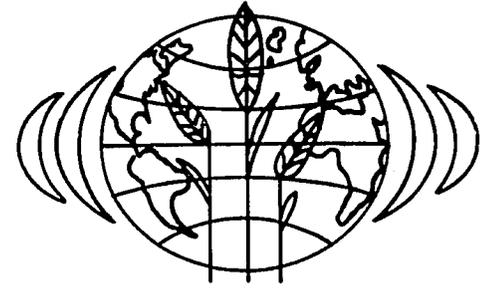


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kisii



**DISTRICT ENVIRONMENTAL
ASSESSMENT REPORT**

**Published by: National Environment Secretariat,
Ministry of Environment and Natural Resources
P.O. Box 67839
Nairobi**

**in cooperation with Clark University
and the United States Agency
for International Development**

August, 1981

NES/CLARK UNIVERSITY/USAID PROGRAMME

K I S I I

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FOREWORD

This Report is the third in a series of District Environmental Assessment Reports, following upon the already published reports for Kajiado and Nyeri districts. The report will be followed by similar reports for Kitui, Murang'a and Nakuru districts which are expected to be published by the first quarter of 1982.

The District Environmental Assessment Report for Kisii District is the result of a collaborative effort between the National Environment Secretariat, a department of the Ministry of Environment and Natural Resources of the Government of Kenya and the Program for International Development of Clark University (USA).

This Report is one of the direct results of the NES/Clark University project on District Environmental Assessment initiated in 1978 by the NES and Clark University with the principal objective of finding ways and means of incorporating environmental considerations into the process of district planning and decision-making. Funding has come from the Kenyan Government and the United States Agency for International Development. The project itself derives its motivation from a number of considerations, chief among them being:

- (i) The consideration that it is a facet of Government policy to bring environmental factors into the mainstream of Government policy-making generally in order to optimise on the use of scarce resources for the overall national good.
- (ii) The consideration that the Government has recognized the district as the primary unit of planning in order to effectively bridge the gap between the grassroots and the higher policy-making levels. To this end the Government has established district development committees to administer policy at the district level as part and parcel of a judicious policy of decentralization of decision-making and policy administration.
- (iii) The realization that the incorporation of environmental considerations at the planning stages of any project or programme would

avoid the costly correction of environmental degradation that would otherwise ensue, and hence the need to ensure the integration of development planning and environmental management objectives at the district level.

Thus this report, parallel to others in the series, is geared toward making a contribution to the implementation and future formulation of the District Development Plan for Kisii District. Its aim is that the development of the District take place without destruction of the resource base upon which it depends so as to ensure a sustained and enhanced quality of life for the people of Kisii. To this end, the report is complementary not only to others in the series but also to other parallel exercises being undertaken by the NES at the provincial and national levels.

The basic framework of the project itself derives directly from the Guidelines for Environmental Management (GEM) developed by the NES and tailored to meet the specific requirements of the district exercise. It is hoped therefore that the recommendations contained in this report, and as they will be refined by a seminar to be organized soon, will form a truly useful basis for the management of the environment of Kisii District in the dynamic context of the development of the District.

I would like sincerely to thank all those persons who have made contributions to the success of this exercise including the following: the District political leadership whose enthusiasm boosted the morale of our researchers; the District Heads of Departments and Ministries who accorded unqualified cooperation and assistance to the researchers the people of Kisii District who provided insights which helped to attune the report to the actual realities of the district and finally, all those persons, including NES researchers, whose contribution to the overall exercise made this report possible.

3

It is my sincere hope that the work and the cooperative spirit shown by the above groups will be sustained during the more important phase of the implementation of the recommendations and findings contained in this report.

