will have no significant effect on the water demand calculation.

The count from DRSRS confirms the MoLD estimate of the total number of livestock in the District, but shows a different distribution between the Divisions. This may be due to the movement of the animals through the district, but may also reflect the inaccuracy of the MoLD estimates, because also some difference exist for the small stock, which is generally considered not to move.

The livestock population per sub-location was estimated both from the MoLD estimate and from the DRSRS count:

1. The subdivision per sub-location of the MoLD estimate was based on the sub-location area, population and land potential, except for Baragoi Division, where the sub-location estimate was based on the livestock numbers obtained from the chiefs, with a reduction to obtain the estimated divisional total (Appendix 8.2 and 8.3)

2. The DRSRS count gives a livestock density per 5 x 5 km and sub-location estimates are obtained directly from the provided maps (Appendix 8.3).

The livestock numbers in TLU are summarized in Table A8.2.

3. POTENTIAL LIVESTOCK NUMBERS

The potential livestock numbers in Samburu District can be obtained from the recommended stocking rates, calculated for the Rangemanagement Handbook Project of the Ministry of Livestock Development. The stocking rates indicate for each range unit (Fig. A8.1) the maximum stocking density in ha/TLU (Tropical Livestock Unit: 250 kg) for the optimal number of grazing days (Table A8.1). The densities are calculated for two rain seasons and for two levels of production. The maintenance level gives the livestock density at which livestock survives, but will not gain weight or reproduce. The maintenance + production level gives the (lower) livestock density at which livestock can gain weight and get calves. Only at this level it will be possible to sell animals regularly. The planning of water supply development will be based on the livestock densities of this level.

The stocking densities are a maximum, which are only permitted during the grazing period. Outside the grazing period no grazing is allowed, because this will have a detrimental effect on the rangeland. However there is no indication of where the animals should go and actually it can be expected that many will stay in the area and look for pasture. Actually some areas do have a potential for dry season grazing, but for limited numbers only.

The determination of the permitted number of livestock in each range unit must be based on the recommended stocking densities, but should also take into account the present range condition. In areas where currently the range condition is less than good, a lower stocking density is recommended. And in some areas, where the current range condition is classified as poor and where erosion is in a severe to very severe status, grazing of livestock may even not or at a very low level be recommended. A summary of the properties of the range units is included in Appendix 8.1.

The potential livestock numbers include cattle, sheep, goats and camels. The grazing and browsing requirements of these animals are different, because they use different kinds of vegetation and therefore

Table A8.1 Recommended Stocking Rates Samburu District

MAXIMUM STOCKING DENSITY (ha/TLU) FOR OPTIMAL NUMBER OF GRAZING DAYS AT MAINTENANCE + PRODUCTION LEVEL

Range Unit no.	Name	Area (km2)	First Rains								Second Rains								Total Grazing Period			
			Cattle		Sheep		Goats		Camels		Cattle		Sheep		Goats		Camels		Cattle	Sheep	Goats	Camels
			Dens.	Days	Dens.	Days	Dens.	Days	Dens.	Days	Dens.	Days	Dens.	Days	Dens.	Days	Dens.	Days	Days	Days	Days	Days
1	Karissa	2420	1.9	130	2.1	150	5.5	180	5.9	195	2.7	60	4.5	80	9.7	80	10.9	90	190	230	260	285
2	Ndoto	3020	1.6	110	1.8	130	4.9	160	5.4	175	1.8	50	3.1	70	6.5	70	7.4	80	160	200	230	255
3	Nyiru	1230	1.6	110	1.8	130	4.8	160	5.2	175	1.4	50	2.5	70	4.3	70	4.9	80	160	200	230	255
4	Old. Lenkiyio	3170	1.8	120	2.1	140	5.2	170	5.6	185	2.2	55	3.7	75	8	75	9	85	175	215	245	270
5	Rift Esc. North	4370	2.3	50	3.2	70	12.4	100	14.2	115		20		40		40		50	70	110	140	165
6	Rift Esc. South	5050	2	60	2.6	80	10.4	110	11.9	125	1.9	25	4.3	45	16.4	45	20	55	85	125	155	180
7	Marti	3360	2.4	80	2.9	100	5.3	130	6	145	3.1	35	6.1	55	9.5	55	11.2	65	115	155	185	210
8	Leroghi	7190	2.1	120	2.4	140	5.1	170	5.5	185	2.6	55	4.4	75	8.3	75	9.4	85	175	215	245	270
9	Elbarta North	3480	3.5	75	4.3	95	8.4	125	9.4	140	4.2	30	8.7	50	13.8	50	16.6	60	105	145	175	200
10	Elbarta East	1910	4.3	75	5.3	95	10.5	125	11.8	140	3.5	30	7.1	50	9.4	50	11.3	60	105	145	175	200
11	Elbarta South	3350	5	60	6.5	80	15	110	17	125	4	25	9	45	13.2	45	16.2	55	85	125	155	180
12	Upper Milgis	6130	14.3	65	18.1	85	19.3	115	21.8	130	11.4	25	25.4	45	19.1	45	23.3	55	90	130	160	185
13	Barsaloi	7970	24.2	70	30.2	90	15.9	120	17.9	135	20.1	30	41.3	50	14.7	50	17.7	60	100	140	170	195
14	Barsalinga	3500	16.4	65	20.7	85	16.2	115	18.3	130	7	25	15.6	45	7.6	45	9.3	55	90	130	160	185
15	Lower Milgis	3090	3.5	85	4.2	105	9.5	135	10.5	150	2.1	35	4.1	55	5.8	55	6.9	65	120	160	190	215
16	Lerata	3780	5.2	90	6.2	110	8.8	140	9.8	155	4.6	40	8.5	60	9.4	60	11	70	130	170	200	225
17	Lodosoit	4420	3.5	75	4.4	95	8.5	125	9.5	140	3	30	6.1	50	8.5	50	10.2	60	105	145	175	200
18	Konya	5860	3.5	55	4.6	75	13.5	105	15.4	120	2.2	15	6.4	35	12.9	35	16.6	45	70	110	140	165
19	Ewaso	7670	3.2	55	4.2	75	8.2	105	9.4	120	1.3	15	3.7	35	7	35	9.1	45	70	110	140	165
20	Ilaut	940	3.5	75	4.3	95	7.7	125	8.6	140	2.9	30	6	50	7.7	50	9.2	60	105	145	175	200

From: Rangemanagement Handbook, MoLD (in preparation)

the numbers in TLU can be added. The use of the range and also the effect on the range by each livestock type is different and therefore reductions in livestock densities are different for each type. The number of donkeys is not related to the rangeland potential, therefore no reduction was applied to the current donkey numbers.

The potential livestock numbers in each sub-location of Samburu District was determined for the wet season and the dry season, by considering:

- recommended stocking densities (table 1)
- present range condition (figure A6.2 in Appendix 6)
- present erosion status (figure A7.5 in Appendix 7)
- accessibility (figure A7.6 in Appendix 7).

The following assumptions were used:

- no development of water supplies in areas where:

  1. present range condition is poor
  2. present erosion status is severely to very severely eroded
  3. accessibility is severely to very severely restricted
  4. gazetted forest or game reserve

- limited development of water supplies in areas where:

  1. present range condition is fair (for the wet season also areas with poor range condition were included)
  2. present erosion status is slightly to moderately eroded
  3. accessibility is slightly restricted

- optimal development of water supplies in areas where:

  1. present range condition is fair to good
  2. present erosion status is no degradation to slightly eroded
  3. accessibility is not restricted

The areas where development of water supplies is possible are indicated on Plate 3. It was assumed that only cattle and camels migrate during the dry season and that sheep and goats remain within the sub-location. The recommended stocking rates are valid for the grazing period or wet season and therefore numbers of cattle, sheep, goats and camels need to be estimated for the dry season using a reduction of the recommended densities, which depends on the range condition in the sub-location:

Cattle: It was assumed that in the dry areas between 5-20 % and in the wet area of the Leroghi Plateau (Range Unit 8) 50 % of the animals may remain during the dry season.

Sheep: The number of animals which may be kept in the sub-location was determined using the same percentages as for cattle

Goats: The number of animals which may be kept in the sub-location was determined using the same percentages as for cattle

Camels: It was assumed that a higher percentage may remain than for cattle, but with a maximum of 50 %.

Donkeys: It was assumed that the number of donkeys relate to the population and not to the rangeland potential, therefore no reduction was applied on current donkey numbers

In the wet season the permitted number of cattle and camels was estimated according the recommended stocking rates in those sub-locations where no limitations exist. The permitted number of small stock in the wet season should be the same as in the dry season, because the small stock does not migrate.

The permitted number of animals in a sub-location was determined using the following procedure:

1. Determine the percentage area in the sub-location where development of water supplies is allowed, according the above assumptions

2. Determine the percentage reduction in animal numbers for those areas where only a limited development of water supplies is allowed; this reduction gives the number of animals which are

permitted to stay in the sub-location during the dry season; during the wet season no reduction is applied.