M. J. NJENGA

PROJECT MANAGER

DIRECTOR/ENVIRONMENT PROTECTION

T A B L E O F C O N T E N T S

Foreword	iii
Table of Contents	vii
List of Figures	ix
List of Tables	ix
I. INTRODUCTION	1
II. PHYSICAL AND NATURAL ENVIRONMENT	3
2.1 Terrain	3
2.2 Geology	4
2.3 Soils	6
2.4 Climate	10
2.5 Hydrology and Water Quality	11
2.6 Vegetation and Ecology	15
III. HUMAN ENVIRONMENT	18
3.1 Population	18
3.2 Cultural Perception of the Environment	26
3.3 Cooperative Societies and Self-Help Activities	29
IV. LAND USES	32
4.1 Land Tenure and Ownership Patterns	32
4.2 Agriculture	33
4.3 Forestry	48
4.4 Human Settlements and Infrastructure	50
4.5 Commerce and Industry	71
4.6 Employment	76
4.7 Recreation and Tourism	79
V. ANALYSIS OF TRENDS AND IDENTIFICATION OF ENVIRONMENTAL PROBLEMS	81
5.1 Trends	81
5.2 Identification of Environmental Problems	85

VI.	RECOMMENDATIONS.	88
	6.1 Monitoring Trends	88
	6.2 Environmental Problems.	89
VII.	APPENDIX TABLES.	95

F I G U R E S

1	Location Map	2
2	Terrain and Geology	5
3	Soils and Drainage	7
4	Rainfall and Temperature	12
5	Vegetation and Forestry	17
6	Age-Sex Pyramid	22
7	Crop Production	34
8	Proposed Water Projects	54
9	Health Facilities and Secondary Schools	55
10	Proposed Roads	66
11	Infrastructure of Urban and Rural Centers.	68

T A B L E S

2.1	Areas Recommended for Soil Conservation Programmes, 1979	9
2.2	Areas Recommended for Land Reclamation Programmes, 1979	10
2.3	Surface Water Flow Rates	13
2.4	Groundwater Borehole Yield	14
3.1	Ethnic Structure	19
3.2	Population Distribution and Density	20
3.3	Sex Proportions	23
3.4	Population Projection	24
3.5	Historical Events	27
3.6	Cooperative Societies, 1980	29
4.1	Land Tenure and Ownership	32
4.2	Crop Production, Land Use and Agricultural Employment, 1978	35
4.3	Cash Crop Hectarage	37
4.4	Yield Levels of Various Crops, 1980	38
4.4a	Crop Hectarage and Yield, 1977-78	39
4.5	Agro-Chemical Consumption, 1977-78	41
4.6	Coffee Agro-Chemical Consumption, 1978	42
4.7	Existing and Proposed Cattle Dips, 1979	45
4.8	Livestock Diseases. 1978	47
4.9	Source of Household Water Supply	50
4.10	Registered Self-Help Water Projects	52
4.11	Infectious Diseases Reported in Kisii District Hospital, 1979	57
4.12	Educational Facilities in Kisii, 1979	62
4.13	Road Network	65
4.14	Registered Traders, 1979	72
4.15	Industries in Kisii District, 1979	75
4.16	Wage Employment, Kisii District, 1971-1979	77
4.17	Earnings of Wage Employees, 1975-79	77
4.18	Wage Employment by Industry, Kisii Town, 1975 & 1979	78
4.19	Gross Domestic Product, Kisii District, 1972	79

APPENDIX TABLES

A.1	Water Projects Sponsored and Maintained by Central and Local Government in Kisii.	95
A.2	Health Facilities, Kisii District.	97
A.3	Village Polytechnics in Kisii, 1978 (Enrollement for 1978)	102
A.4	Adult Literacy Classes, Kisii District, 1978 and 1979.	103