3. Determine the livestock density by using the lowest recommended stocking rate of the two grazing periods

4. Calculate number of cattle, sheep, goats and camels in TLU for each sub-location.

The wet season period is considered to be the same as the grazing period indicated for the maximum stocking densities. The dry season period is the remaining part of the year. The potential livestock numbers in TLU for each period is presented in table A8.2, which summarises the numbers per sub-location as presented in Appendix 8.3.

Table A8.2 Stocking Rates (TLU) Samburu District

Livestock Division		Area sq.Km.	Actual Numbers		DRY SEASON GRAZING		WET SEASON GRAZING	
			WRAP	DRSRS	Potential Numbers	Numbers for Planning	Potential Numbers	Numbers for Planning
Cattle	Baragoi	7,022	51,141	32,820	4,131	4,131	38,402	25,798
	Lorroki	4,010	58,510	33,120	21,478	19,678	44,074	30,513
	Wamba	5,162	20,885	44,420	1,024	1,024	13,547	4,904
	Waso	4,608	5,949	6,700	5,045	3,313	96,111	4,219
	Total	20,802	136,484	117,060	31,677	28,146	192,134	65,434
Sheep	Baragoi	7,022	5,837	6,154	3,304	2,509	3,304	2,509
	Lorroki	4,010	14,670	7,841	18,787	8,674	18,787	8,674
	Wamba	5,162	2,564	3,702	829	323	829	323
	Waso	4,608	763	1,713	3,870	605	3,870	605
	Total	20,802	23,834	19,410	26,789	12,112	26,789	12,112
Goats	Baragoi	7,022	19,540	20,602	1,676	1,676	1,676	1,676
	Lorroki	4,010	10,623	5,678	8,850	5,642	8,850	5,642
	Wamba	5,162	7,691	11,107	404	404	404	404
	Waso	4,608	2,290	5,140	3,870	1,540	3,870	1,540
	Total	20,802	40,145	42,527	14,799	9,261	14,799	9,261
Camels	Baragoi	7,022	11,453	10,843	2,974	1,978	9,092	3,234
	Lorroki	4,010	4,076	572	8,259	2,564	16,854	2,582
	Wamba	5,162	3,131	2,199	726	387	3,156	688
	Waso	4,608	663	2,018	9,882	360	91,072	419
	Total	20,802	19,323	15,633	21,841	5,289	120,174	6,923
Total	Baragoi	7,022	87,971	70,420	12,085	10,295	52,474	33,218
	Lorroki	4,010	87,879	47,211	57,374	36,558	88,564	47,411
	Wamba	5,162	34,271	61,428	2,982	2,138	17,935	6,319
	Waso	4,608	9,665	15,571	22,666	5,818	194,922	6,783
	Total	20,802	219,786	194,630	95,107	54,808	353,897	93,730

Note: 1. Actual Numbers WRAP based on 1988 MoLD census
2. Actual numbers DRSRS based on 1987 aerial count
3. Number of donkeys can be found in Appendix 8.2.

4. CALCULATION OF LIVESTOCK WATER DEMAND

The water demand from livestock which remains in the dry season may be considered as a constant year round demand. The additional demand from the animals during the wet season, exists only during the recommended grazing period. This demand is considered to be supplied from natural sources. Therefore planning of water supplies for livestock will be based on the dry season demand only.

The determination of the number of required water supplies for livestock in each sub-location was based on the water demand for the potential number of livestock. However, in case the actual (1988 estimate) number of animals in a sub-location is lower than the potential, then this number was used for the calculation of the water demand. This ensures that water supply development is based on the present day livestock numbers and cannot cause an increase in livestock numbers, which may cause more damage to the vulnerable rangelands of Samburu District.

The livestock water demand was calculated using a consumption rate of 50 l/day, which is the standard MoWD rate for a livestock unit of 450 kg. This unit is different from the livestock unit used in this appendix, the TLU which corresponds with a livestock unit of 250 kg. Therefore a different converstion from animal numbers to livestock unit must be used to calculate the water demand: 1 LU = 3 indig. cows = 15 shoats. The livestock water demand was calculated with the Database program (paragraph 4.2.7) and the results are included in Appendix 4, summarized in Table A8.3 and shown in Plate 3.

The calculated water demand is small in many sub-locations, due to the used calculation procedure. This may result in a small number of water supplies required to supply this demand. However a too few number of water supplies may lead to too large walking distances between grazing areas and water points. An appropriate balance between grazing and water supplies must be maintained, as mentioned in the introduction. This aspect will not be analyzed further in this study, but it should certainly be part of the feasibility studies which follow.

The projection of the livestock demand during the plan period of 20 years was done using a straightforward percentage (see paragraph 4.2.4). A future livestock water demand was projected only for those sub-locations where development of water supplies is allowed and for which a livestock water demand was estimated. The planning of water supplies thus assumes that within the plan period no significant improvements occur in sub-locations where the range potential is currently insufficient. This may not be true, but it is considered to be the most safe approach for this moment. The planning of water supplies will be revised in 5-10 years from now and if range conditions have improved, more water supplies may then be planned for.

Table A8.3: Livestock Numbers and Livestock Water Demand (m3/day) for Development Planning of Water Supplies

SUMMARY: SAMBURU DISTRICT	DRY SEASON							WET SEASON						
	Livestock Numbers (TLU)						Water Demand	Livestock Numbers (TLU)						Water Demand
Division	Cattle	Sheep	Goats	Camels	Donkeys	Total		Cattle	Sheep	Goats	Camels	Donkeys	Total	
Baragoi	4131	2509	1676	1978	2000	10295	279	25798	2509	1676	3234	2000	33218	925
Lorroki	19678	8674	5642	2564	775	36557	860	30513	8674	5642	2582	775	47411	1333
Wamba	1024	323	404	387	900	2138	67	4904	323	404	688	900	6318	185
Waso	3313	605	1540	360	2000	5819	174	4219	605	1540	419	2000	6784	214
Total	28146	12112	9262	5289	5675	54808	1380	65434	12112	9262	6923	5675	93730	2657

5. LIVESTOCK WATER SUPPLY DEVELOPMENT

The water demand from livestock was calculated only in those sub-locations where development of livestock water supplies is allowed. This depends on the rangeland conditions as explained in section 3.

The livestock water demand is not constant during the year, but varies between the wet and the dry season. Livestock water supply development is to be planned for both seasons.

The water sources which may be developed for livestock water supply are in general groundwater, surface water and springs. The selection of the source in each sub-location was done using the following methodology:

1. Determine supply from already developed sources or from natural sources (springs, lakes, rivers, etc.) for which no development has to take place.

2. Determine remaining required water supply development in the dry season and check availability of water sources in the following sequence: (i) springs, (ii) surface water, (iii) groundwater. If possible surfacewater and groundwater are to be used in combination on a 50-50% basis. Small supplies will be from groundwater only.

The result of the selection of water sources is presented in table A8.4.

The wet season demand is assumed to be supplied from natural sources only. It is expected that these sources will dry up in the dry season and will therefore not be available to livestock bigger in numbers than permitted for the dry season.

The selection of technologies as presented here is preliminary, because site investigations will have to confirm the proposed water supplies. These investigations will have to be part of the feasibility studies, which will follow the present study. The main purpose of the technology selection at this stage is to indicate which technologies are feasible and what are the associated investment costs. The costs are included in the investment packages in Part 3.

Table A8.4 Proposed Livestock Water Supply Development (m3/day)

BARAGOI DIVISION				WET SEASON			DRY SEASON		LIVESTOCK WATER SUPPLY DEVELOPMENT					
Location	Sub Location	Area sq.Km.	Range Unit	Water Demand	Grazing Period First	Second	Water Demand	Period (days)	WET SEASON Rw/Sw	No Dev.	DRY SEASON Gw	Rw/Sw	Sp	No Dev.
Nyiro	South Horr	407	5	33	50	20	11	295	0	22	-	0	-	11
Nyiro	Tuum	377		0			0		0	0	-	0	-	0
Nyiro	Parkati	151		0			0		0	0	-	0	-	0
Nyiro	Uaso Rongai	325	9	71	75	30	27	260	0	44	14	13	-	0
Kawop	Losurukoi	477	9	106	75	30	39	260	0	67	20	19	-	0
Kawop	Lonyangaten	360	9	37	75	30	7	260	0	30	7	0	-	0
Ndoto	Latakweny	735		1			1		0	0	1	0	-	0
Ndoto	Lesirikan	728	10,20	135	75	30	43	260	0	92	22	21	-	0
Arsim	Illauti	125	20	35	75	30	3	260	0	32	3	0	-	0
Arsim	Arsim	119	20	44	75	30	8	260	0	36	8	0	-	0
Arsim	Nguronit	273	15	46	85	35	9	245	0	37	-	0	-	9
Nachola	Nachola	254	7,11	100	60	25	29	280	0	71	15	14	-	0
Nachola	Terter	311	9,11	29	60	25	6	280	0	24	6	0	-	0
Baragoi	Baragoi	14		1			1		0	0	1	0	-	0
Marti	Kalele	359	7	45	80	35	30	250	0	15	15	15	-	0
Marti	Lokorkor	173	7	49	80	35	25	250	0	24	13	12	-	0
Marti	Moru-Akiring	691		0			0		0	0	-	0	-	0
Elbarta	Marti	301	7,11	81	60	25	31	280	0	50	16	15	-	0
Elbarta	Ngilai	200	10,11	59	60	25	5	280	0	54	5	0	-	0
Elbarta	Masikita	642	7,11	53	60	25	5	280	0	48	5	0	-	0
	Total	7022		925			280		0	646	151	109	0	20

Notes:
1. Grazing period (days) indicated for period of first rains and second rains
2. Grazing period is for cattle
3. The shortest grazing period was used if two range units cover a sub-location
4. Gw = Groundwater, Rw = Rainwater, Sw = Surfacewater, Sp = Spring, No Dev. = No Development

Table A8.4 (cont.) Proposed Livestock Water Supply Development (m3/day)

LORROKI DIVISION				WET SEASON			DRY SEASON		LIVESTOCK WATER SUPPLY DEVE				
Location	Sub Location	Area sq.Km.	Range Unit	Water Demand	Grazing Period First	Second	Water Demand	Period (days)	WET SEASON RW/Sw	No Dev.	Gw	DRY SEASO RW/Sw	Sp
Poro	Siambu	421		0			0		0	0	-	0	-
Poro	Seketet	60	8	48	120	55	30	190	0	18	-	0	-
Poro	Sirata Oirobi	48	8	40	120	55	23	190	0	17	-	0	-
Poro	Nkejemueny	20	8	28	120	55	19	190	0	9	-	0	-
Angata	Angata Nanyuk.	185		3			3		0	0	-	0	-
Nanyukie	Loibashai	168	7	42	80	35	9	250	0	33	-	0	-
	Barsaloi	237		5			5		0	0	-	0	-
Opiroi	Opiroi	323		0			0		0	0	-	0	-
Opiroi	Mabati	129		0			0		0	0	-	0	-
Opiroi	Mbukoi	119		1			1		0	0	-	1	-
Loosuk	Malaso	205	8	89	120	55	53	190	0	36	14	14	-
Loosuk	Tinga	147	8	72	120	55	44	190	0	28	10	9	-
Loosuk	Loosuk	133	8	91	120	55	55	190	0	36	5	0	-
Maralal	Ledero	66		0			0		0	0	-	0	-
Maralal	Township	53		0			0		0	0	-	0	-
Maralal	Lpartuk	63		0			0		0	0	-	0	-
Sukuta	Lolmolok	214	8	98	120	55	79	190	0	19	27	27	-
Marmar	Amaiya	100		0			0		0	0	-	0	-
	Longewan	90	8	81	120	55	66	190	0	15	20	21	-
	Logorate	67	8	87	120	55	61	190	0	26	18	18	-
	Sukuta Marmar	103	8	116	120	55	87	190	0	29	24	23	-
Kisima	Nauneri	90	8	92	120	55	62	190	0	30	18	19	-
Kisima	Lmisigiyoi	45	8	30	120	55	24	190	0	6	0	0	-
Kisima	Lkilorit	143	8	77	120	55	45	190	0	32	5	0	-
Kisima	Mbaringon	150	8	150	120	55	85	190	0	65	23	22	-
Lodokejek	Moru	243		7			7		0	0	7	0	-
Lodokejek	Nonkeek	110		0			0		0	0	-	0	-
Lodokejek	Lodokejek	153	8	92	120	55	52	190	0	40	6	6	-
Lodokejek	Kirimun	124	8	84	120	55	51	190	0	33	0	0	-
	Total	4010		1333			861		0	472	177	160	0

Table A8.4 (cont.) Proposed Livestock Water Supply Development (m3/day)

WAMBA DIVISION				WET SEASON			DRY SEASON		LIVESTOCK WATER SUPPLY DEVELOPMENT					
Location	Sub-location	Area sq.Km.	Range Unit	Water Demand	Grazing Period First	Second	Water Demand	Period (days)	WET SEASON RW/SW	No Dev.	DRY SEASON GW	RW/SW	Sp	No Dev.
Ngilai	Swari	803	11	22	60	25	3	280	0	19	3	0	-	0
Ngilai	Ngare Narok	911	15,17	51	75	30	39	260	0	12	20	19	-	0
Ngilai	Ngilai	1002		7			7		0	0	7	0	-	0
Ngilai	Lkisin	177		0			0		0	0	-	0	-	0
Ngilai	Ngogoltin	468	17	73	75	30	9	260	0	64	9	0	-	0
Lodungukwe	Nkaroni	325		0			0		0	0	-	0	-	0
Lodungukwe	Lpus	130		0			0		0	0	-	0	-	0
Lodungukwe	Litrimin	167		0			0		0	0	-	0	-	0
Lodungukwe	Sesia	420		2			2		0	0	2	0	-	0
Wamba	Matakwen	306	17	29	75	30	7	260	0	22	7	0	-	0
Wamba	Kolting	409		0			0		0	0	-	0	-	0
Wamba	Wamba	45		0			0		0	0	-	0	-	0
	Total	5162		185			67		0	117	48	19	0	0

WASO DIVISION				WET SEASON			DRY SEASON		LIVESTOCK WATER SUPPLY DEVELOPMENT					
Location	Sub-location	Area sq.Km.	Range Unit	Water Demand	Grazing Period First	Second	Water Demand	Period (days)	WET SEASON RW/SW	No Dev.	DRY SEASON GW	RW/SW	Sp	No Dev.
Waso	Lerata	319		0			0		0	0	-	0	-	0
Waso	Lengusaka	98	14	14	65	25	10	275	0	4	10	0	-	0
Waso	Remote	76	14	7	65	25	4	275	0	3	-	0	-	4
Waso	Ngutuk Ongiron	239	14	25	65	25	21	275	0	4	-	0	-	21
Waso	Archer's Post	325	19	43	55	15	29	295	0	14	6	0	-	23
Waso	Losesia	1463	19	29	55	15	29	295	0	0	7	7	-	15
Serolipi	Donyo Uasin	574	17	29	75	30	21	260	0	8	11	10	-	0
Serolipi	Serolipi	1514	18	67	55	15	60	295	0	7	30	30	-	0
	Total	4608		214			174		0	40	64	47	0	63

SUMMARY:

SAMBURU DISTRICT		WET SEASON	DRY SEASON	LIVESTOCK WATER SUPPLY DEVELOPMENT					
Division	Area sq.Km.	Water Demand	Water Demand	WET SEASON RW/SW	No Dev.	DRY SEASON GW	RW/SW	Sp	No Dev.
Baragoi	7022	925	280	0	646	151	109	0	20
Lorroki	4010	1333	861	0	472	169	157	0	535
Wamba	5162	185	67	0	117	48	19	0	0
Waso	4608	214	174	0	40	64	47	0	63
Total	20801	2656	1382	0	1275	432	332	0	618

APPENDIX 8.1: Summary of Range Unit Properties

Range Units

1,2,3,4 . Livestock use should be kept to a minimum and only for short periods
Area is valuable for dry season (drought) grazing
Wet Season : no grazing allowed
Dry Season : grazing allowed only by exception
no water facilities planned

5,6. Low carrying capacity
Grazing periods very short in wet season
Little basis for intensive range development inputs.
Therefore no development of water facilities.

7. Moderate carrying capacity for livestock
Severe to very severe restrictions on accessibility,
(area around Marti (Unit L3V) only during wet season)
Range condition L3V is fair, slight erosion
Wet season: only restriction is accessibility
Dry season: limited grazing allowed
Cattle: Water supply development for dry season animal numbers.

8. Valuable dry season grazing
No limitation to accessibility
Near Maralal severe erosion
Wet season, no restrictions
Dry season, no restrictions
Cattle: Water supply development for dry season animal numbers.

9,10,11. Dry season grazing possible (limited though)
Severe to very severe erosion around Baragoi, southern and northern part (exclude these areas)
Accessibility restricted in same areas
Water supply development for dry season animal numbers

12. Low productive potential
Only wet season grazing
Good goat habitant
Only water supply development for goats not for cattle

13,14. Severe to very severe erosion
No water supply development, though some dry season grazing exists

15,16,20. Only wet season use because of erosion susceptibility
Dry season grazing in valley bottoms
Check dry season figures for water supply development

17,18,19. Very little dry season use
Unit fairly well watered
No water supply development for cattle
supply development for goats?