8

I. INTRODUCTION

Purpose of Environmental Profile

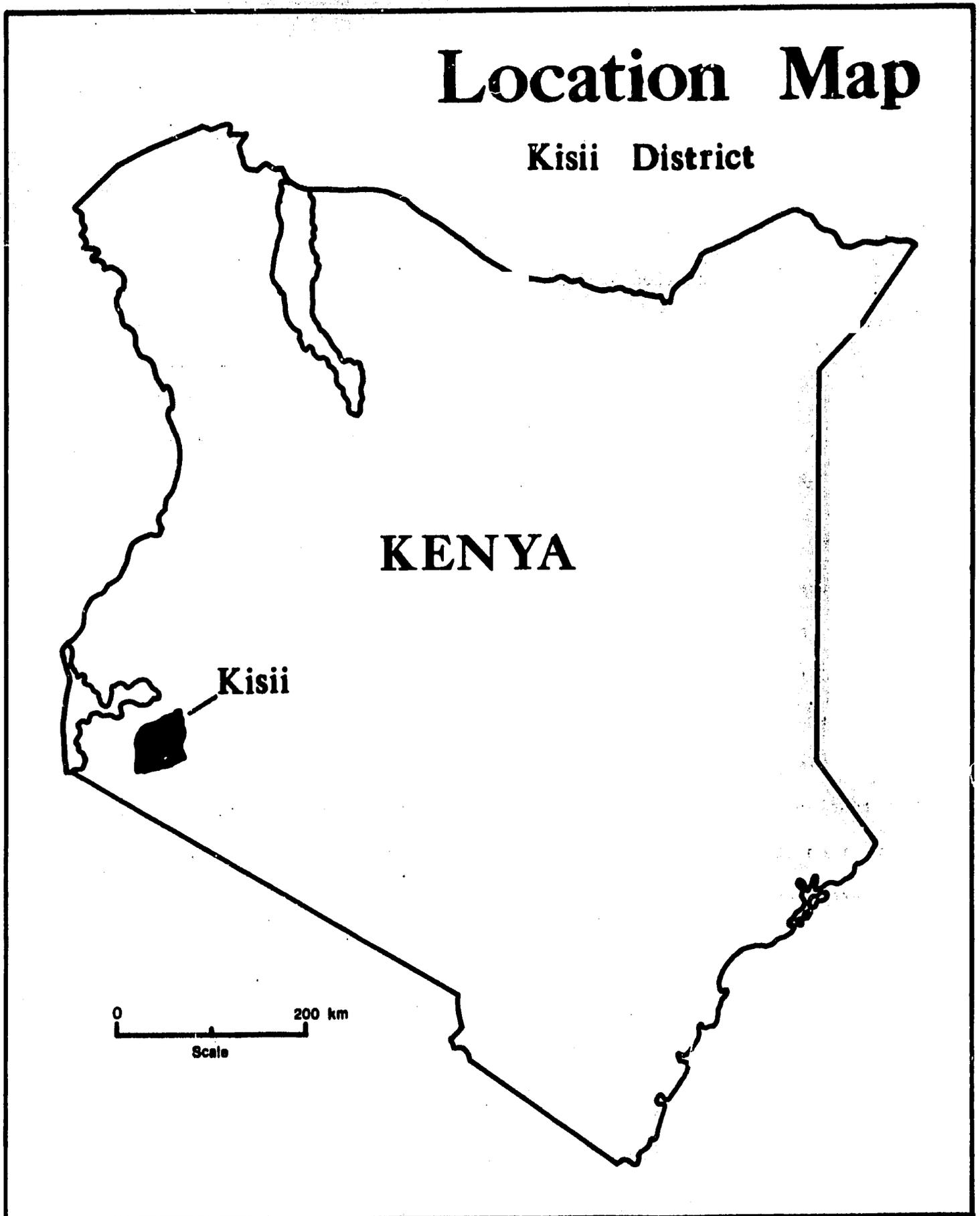
This Kisii District Environmental Assessment Report is the third in a series of district pilot studies. The objectives of this report are twofold:

- (a) to identify environmental pressure points related to development opportunity; and
- (b) to anticipate possible environmental consequences of development.

The pilot studies at the district level fulfil the Government's goal of environmental management as outlined in the present National Development Plan. The Government has recognized the need to develop an information base on the state of the environment and to establish a monitoring system so that changes in environmental conditions can be recognized.

This information system will help identify environmental needs and situations of mismanagement. It will supply basic information required for the identification of corrective measures to conserve the environment for future generations.

Figure 1



II. PHYSICAL AND NATURAL ENVIRONMENT

2.1 TERRAIN

Kisii is a hilly district with few level areas. There are several ridges in the east; towards the northeastern side of the district, the terrain becomes less rugged. The region is dissected throughout by rivers which form a dendritic pattern (see Figures 1, 2, and 3). Much of the western area is between 1,500 and 1,800 metres above sea level and is drained by large rivers. The eastern portion is over 1,800 metres in elevation and includes the Kisii highlands, an area of deeply dissected terrain with an altitude of between 2,000 and 2,350 metres.