APPENDIX 8.2 LIVESTOCK NUMBERS PER SUB-LOCATION, SAMBURU DISTRICT, 1988 (MoLD/WRAP ESTIMATE)

Lorroki Division

LOCATION	S/LOCATION	CATTLE	SHOATS	CAMELS	DONKEYS	TOTAL TLU
PORO	Siambu	2,224	6,153	103	71	2,743
	Seketet	1,451	4,014	67	47	1,790
	Sirata Oirobi	1,337	3,697	62	43	1,649
	Nkejemueny	840	2,324	39	30	1,039
ANGATA NANYUKIE	Ang. Nanyukie	5,980	16,547	276	192	7,377
	Loibashai	1,555	4,302	72	50	1,918
	Barsaloi	1,241	3,433	57	40	1,532
OPIROI	Opiroi	5,026	13,906	233	161	6,201
	Mabati	752	2,082	35	24	928
	Mbukoi	1,535	4,247	71	49	1,893
LOOSUK	Malaso	3,365	9,311	155	108	4,151
	Tinga	5,137	14,214	237	164	6,336
	Loosuk	3,783	10,468	175	121	4,667
MARALAL	Ledero	1,862	5,154	86	60	2,297
	Township	748	2,069	35	24	924
	Lpartuk	1,778	4,919	82	57	2,193
SUKUTA MARMAR	Lolmolok	2,924	8,091	136	94	3,608
	Amaiya	1,755	4,854	81	56	2,164
	Longewan	2,425	6,708	112	78	2,991
	Logorate	2,595	7,178	120	83	3,201
	Sukuta Marmar	3,467	9,591	161	111	4,277
KISIMA	Nauneri	2,760	7,636	128	88	3,405
	Lmisigiyoi	903	2,498	42	29	1,114
	Lkilorit	2,837	7,850	132	91	3,501
	Mbaringon	4,617	12,774	214	148	5,695
LODOKOJEK	Moru	2,062	5,705	95	66	2,543
	Nonkeek	1,873	5,180	86	60	2,310
	Lodokojek	2,773	7,672	128	89	3,422
	Kirimun	3,532	9,771	163	113	4,356
TOTAL		73,137	202,348	3,383	2,347	90,226

Waso Division

LOCATION	S/LOCATION	CATTLE	SHOATS	CAMELS	DONKEYS	TOTAL TLU
WASO	Lerata	661	2,126	75	68	953
	Lengusaka	616	1,978	70	63	887
	Remote	781	2,509	88	80	1,124
	Ngutuk Ong.	698	2,247	79	72	1,006
	Archer's Post	1,305	4,192	148	134	1,880
	Losesia	661	2,126	75	68	953
SEREOLIPI	Donyo Uasin	746	2,542	68	49	1,045
	Sereolipi	1,968	6,706	180	129	2,759
TOTAL		7,436	24,426	783	663	10,608

Note: 1 TLU = 1.25 Cattle = 8 Shoats = 0.83 Camels = 1 Donkey

(The TLU used for calculation of livestock water demand is differe
1 TLU = 3 Indig. cows = 15 shoats)

APPENDIX 8.2 (Cont.) LIVESTOCK NUMBERS PER SUB-LOCATION, SAMBURU DISTRICT, 1988 (MoLD/WRAP ESTIMATE)

Baragoi Division

LOCATION	S/LOCATION	CATTLE	SHOATS	CAMELS	DONKEYS	TOTAL TLU
ARSIM	Ngurunoit	4,177	8,197	0	135	4,501
	Illaut	3,842	9,563	381	338	5,066
	Arsim	3,436	7,732	27	113	3,861
NYIRO	South Horr	5,280	11,339	838	149	6,800
	Parkate	1,970	16,087	508	169	4,368
	Tum	3,940	9,988	212	282	4,938
	Uaso Rongai	2,798	9,727	229	182	3,912
NACHOLA	Nachola	2,837	10,424	1,151	90	5,049
	Terter	4,078	10,967	1,523	451	6,919
MARTI	Moru-Akiring	1,379	9,017	355	101	2,759
	Kalele	1,163	6,284	254	124	2,146
	Lokorkor	1,301	6,831	296	142	2,393
ELBARTA	Ngilai	4,532	2,186	846	113	5,031
	Masikita	2,364	9,563	1,270	646	5,263
	Marti	2,955	6,148	76	66	3,290
NDOTO	Lesirkan	4,926	23,225	85	360	7,306
	Latakweny	4,729	19,354	592	451	7,367
KAWOP	Lonyangatan	4,137	12,903	474	315	5,809
	Losirikoi	4,082	13,483	389	282	5,702
TOTAL		63,926	203,018	9,506	4,509	92,480

Wamba Division

LOCATION	S/LOCATION	CATTLE	SHOATS	CAMELS	DONKEYS	TOTAL TLU
NGILAI	Swari	6,347	17,812	740	587	8,783
	Ngare Narok	1,482	4,160	173	137	2,052
	Ngilai	5,181	14,540	604	479	7,169
	Lkisin	1,885	5,291	220	174	2,608
	Ngogoltin	2,634	7,391	307	243	3,644
LODUNGOKWE	Nkaroni	2,023	6,553	110	288	2,858
	Lpus	1,228	3,979	67	175	1,735
	Ltirimin	1,156	3,745	63	165	1,634
	Sesia	1,661	5,383	90	237	2,347
WAMBA	Matakwen	1,010	5,309	91	140	1,722
	Kolting	1,350	7,096	121	188	2,301
	Wamba	149	780	13	21	253
TOTAL		26,106	82,039	2,599	2,834	37,105

Note: 1 TLU = 1.25 Cattle = 8 Shoats = 0.83 Camels = 1 Donkey

(The TLU used for calculation of livestock water demand is different:
1 TLU = 3 Indig. cows = 15 shoats)

APPENDIX 8.3

STOCKING RATES

Contents

1. Wet Season Grazing - Cattle
2. Dry Season Grazing - Cattle
3. Dry Season Grazing - Sheep
4. Dry Season Grazing - Goats
5. Wet Season Grazing - Camels
6. Dry Season Grazing - Camels

STOCKING RATES WET SEASON GRAZING - CATTLE (TLU)

BARAGOI DIVISION

Location	Sub Location	Area sq.Km.	% of Area	% of Animals	Range Unit	Density	Potential Numbers	Actual WRAP	Numbers DRSRS	Numbe Plann
Nyiro	South Horr	407	5	100	5	2.3	885	4224	2540	88
Nyiro	Tuum	377	0				0	3152	1860	
Nyiro	Parkati	151	0				0	1576	260	
Nyiro	Uaso Rongai	325	20	100	9	3.5	1857	2238	820	185
Kawop	Losurukoi	477	20	100	9	3.5	2728	3266	1980	272
Kawop	Lonyangaten	360	10	100	9	3.5	1027	3310	1140	102
Ndoto	Latakweny	735	0				0	3783	2700	
Ndoto	Lesirikan	728	30	100	10,20	4.3	5079	3941	5200	394
Arsim	Illauti	125	30	100	20	3.5	1075	3074	80	107
Arsim	Arsim	119	40	100	20	3.5	1366	2749	0	136
Arsim	Nguronit	273	20	100	15	3.5	1560	3342	2840	156
Nachola	Nachola	254	70	100	7,11	3.5	5086	2270	2360	227
Nachola	Terter	311	10	100	9,11	4.2	739	3262	620	73
Baragoi	Baragoi	14	0				0		340	
Marti	Kalele	359	15	100	7	2.4	2245	930	2120	93
Marti	Lokorkor	173	25	100	7	2.4	1798	1041	100	104
Marti	Moru-Akiring	691	0				0	1103	940	
Elbarta	Marti	301	80	100	7,11	3.7	6498	2364	1720	236
Elbarta	Ngilai	200	50	100	10,11	4.7	2125	3626	4760	212
Elbarta	Masikita	642	25	100	7,11	3.7	4335	1891	440	189
	Total	7022					38402	51141	32820	2579

LORROKI DIVISION

Location	Sub Location	Area sq.Km.	% of Area	% of Animals	Range Unit	Density	Potential Numbers	Actual WRAP	Numbers DRSRS	Numbe Plann
Poro	Siambu	421	0				0	1779	280	
Poro	Seketet	60	50	100	8	2.1	1425	1161	660	116
Poro	Sirata Oirobi	48	40	100	8	2.1	906	1070	1340	90
Poro	Nkejemueny	20	100	100	8	2.1	950	672	700	67
Angata	Angata Nanyukie	185	0				0	4784	1940	
Nanyukie	Loibashai	168	20	100	7	2.4	1397	1244	2120	124
	Barsaloi	237	0				0	993	1100	
Opiroi	Opiroi	323	0				0	4021	2120	
Opiroi	Mabati	129	0				0	602	300	
Opiroi	Mbukoi	119	0				0	1228	1000	
Loosuk	Malaso	205	20	100	8	2.1	1953	2692	0	195
Loosuk	Tinga	147	20	100	8	2.1	1403	4110	0	140
Loosuk	Loosuk	133	30	100	8	2.1	1901	3026	780	190
Maralal	Ledero	66	0				0	1490	1640	
Maralal	Township	53	0				0	598	260	
Maralal	Lpartuk	63	0				0	1422	1580	
Sukuta	Lolmolok	214	70	100	8	2.1	7146	2339	2580	233
Marmar	Amaiya	100	0				0	1404	720	
	Longewan	90	100	100	8	2.1	4296	1940	1000	194
	Logorate	67	100	100	8	2.1	3194	2076	1200	207
	Sukuta Marmar	103	100	100	8	2.1	4912	2774	2260	277
Kisima	Nauneri	90	75	100	8	2.1	3214	2208	480	220
Kisima	Lmisigiyoi	45	100	100	8	2.1	2163	722	0	72
Kisima	Lkilorit	143	25	100	8	2.1	1698	2270	3580	169
Kisima	Mbaringon	150	50	100	8	2.1	3563	3694	1400	356
Lodokejek	Moru	243	0				0	1650	300	
Lodokejek	Nonkeek	110	0				0	1498	1340	
Lodokejek	Lodokejek	153	30	100	8	2.1	2183	2218	960	218
Lodokejek	Kirimun	124	30	100	8	2.1	1771	2826	1480	177
	Total	4010					44074	58510	33120	3051

STOCKING RATES WET SEASON GRAZING - CATTLE (TLU)

WAMBA DIVISION

Location	Sub-location	Area sq.Km.	% of Area	% of Animals	Range Unit	Density	Potential Numbers	Actual WRAP	Numbers DRSRS	Numbers for Planning
Ngilai	Swari	803	5	100	11	5	803	5078	1540	803
Ngilai	Ngare Narok	911	15	100	15,17	3.5	3904	1186	21840	1186
Ngilai	Ngilai	1002	0				0	4145	4520	0
Ngilai	Lkisin	177	0				0	1508	0	0
Ngilai	Ngogoltin	468	40	100	17	3.5	5346	2107	660	2107
Lodungukwe	Nkaroni	325	0				0	1618	780	0
Lodungukwe	Lpus	130	0				0	982	2120	0
Lodungukwe	Litrimin	167	0				0	925	400	0
Lodungukwe	Sesia	420	0				0	1329	1300	0
Wamba	Matakwen	306	40	100	17	3.5	3493	808	8020	808
Wamba	Kolting	409	0				0	1080	3160	0
Wamba	Wamba	45	0				0	119	80	0
	Total	5162					13547	20885	44420	4904

WASO DIVISION .....

Location	Sub-location	Area sq.Km.	% of Area	% of Animals	Range Unit	Density	Potential Numbers	Actual WRAP	Numbers DRSRS	Numbers for Planning
Waso	Lerata	319	0				0	529	2500	0
Waso	Lengusaka	98	20	100	14	16.4	120	493	0	0
Waso	Remote	76	20	100	14	16.4	93	625	0	93
Waso	Ngutuk Ongiron	239	20	100	14	16.4	291	558	0	291
Waso	Archer's Post	325	10	100	19	3.2	1016	1044	1160	1016
Waso	Losesia	1463	80	100	19	3.2	36576	529	160	529
Serolipi	Donyo Uasin	574	90	100	17	3.5	14758	597	2040	597
Serolipi	Serolipi	1514	100	100	18	3.5	43257	1574	840	1574
	Total	4608					96111	5949	6700	4100

SUMMARY OF AREAS:

Division	Area sq.Km.	Potential Numbers	Actual WRAP	Numbers DRSRS	Numbers for Planning
Baragoi	7022	38402	51141	32820	25798
Lorroki	4010	44074	58510	33120	30513
Wamba	5162	13547	20885	44420	4904
Waso	4608	96111	5949	6700	4100
Total	20801	192133	136484	117060	65315

STOCKING RATES DRY SEASON GRAZING - CATTLE (TLU)

BARAGOI DIVISION

Location	Sub Location	Area sq.Km.	% of Area	% of Animals	Range Unit	Density	Potential Numbers	Actual WRAP	Numbers DRSRS	Number Planni
Nyiro	South Horr	407	5	20	5	2.3	177	4224	2540	177
Nyiro	Tuum	377	0				0	3152	1860	0
Nyiro	Parkati	151	0				0	1576	260	0
Nyiro	Uaso Rongai	325	20	20	9	3.5	371	2238	820	371
Kawop	Losurukoi	477	20	20	9	3.5	546	3266	1980	546
Kawop	Lonyangaten	360	5	20	9	3.5	103	3310	1140	103
Ndoto	Latakweny	735	0				0	3783	2700	0
Ndoto	Lesirikan	728	25	15	10,20	4.3	635	3941	5200	635
Arsim	Illauti	125	10	10	20	3.5	36	3074	80	36
Arsim	Arsim	119	40	10	20	3.5	137	2749	0	137
Arsim	Nguronit	273	10	10	15	3.5	78	3342	2840	78
Nachola	Nachola	254	40	15	7,11	3.5	436	2270	2360	436
Nachola	Terter	311	10	10	9,11	4.2	74	3262	620	74
Baragoi	Baragoi	14	0				0		340	0
Marti	Kalele	359	15	20	7	2.4	449	930	2120	449
Marti	Lokorkor	173	25	20	7	2.4	360	1041	100	360
Marti	Moru-Akiring	691	0				0	1103	940	0
Elbarta	Marti	301	60	15	7,11	3.7	731	2364	1720	731
Elbarta	Ngilai	200	0	20	10,11	4.7	0	3626	4760	0
Elbarta	Masikita	642	0	15	7,11	3.7	0	1891	440	0
	Total	7022					4131	51141	32820	4131

LORROKI DIVISION

Location	Sub Location	Area sq.Km.	% of Area	% of Animals	Range Unit	Density	Potential Numbers	Actual WRAP	Numbers DRSRS	Number Planni
Poro	Siambu	421	0				0	1779	280	0
Poro	Seketet	60	50	50	8	2.1	713	1161	660	713
Poro	Sirata Oirobi	48	40	50	8	2.1	453	1070	1340	453
Poro	Nkejemueny	20	100	50	8	2.1	475	672	700	475
Angata	Angata Nanyukie	185	0				0	4784	1940	0
Nanyukie	Loibashai	168	20	10	7	2.4	140	1244	2120	140
	Barsaloi	237	0				0	993	1100	0
Opiroi	Opiroi	323	0				0	4021	2120	0
Opiroi	Mabati	129	0				0	602	300	0
Opiroi	Mbukoi	119	0				0	1228	1000	0
Loosuk	Malaso	205	20	50	8	2.1	976	2692	0	976
Loosuk	Tinga	147	20	50	8	2.1	701	4110	0	701
Loosuk	Loosuk	133	30	50	8	2.1	951	3026	780	951
Maralal	Ledero	66	0				0	1490	1640	0
Maralal	Township	53	0				0	598	260	0
Maralal	Lpartuk	63	0				0	1422	1580	0
Sukuta	Lolmolok	214	70	50	8	2.1	3573	2339	2580	2339
Marmar	Amaiya	100	0				0	1404	720	0
	Longewan	90	100	50	8	2.1	2148	1940	1000	1940
	Logorate	67	100	50	8	2.1	1597	2076	1200	1597
	Sukuta Marmar	103	100	50	8	2.1	2456	2774	2260	2456
Kisima	Nauneri	90	75	50	8	2.1	1607	2208	480	1607
Kisima	Lmisigiyoi	45	100	50	8	2.1	1081	722	0	722
Kisima	Lkilorit	143	25	50	8	2.1	849	2270	3580	849
Kisima	Mbaringon	150	50	50	8	2.1	1781	3694	1400	1781
Lodokejek	Moru	243	0				0	1650	300	0
Lodokejek	Nonkeek	110	0				0	1498	1340	0
Lodokejek	Lodokejek	153	30	50	8	2.1	1092	2218	960	1092
Lodokejek	Kirimun	124	30	50	8	2.1	885	2826	1480	885
	Total	4010					21478	58510	33120	19678

STOCKING RATES DRY SEASON GRAZING - CATTLE (TLU)

WAMBA DIVISION

Location	Sub-location	Area sq.Km.	% of Area	% of Animals	Range Unit	Density	Potential Numbers	Actual WRAP	Numbers DRSRS	Numbers for Planning
Ngilai	Swari	803	0	10	11	5	0	5078	1540	0
Ngilai	Ngare Narok	911	15	20	15,17	3.5	781	1186	21840	781
Ngilai	Ngilai	1002	0				0	4145	4520	0
Ngilai	Lkisin	177	0				0	1508	0	0
Ngilai	Ngogoltin	468	20	5	17	3.5	134	2107	660	134
Lodungukwe	Nkaroni	325	0				0	1618	780	0
Lodungukwe	Lpus	130	0				0	982	2120	0
Lodungukwe	Litrimin	167	0				0	925	400	0
Lodungukwe	Sesia	420	0				0	1329	1300	0
Wamba	Matakwen	306	25	5	17	3.5	109	808	8020	109
Wamba	Kolting	409	0				0	1080	3160	0
Wamba	Wamba	45	0				0	119	80	0
	Total	5162					1024	20885	44420	1024