Many permanent streams drain the district, the main one being the Kuja River in the southwest and its tributaries, the Mogunga and Umbati. The valley bottoms and depressions are often marshy and waterlogged. The rivers Iyabe, Riana, Nyangore, Magusi and Awach drain the northwest of the district into Lake Victoria. The northern part of the district is drained by the rivers Ober and its tributaries and the Sondu (Figure 3). The southern part is drained by the rivers Magumo and Bromosha while the eastern side of the district is drained by the rivers Meuk and Isogi. Finally, the central portion of the district is drained by several tributaries of rivers including the Kuja, Chira, Omogonga and Nyamacha. The catchment of these rivers is the Kisii highlands which also forms a watershed.

The probability of drought and floods is low because the Kisii highland area receives high reliable rainfall.

The environmental problems associated with the terrain include:

- (1) Reclamation: the marshes reduce the land available for agriculture in this densely populated agricultural district.
- (2) Diseases: marshes provide ideal breeding grounds for vectors of diseases such as malaria.
- (3) Soil erosion: cultivation on the steep slopes in many parts of the district can increase soil erosion.
- (4) Communication: the hilly topography makes road construction and maintenance more difficult.

2.2 GEOLOGY

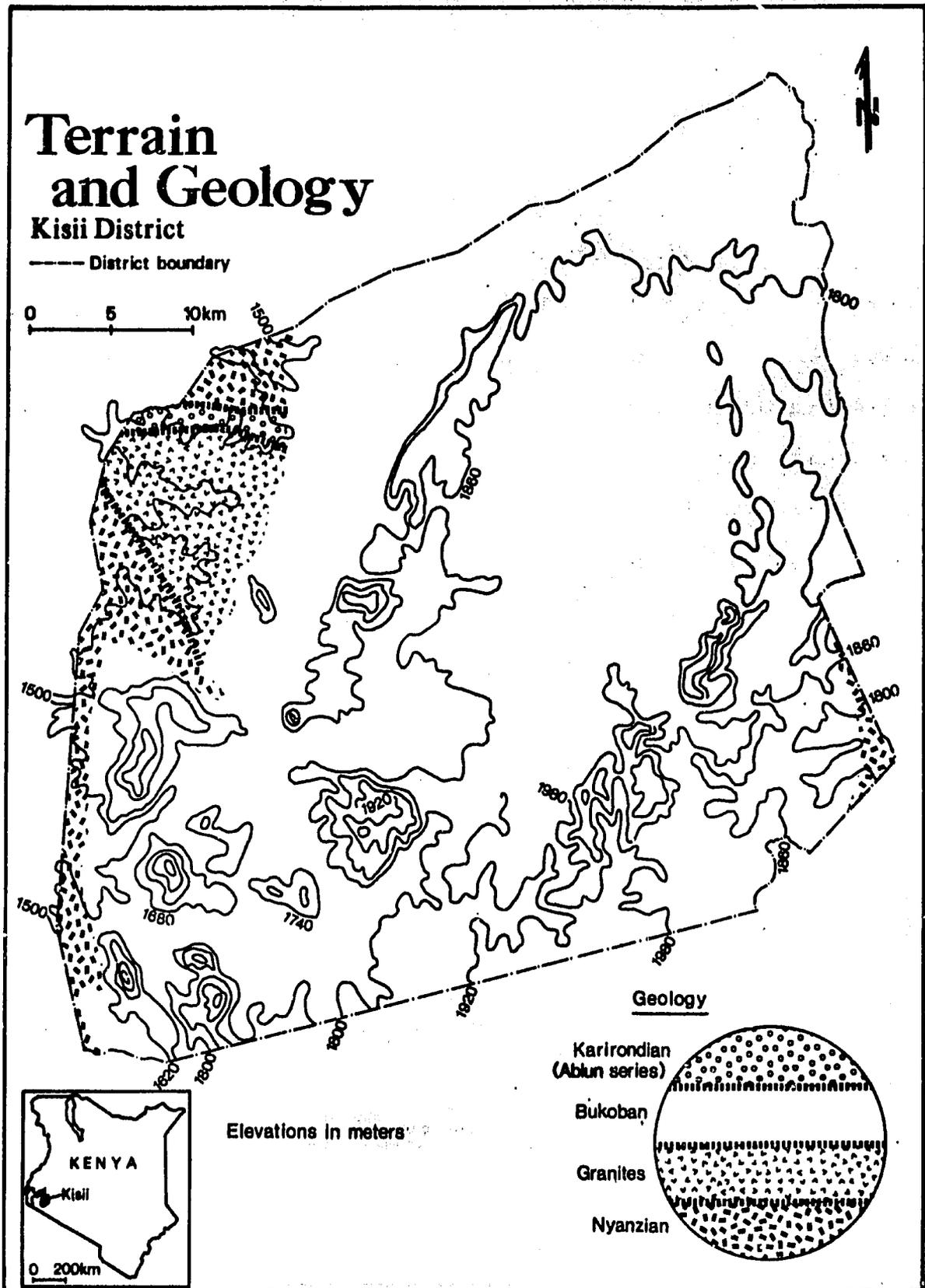
Figure 2 illustrates the geology of Kisii district. The geological base structure of the district consists of the Bukoban, Granitic, Nyanzian and Kavirondian (Ablun series) rocks.

The Bukoban system rock, also known as the Kisii series, predominate in this district. It is a threefold series with upper and lower divisions of lava separated by quartzites. The rocks were formed in the Precambrian era but are considerably younger than the flanking Nyanzian and the Kavirondian systems. There is also an area of granites which have been ejected through the crust during the Precambrian age. Some are of true intrusive origin, others are the product of granitization (the alteration in place of original sediments to granitic rocks).

The Nyanzian system rocks in this area are made up of very thick lava flows, associated with a variable thickness of proclastic rocks and in some places, with lenses of conglomerate, which include other sediments and banded ironstones. Finally, there is an area of rocks of the Kavirondian system of Ablun series which consists of alternating bands of grit or sandstone and mudstones with huge lenses of waterlain conglomerates.

There are no rocks of economic importance apart from building and con-

Figure 2



structional materials, found in small quantities in scattered locations, and soapstone (used for ornamental carving, electrical insulators and blackboard chalk) found in the Tabaka area.

2.3 SOILS

2.3.1 Soil Characteristics

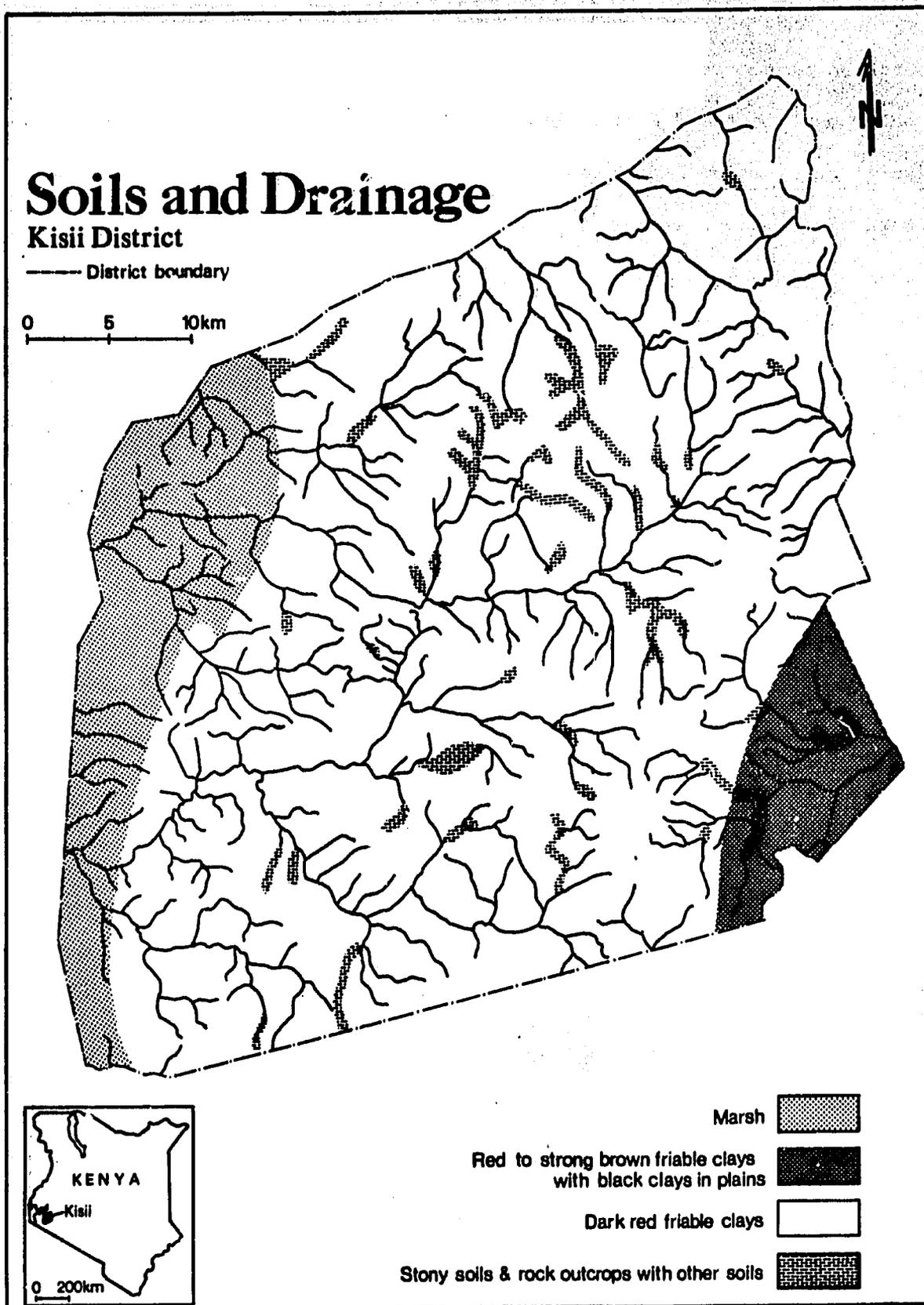
The soils of Kisii district are generally fertile and productive except in a few places where the soil is stony and has rock outcrops. Figure 3 shows the major soil groups found in the district. The soils are broadly classified into three groups. A major portion of the district is covered with dark red friable clays formed over Bukoban rocks. Climatic conditions in this portion of the district make the soils very productive. These soils are deep and rich in organic matter (about 3-7% carbon). The A horizon overlies a dark red (2.5 YR 3/6) subangular blocky friable clay.