WASO DIVISION

Location	Sub-location	Area sq.Km.	% of Area	% of Animals	Range Unit	Cattle Density	Potential Numbers	Actual WRAP	Numbers DRSRS	Numbers for Planning
Waso	Lerata	319	0				0	529	2500	0
Waso	Lengusaka	98	5	50	14	16.4	15	493	0	15
Waso	Remote	76	20	50	14	16.4	46	625	0	46
Waso	Ngutuk Ongiron	239	20	50	14	16.4	145	558	0	145
Waso	Archer's Post	325	20	20	19	3.2	406	1044	1160	406
Waso	Losesia	1463	80	5	19	3.2	1829	529	160	529
Serolipi	Donyo Uasin	574	80	5	17	3.5	656	597	2040	597
Serolipi	Serolipi	1514	90	5	18	3.5	1947	1574	840	1574
	Total	4608					5045	5949	6700	3313

Summary of Areas:

Division	Area sq.Km.	Potential Numbers	Actual WRAP	Numbers DRSRS	Numbers for Planning
Baragoi	7022	4131	51141	32820	4131
Lorroki	4010	21478	58510	33120	19678
Wamba	5162	1024	20885	44420	1024
Waso	4608	5045	5949	6700	3313
Total	20802	31677	136484	117060	28146

STOCKING RATES DRY SEASON GRAZING - SHEEP (TLU)

BARAGOI DIVISION

Location	Sub Location	Area sq.Km.	% of Area	% of Animals	Range Unit	Density	Potential Numbers	Actual WRAP	Numbers DRSRS	Number Planni
Nyiro	South Horr	407	5	20	5	3.2	127	326	217	127
Nyiro	Tuum	377	0				0	287	257	0
Nyiro	Parkati	151	0				0	463	43	0
Nyiro	Uaso Rongai	325	20	20	9	4.3	302	280	91	280
Kawop	Losurukoi	477	20	20	9	4.3	444	388	387	388
Kawop	Lonyangaten	360	5	20	9	4.3	84	371	188	84
Ndoto	Latakweny	735	0				0	556	725	0
Ndoto	Lesirikan	728	25	15	10,20	5.3	515	668	371	515
Arsim	Illauti	125	10	10	20	4.3	29	275	86	29
Arsim	Arsim	119	40	10	20	4.3	111	222	20	111
Arsim	Nguronit	273	10	10	15	4.2	65	236	397	65
Nachola	Nachola	254	40	15	7,11	4.7	325	300	297	300
Nachola	Terter	311	10	10	9,11	5.4	58	315	502	58
Baragoi	Baragoi	14	0				0	0	111	0
Marti	Kalele	359	15	20	7	2.9	372	181	275	181
Marti	Lokorkor	173	25	20	7	2.9	298	196	1270	196
Marti	Moru-Akiring	691	0				0	259	87	0
Elbarta	Marti	301	60	15	7,11	4.7	576	177	178	171
Elbarta	Ngilai	200	0	20	10,11	4.7	0	63	46	0
Elbarta	Masikita	642	0	15	7,11	4.7	0	275	606	0
	Total	7022					3304	5837	6154	2509

LORROKI DIVISION

Location	Sub Location	Area sq.Km.	% of Area	% of Animals	Range Unit	Density	Potential Numbers	Actual WRAP	Numbers DRSRS	Number Planni
Poro	Siambu	421	0				0	446	22	0
Poro	Seketet	60	50	50	8	2.4	623	291	221	291
Poro	Sirata Oirobi	48	40	50	8	2.4	396	268	65	268
Poro	Nkejemueny	20	100	50	8	2.4	416	168	544	168
Angata	Angata Nanyukie	185	0				0	1200	796	0
Nanyukie	Loibashai	168	20	10	7	2.9	116	312	382	116
	Barsaloi	237	0				0	249	9	0
Opiroi	Opiroi	323	0				0	1008	105	0
Opiroi	Mabati	129	0				0	151	0	0
Opiroi	Mbukoi	119	0				0	308	38	0
Loosuk	Malaso	205	20	50	8	2.4	854	675	42	675
Loosuk	Tinga	147	20	50	8	2.4	614	1031	36	614
Loosuk	Loosuk	133	30	50	8	2.4	832	759	147	759
Maralal	Ledero	66	0				0	374	636	0
Maralal	Township	53	0				0	150	0	0
Maralal	Lpartuk	63	0				0	357	105	0
Sukuta	Lolmolok	214	70	50	8	2.4	3126	587	401	587
Marmar	Amaiya	100	0				0	352	266	0
	Longewan	90	100	50	8	2.4	1879	486	132	486
	Logorate	67	100	50	8	2.4	1397	520	80	520
	Sukuta Marmar	103	100	50	8	2.4	2149	695	877	695
Kisima	Nauneri	90	75	50	8	2.4	1406	554	270	554
Kisima	Lmisigiyoi	45	100	50	8	2.4	946	181	127	181
Kisima	Lkilorit	143	25	50	8	2.4	743	569	576	569
Kisima	Mbaringon	150	50	50	8	2.4	1559	926	756	926
Lodokejek	Moru	243	0				0	414	401	0
Lodokejek	Nonkeek	110	0				0	376	225	0
Lodokejek	Lodokejek	153	30	50	8	2.4	955	556	449	556
Lodokejek	Kirimun	124	30	50	8	2.4	775	708	132	708
	Total	4010					18787	14670	7841	8674

STOCKING RATES DRY SEASON GRAZING - SHEEP (TLU)

WAMBA DIVISION

Location	Sub-location	Area sq.Km.	% of Area	% of Animals	Range Unit	Density	Potential Numbers	Actual WRAP	Numbers DRSRS	Numbers for Planning
Ngilai	Swari	803	0	10	11	6.5	0	557	629	0
Ngilai	Ngare Narok	911	15	20	15,17	4.3	636	130	334	130
Ngilai	Ngilai	1002	0				0	454	794	0
Ngilai	Lkisin	177	0				0	165	534	0
Ngilai	Ngogoltin	468	20	5	17	4.4	106	231	0	106
Lodungukwe	Nkaroni	325	0				0	205	244	0
Lodungukwe	Lpus	130	0				0	124	189	0
Lodungukwe	Litrimin	167	0				0	117	303	0
Lodungukwe	Sesia	420	0				0	168	392	0
Wamba	Matakwen	306	25	5	17	4.4	87	166	266	87
Wamba	Kolting	409	0				0	222	14	0
Wamba	Wamba	45	0				0	24	5	0
	Total	5162					829	2564	3702	323

WASO DIVISION

Location	Sub-location	Area sq.Km.	% of Area	% of Animals	Range Unit	Density	Potential Numbers	Actual WRAP	Numbers DRSRS	Numbers for Planning
Waso	Lerata	319	0				0	66	36	0
Waso	Lengusaka	98	5	50	14	20.7	12	62	205	12
Waso	Remote	76	20	50	14	20.7	37	78	23	37
Waso	Ngutuk Ongiron	239	20	50	14	20.7	115	70	234	70
Waso	Archer's Post	325	20	20	19	4.2	310	131	596	131
Waso	Losesia	1463	80	5	19	4.2	1393	66	320	66
Serolipi	Donyo Uasin	574	80	5	17	4.4	522	79	0	79
Serolipi	Serolipi	1514	90	5	18	4.6	1481	210	298	210
	Total	4608					3870	763	1713	605

Summary of Areas:

Division	Area sq.Km.	Potential Numbers	Actual WRAP	Numbers DRSRS	Numbers for Planning
Baragoi	7022	3304	5837	6154	2509
Lorroki	4010	18787	14670	7841	8674
Wamba	5162	829	2564	3702	323
Waso	4608	3870	763	1713	605
Total	20802	26789	23834	19410	12112

STOCKING RATES DRY SEASON GRAZING - GOATS (TLU)

BARAGOI DIVISION

Location	Sub Location	Area sq.Km.	% of Area	% of Animals	Range Unit	Density	Potential Numbers	Actual WRAP	Numbers DRSRS	Numbe Plann
Nyiro	South Horr	407	5	20	5	12.4	33	1091	727	3
Nyiro	Tuum	377	0				0	961	859	
Nyiro	Parkati	151	0				0	1548	144	
Nyiro	Uaso Rongai	325	20	20	9	8.4	155	936	303	15
Kawop	Losurukoi	477	20	20	9	8.4	227	1298	1295	22
Kawop	Lonyangaten	360	5	20	9	8.4	43	1242	630	4
Ndoto	Latakweny	735	0				0	1863	2428	
Ndoto	Lesirikan	728	25	15	10,20	9.1	300	2235	1242	30
Arsim	Illauti	125	10	10	20	7.7	16	920	289	1
Arsim	Arsim	119	40	10	20	7.7	62	744	67	6
Arsim	Nguronit	273	10	10	15	9.5	29	789	1328	2
Nachola	Nachola	254	40	15	7,11	10.1	151	1003	994	15
Nachola	Terter	311	10	10	9,11	11.7	27	1056	1682	2
Baragoi	Baragoi	14	0				0	0	373	
Marti	Kalele	359	15	20	7	5.3	203	605	922	20
Marti	Lokorkor	173	25	20	7	5.3	163	657	4252	16
Marti	Moru-Akiring	691	0				0	868	291	
Elbarta	Marti	301	60	15	7,11	10.1	268	592	594	26
Elbarta	Ngilai	200	0	20	10,11	12.7	0	210	154	
Elbarta	Masikita	642	0	15	7,11	10.1	0	920	2028	
	Total	7022					1676	19540	20602	167