Another portion of the district is covered with red to strong brown friable clays with black clays in plains. These soils have a lateritic horizon and medium organic matter content (2-3% carbon). There is a possibility of having iron concretions which may become massive with depth. The fertile but difficult to work black cotton soils (grumosolic) are found in alluvial plains. The black cotton soils crack when dry and expand when wet and are less likely to erode than other soils.

The third area is covered with rock outcrops and other soils which have been subjected to geological and recent accelerated erosion and have lost their original characteristics. They are shallow and less productive than the other soils found in the district.

Since a detailed soil survey of the area has not been prepared, information on important soil characteristics such as fertility, slope,

Figure 3



erosion potential, moisture, etc. is not available.

2.3.2 Soil Conservation

Although Kisii district is a hilly area, soil degradation due to erosion is not generally a serious problem. The level of environmental management in the district generally is above average, with many recommended soil conservation measures being implemented. The sheet erosion which does take place is not at a level that causes serious concern, although it may over time decrease crop yields and may then be recognized as a problem.

There have been no major floods in the district, and the probability of having drought and bush fires is low. The soil conservation measures used to date include cut-off drains (training banks), grass stripping, trash lining, terracing (bench terraces and narrow and broad-based terraces), contour farming, afforestation, strip cropping and the control of stocking rates. Indiscriminate felling of trees, burning of vegetation and cultivation along river banks and on steep slopes is discouraged. In 1978, there were 7,191 metres of grass strips, and 84,006 metres of cut-off drains. During the same year, 28,820 trees were planted in the district. The high stocking rates, however (see Section 6.2.2), increase the probability of soil degradation. Areas that have been recommended for soil conservation programmes in the district are listed in Table 2.1.

2.3.3 Land Reclamation

There are many swampy areas in the district whose soils are poorly drained (refer to Figure 3). Several of these have already been drained or reclaimed in order to make land available for cultivation and to control vectors (i.e., carriers) of diseases. Areas recommended by the Ministry of Agriculture for reclamation programmes are listed in Table 2.2.

1/10

**TABLE 2.1 AREAS RECOMMENDED FOR SOIL CONSERVATION PROGRAMMES
IN KISII DISTRICT - 1979**

<u>AREA</u>	<u>LOCATION</u>	<u>DIVISION</u>
Nyaribari	N. Mugirango	Nyamira
Nyangoso	W. Mugirango	do
Bundo	do	do
Kabosi	Nyaribari Chache	Irianyi
Kiriwa	do	do
Taracha	do	do
Irondi	Nyaribandi	do
Gesusu/Iberia	do	do
Ikorongo	do	do
Emborogo	do	do
Nyamasibi	do	do
Emaagara	do	do
Nyanguru	do	do
Semeta hill	Bassi Chache	Ogembo
Gionseri hill	do	do
Turwa	do	do
Ritumbe	do	do

SOURCE: Ministry of Agriculture

TABLE 2.2 AREAS RECOMMENDED FOR LAND RECLAMATION PROGRAMMES,KISII DISTRICT - 1979

<u>Area</u>	<u>Location</u>	<u>Division</u>
Isoge Settlement Scheme	Borabu	Nyamira
Sere	N. Mugirango	do
Nyakimicha	W. Mugirango	do
Nyagachi	do	do
Nyaturago Swamp	Nyaribari Chache	Irianyi
Mogunga Swamp	Basi Birabu	do
Nyasike Swamp	Nyaribari Masaba	do
Iranga Swamp	do	do
Masimba Swamp	do	do
Itibo Pond	do	Ogembo
Sameta Pond	do	do
Egetubi Market Pond	do	do
Nyamache Chiefs Camp Pond	do	do

SOURCE: Ministry of Agriculture

2.4 CLIMATE

Kisii district lies within the highland equatorial climate zone of Kenya, a zone characterized by high altitude and high rainfall. There are no pronounced climatic variations in the district as found in other parts of Kenya because the topography is not very varied.

There are two rainfall maxima, March to June (long rains) and October to December (short rains). Rainfall is reliable with more than 1,500 mm expected per year. The rain that falls is mainly relief in

nature and is influenced by Lake Victoria. Figure 4 shows that the area of Kisii town receives more than 2,000 mm of rain annually. Rainfall dwindles outwards from the Kisii township area to about 1,524 mm/yr in both the northern and the southeastern sections of the district.

Data is lacking on rainfall intensity and variability and on potential evaporation and evapotranspiration. From the available information, it can be concluded that the southeastern part of the district is wetter than other sections because although rainfall is not as high as in the area around Kisii township, the high evaporative demands in the latter area reduce the amount of available water, making it drier than the southeastern part of the district.

The warmest part of the district is the northwest where the mean minimum annual temperature is between 14°C and 18°C. The mean minimum annual temperature in the rest of the district is between 10°C and 14°C. Both the northwestern and the northern parts of the district have a mean maximum annual temperature of between 26°C and 30°C, while the rest of the district has a mean maximum annual temperature of between 22°-26°C.

2.5 HYDROLOGY AND WATER QUALITY

Table 2.3 presents the data on flow rates of the Kuja River just outside the district (Gauging Station 1KB8) and near Nyandoche (Gauging Station 1KB4). The discharge of the Kuja River is relatively high most of the time. Records are not available for other rivers but, due to the climate of the district, surface water flow is maintained in most years in most rivers and streams.