LORROKI DIVISION

Location	Sub Location	Area sq.Km.	% of Area	% of Animals	Range Unit	Density	Potential Numbers	Actual WRAP	Numbers DRSRS	Numbe Plann
Poro	Siambu	421	0				0	323	16	
Poro	Seketet	60	50	50	8	5.1	293	211	160	21
Poro	Sirata Oirobi	48	40	50	8	5.1	186	194	47	18
Poro	Nkejemueny	20	100	50	8	5.1	196	122	394	12
Angata	Angata Nanyukie	185	0				0	869	576	
Nanyukie	Loibashai	168	20	10	7	5.3	63	226	277	6
	Barsaloi	237	0				0	180	7	
Opiroi	Opiroi	323	0				0	730	76	
Opiroi	Mabati	129	0				0	109	0	
Opiroi	Mbukoi	119	0				0	223	28	
Loosuk	Malaso	205	20	50	8	5.1	402	489	30	40
Loosuk	Tinga	147	20	50	8	5.1	289	746	26	28
Loosuk	Loosuk	133	30	50	8	5.1	391	550	106	39
Maralal	Ledero	66	0				0	271	461	
Maralal	Township	53	0				0	109	0	
Maralal	Lpartuk	63	0				0	258	76	
Sukuta	Lolmolok	214	70	50	8	5.1	1471	425	290	42
Marmar	Amaiya	100	0				0	255	193	
	Longewan	90	100	50	8	5.1	884	352	96	35
	Logorate	67	100	50	8	5.1	658	377	58	37
	Sukuta Marmar	103	100	50	8	5.1	1011	504	635	50
Kisima	Nauneri	90	75	50	8	5.1	662	401	196	40
Kisima	Lmisigiyoi	45	100	50	8	5.1	445	131	92	13
Kisima	Lkilorit	143	25	50	8	5.1	350	412	417	35
Kisima	Mbaringon	150	50	50	8	5.1	734	671	547	67
Lodokejek	Moru	243	0				0	300	290	
Lodokejek	Nonkeek	110	0				0	272	163	
Lodokejek	Lodokejek	153	30	50	8	5.1	449	403	326	40
Lodokejek	Kirimun	124	30	50	8	5.1	365	513	96	36
	Total	4010					8850	10623	5678	564

STOCKING RATES DRY SEASON GRAZING - GOATS (TLU)

WAMBA DIVISION

Location	Sub-location	Area sq.Km.	% of Area	% of Animals	Range Unit	Density	Potential Numbers	Actual WRAP	Numbers DRSRS	Numbers for Planning
Ngilai	Swari	803	0	10	11	15	0	1670	1887	0
Ngilai	Ngare Narok	911	15	20	15,17	9	304	390	1001	304
Ngilai	Ngilai	1002	0				0	1363	2381	0
Ngilai	Lkisin	177	0				0	496	1601	0
Ngilai	Ngogoltin	468	20	5	17	8.5	55	693	0	55
Lodungukwe	Nkaroni	325	0				0	614	731	0
Lodungukwe	Lpus	130	0				0	373	567	0
Lodungukwe	Litrimin	167	0				0	351	909	0
Lodungukwe	Sesia	420	0				0	505	1177	0
Wamba	Matakwen	306	25	5	17	8.5	45	498	797	45
Wamba	Kolting	409	0				0	665	42	0
Wamba	Wamba	45	0				0	73	14	0
	Total	5162					404	7691	11107	404

WASO DIVISION

Location	Sub-location	Area sq.Km.	% of Area	% of Animals	Range Unit	Density	Potential Numbers	Actual WRAP	Numbers DRSRS	Numbers for Planning
Waso	Lerata	319	0				0	199	108	0
Waso	Lengusaka	98	5	50	14	20.7	12	185	616	12
Waso	Remote	76	20	50	14	20.7	37	235	68	37
Waso	Ngutuk Ongiron	239	20	50	14	20.7	115	211	703	115
Waso	Archer's Post	325	20	20	19	4.2	310	393	1788	310
Waso	Losesia	1463	80	5	19	4.2	1393	199	961	199
Serolipi	Donyo Uasin	574	80	5	17	4.4	522	238	0	238
Serolipi	Serolipi	1514	90	5	18	4.6	1481	629	895	629
	Total	4608					3870	2290	5140	1540

Summary of Areas:

Division	Area sq.Km.	Potential Numbers	Actual WRAP	Numbers DRSRS	Numbers for Planning
Baragoi	7022	1676	19540	20602	1676
Lorroki	4010	8850	10623	5678	5642
Wamba	5162	404	7691	11107	404
Waso	4608	3870	2290	5140	1540
Total	20802	14799	40145	42527	9261

STOCKING RATES WET SEASON GRAZING - CAMELS (TLU)

BARAGOI DIVISION

Location	Sub Location	Area sq.Km.	% of Area	% of Animals	Range Unit	Density	Potential Numbers	Actual WRAP	Numbers DRSRS	Numbe Planni
Nyiro	South Horr	407	5	100	5	14.2	143	1010	0	14
Nyiro	Tuum	377	0				0	255	602	
Nyiro	Parkati	151	0				0	612	0	
Nyiro	Uaso Rongai	325	20	100	9	9.4	691	276	361	27
Kawop	Losurukoi	477	20	100	9	9.4	1016	469	783	46
Kawop	Lonyangaten	360	5	100	9	9.4	191	571	361	19
Ndoto	Latakweny	735	0				0	713	723	
Ndoto	Lesirikan	728	25	100	10,20	10.2	1784	102	271	10
Arsim	Illauti	125	10	100	20	8.6	146	459	0	14
Arsim	Arsim	119	40	100	20	8.6	556	33	0	3
Arsim	Nguronit	273	10	100	15	10.5	260	0	0	
Nachola	Nachola	254	40	100	7,11	11.5	884	1387	663	88
Nachola	Terter	311	10	100	9,11	13.2	235	1835	633	23
Baragoi	Baragoi	14	0				0		151	
Marti	Kalele	359	15	100	7	6	898	306	90	30
Marti	Lokorkor	173	25	100	7	6	719	357	1235	35
Marti	Moru-Akiring	691	0				0	428	512	
Elbarta	Marti	301	60	100	7,11	11.5	1568	92	1717	9
Elbarta	Ngilai	200	0	100	10,11	14.4	0	1019	60	
Elbarta	Masikita	642	0	100	7,11	11.5	0	1530	2681	
	Total	7022					9092	11453	10843	323

LORROKI DIVISION

Location	Sub Location	Area sq.Km.	% of Area	% of Animals	Range Unit	Density	Potential Numbers	Actual WRAP	Numbers DRSRS	Numbe Planni
Poro	Siambu	421	0				0	124	0	
Poro	Seketet	60	50	100	8	5.5	544	81	0	8
Poro	Sirata Oirobi	48	40	100	8	5.5	346	75	0	7
Poro	Nkejemueny	20	100	100	8	5.5	363	47	30	4
Angata	Angata Nanyukie	185	0				0	333	151	
Nanyukie	Loibashai	168	20	100	7	6	559	87	361	8
	Barsaloi	237	0				0	69	0	
Opiroi	Opiroi	323	0				0	281	0	
Opiroi	Mabati	129	0				0	42	0	
Opiroi	Mbukoi	119	0				0	86	0	
Loosuk	Malaso	205	20	100	8	5.5	746	187	0	18
Loosuk	Tinga	147	20	100	8	5.5	536	286	0	28
Loosuk	Loosuk	133	30	100	8	5.5	726	211	0	21
Maralal	Ledero	66	0				0	104	0	
Maralal	Township	53	0				0	42	0	
Maralal	Lpartuk	63	0				0	99	0	
Sukuta	Lolmolok	214	70	100	8	5.5	2728	164	0	16
Marmar	Amaiya	100	0				0	98	0	
	Longewan	90	100	100	8	5.5	1640	135	0	13
	Logorate	67	100	100	8	5.5	1219	145	0	14
	Sukuta Marmar	103	100	100	8	5.5	1876	194	30	19
Kisima	Nauneri	90	75	100	8	5.5	1227	154	0	15
Kisima	Lmisigiyoi	45	100	100	8	5.5	826	51	0	5
Kisima	Lkilorit	143	25	100	8	5.5	648	159	0	15
Kisima	Mbaringon	150	50	100	8	5.5	1360	258	0	25
Lodokejek	Moru	243	0				0	114	0	
Lodokejek	Nonkeek	110	0				0	104	0	
Lodokejek	Lodokejek	153	30	100	8	5.5	834	154	0	15
Lodokejek	Kirimun	124	30	100	8	5.5	676	196	0	19
	Total	4010					16854	4076	572	258

STOCKING RATES WET SEASON GRAZING - CAMELS (TLU)

WAMBA DIVISION

Location	Sub-location	Area sq.Km.	% of Area	% of Animals	Range Unit	Density	Potential Numbers	Actual WRAP	Numbers DRSRS	Numbers for Planning
Ngilai	Swari	803	0	100	11	17	0	892	602	0
Ngilai	Ngare Narok	911	15	100	15,17	10	1366	208	30	208
Ngilai	Ngilai	1002	0				0	728	452	0
Ngilai	Lkisin	177	0				0	265	211	0
Ngilai	Ngogoltin	468	20	100	17	9.5	985	370	60	370
Lodungukwe	Nkaroni	325	0				0	133	572	0
Lodungukwe	Lpus	130	0				0	81	0	0
Lodungukwe	Litrimin	167	0				0	76	0	0
Lodungukwe	Sesia	420	0				0	108	271	0
Wamba	Matakwen	306	25	100	17	9.5	804	110	0	110
Wamba	Kolting	409	0				0	146	0	0
Wamba	Wamba	45	0				0	16	0	0
	Total	5162					3156	3131	2199	688

WASO DIVISION

Location	Sub-location	Area sq.Km.	% of Area	% of Animals	Range Unit	Density	Potential Numbers	Actual WRAP	Numbers DRSRS	Numbers for Planning
Waso	Lerata	319	0				0	95	0	0
Waso	Lengusaka	98	5	100	14	16.4	30	178	90	30
Waso	Remote	76	20	100	14	16.4	93	90	0	90
Waso	Ngutuk Ongiron	239	20	100	14	16.4	291	0	0	0
Waso	Archer's Post	325	20	100	19	3.2	2032	82	0	82
Waso	Losesia	1463	80	100	19	3.2	36576	217	1506	217
Serolipi	Donyo Uasin	574	80	100	17	3.5	13118	0	0	0
Serolipi	Serolipi	1514	90	100	18	3.5	38931	0	422	0
	Total	4608					91072	663	2018	419

Summary of Areas:

Division	Area sq.Km.	Potential Numbers	Actual WRAP	Numbers DRSRS	Numbers for Planning
Baragoi	7022	9092	11453	10843	3234
Lorroki	4010	16854	4076	572	2582
Wamba	5162	3156	3131	2199	688
Waso	4608	91072	663	2018	419
Total	20802	120173	19323	15633	6923

STOCKING RATES DRY SEASON GRAZING - CAMELS (TLU)

BARAGOI DIVISION

Location	Sub Location	Area sq.Km.	% of Area	% of Animals	Range Unit	Density	Potential Numbers	Actual WRAP	Numbers DRSRS	Number Planni
Nyiro	South Horr	407	5	40	5	14.2	57	1010	0	57
Nyiro	Tuum	377	0				0	255	602	0
Nyiro	Parkati	151	0				0	612	0	0
Nyiro	Uaso Rongai	325	20	40	9	9.4	277	276	361	276
Kawop	Losurukoi	477	20	40	9	9.4	406	469	783	406
Kawop	Lonyangaten	360	5	40	9	9.4	77	571	361	77
Ndoto	Latakweny	735	0				0	713	723	0
Ndoto	Lesirikan	728	25	30	10,20	10.2	535	102	271	102
Arsim	Illauti	125	10	20	20	8.6	29	459	0	29
Arsim	Arsim	119	40	20	20	8.6	111	33	0	33
Arsim	Nguronit	273	10	20	15	10.5	52	0	0	0
Nachola	Nachola	254	40	30	7,11	11.5	265	1387	663	265
Nachola	Terter	311	10	20	9,11	13.2	47	1835	633	47
Baragoi	Baragoi	14	0				0		151	0
Marti	Kalele	359	15	40	7	6	359	306	90	306
Marti	Lokorkor	173	25	40	7	6	288	357	1235	288
Marti	Moru-Akiring	691	0				0	428	512	0
Elbarta	Marti	301	60	30	7,11	11.5	470	92	1717	92
Elbarta	Ngilai	200	0	40	10,11	14.4	0	1019	60	0
Elbarta	Masikita	642	0	30	7,11	11.5	0	1530	2681	0
	Total	7022					2974	11453	10843	1978

LORROKI DIVISION

Sub Location	Area	% of sq.Km.	% of Area	Range Animals	Unit	Potential Density	Actual Numbers	Numbers WRAP	Numbers for DRSRS	Planni
Poro	Siambu	421	0				0	124	0	0
Poro	Seketet	60	50	50	8	5.5	272	81	0	81
Poro	Sirata Oirobi	48	40	50	8	5.5	173	75	0	75
Poro	Nkejemueny	20	100	50	8	5.5	181	47	30	47
Angata	Angata Nanyukie	185	0				0	333	151	0
Nanyukie	Loibashai	168	20	20	7	6	112	87	361	87
	Barsaloi	237	0				0	69	0	0
Opiroi	Opiroi	323	0				0	281	0	0
Opiroi	Mabati	129	0				0	42	0	0
Opiroi	Mbukoi	119	0				0	86	0	0
Loosuk	Malaso	205	20	50	8	5.5	373	187	0	187
Loosuk	Tinga	147	20	50	8	5.5	268	286	0	268
Loosuk	Loosuk	133	30	50	8	5.5	363	211	0	211
Maralal	Ledero	66	0				0	104	0	0
Maralal	Township	53	0				0	42	0	0
Maralal	Lpartuk	63	0				0	99	0	0
Sukuta	Lolmolok	214	70	50	8	5.5	1364	164	0	164
Marmar	Amaiya	100	0				0	98	0	0
	Longewan	90	100	50	8	5.5	820	135	0	135
	Logorate	67	100	50	8	5.5	610	145	0	145
	Sukuta Marmar	103	100	50	8	5.5	938	194	30	194
Kisima	Nauneri	90	75	50	8	5.5	614	154	0	154
Kisima	Lmisigiyoi	45	100	50	8	5.5	413	51	0	51
Kisima	Lkilorit	143	25	50	8	5.5	324	159	0	159
Kisima	Mbaringon	150	50	50	8	5.5	680	258	0	258
Lodokejek	Moru	243	0				0	114	0	0
Lodokejek	Nonkeek	110	0				0	104	0	0
Lodokejek	Lodokejek	153	30	50	8	5.5	417	154	0	154
Lodokejek	Kirimun	124	30	50	8	5.5	338	196	0	196
Total	4010					8259	4076	572	2564	

STOCKING RATES DRY SEASON GRAZING - CAMELS (TLU)

WAMBA DIVISION

Location	Sub-location	Area sq.Km.	% of Area	% of Animals	Range Unit	Density	Potential Numbers	Actual WRAP	Numbers DRSRS	Numbers for Planning
Ngilai	Swari	803	0	20	11	17	0	892	602	0
Ngilai	Ngare Narok	911	15	40	15,17	10	547	208	30	208
Ngilai	Ngilai	1002	0				0	728	452	0
Ngilai	Lkisin	177	0				0	265	211	0
Ngilai	Ngogoltin	468	20	10	17	9.5	98	370	60	98
Lodungukwe	Nkaroni	325	0				0	133	572	0
Lodungukwe	Lpus	130	0				0	81	0	0
Lodungukwe	Litrimin	167	0				0	76	0	0
Lodungukwe	Sesia	420	0				0	108	271	0
Wamba	Matakwen	306	25	10	17	9.5	80	110	0	80
Wamba	Kolting	409	0				0	146	0	0
Wamba	Wamba	45	0				0	16	0	0
	Total	5162					726	3131	2199	387

WASO DIVISION

Location	Sub-location	Area sq.Km.	% of Area	% of Animals	Range Unit	Density	Potential Numbers	Actual WRAP	Numbers DRSRS	Numbers for Planning
Waso	Lerata	319	0				0	95	0	0
Waso	Lengusaka	98	5	50	14	16.4	15	178	90	15
Waso	Remote	76	20	50	14	16.4	46	90	0	46
Waso	Ngutuk Ongiron	239	20	50	14	16.4	145	0	0	0
Waso	Archer's Post	325	20	40	19	3.2	813	82	0	82
Waso	Losesia	1463	80	10	19	3.2	3658	217	1506	217
Serolipi	Donyo Uasin	574	80	10	17	3.5	1312	0	0	0
Serolipi	Serolipi	1514	90	10	18	3.5	3893	0	422	0
	Total	4608					9882	663	2018	360

Summary of Areas:

Division	Area sq.Km.	Potential Numbers	Actual WRAP	Numbers DRSRS	Numbers for Planning
Baragoi	7022	2974	11453	10843	1978
Lorroki	4010	8259	4076	572	2564
Wamba	5162	726	3131	2199	387
Waso	4608	9882	663	2018	360
Total	20802	21841	19323	15633	5289