Table 2.4 presents the yield of boreholes in the district. This indicates that large quantities of water are available underground in the

Figure 4

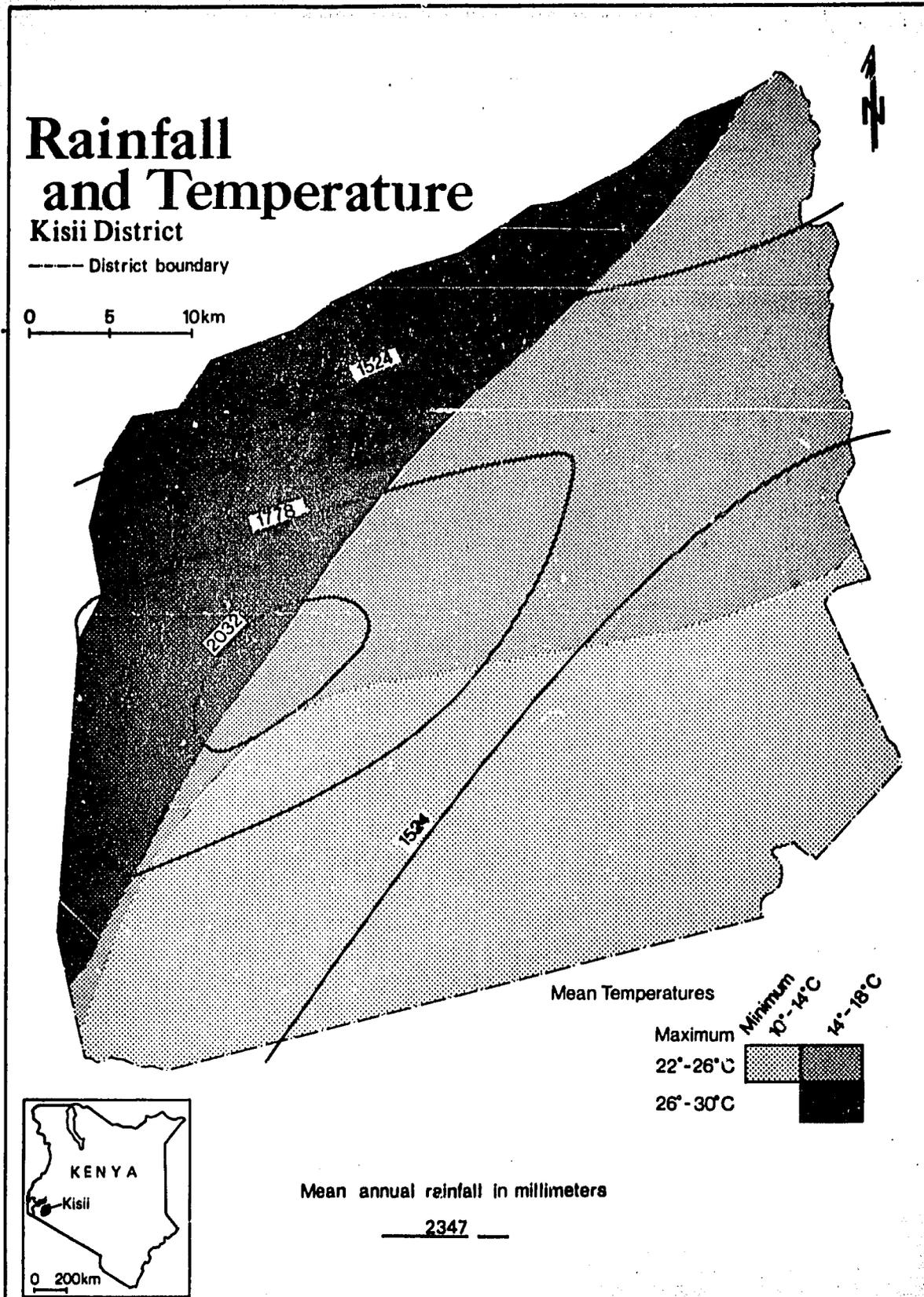


TABLE 2.3 SURFACE WATER FLOW RATES IN CUSECS - KISII DISTRICT

RIVER/GAUGING STATION	1958	1959	1960	1961	1965	1966	1967	1968	1969	1970	1971
Kuja (just outside the district)	N/A	N/A	N/A	N/A	1786	1980	4260	6170	3080	2630	1540
1KB8					348	424	591	819	511	N/A	N/A
					51.7	92.2	44.0	97.5	102	1240	384
Kuja (Near Nyandoche)	480.0	128.0	911.0	1480.0							
1KB4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	20.0	16.0	20.0	18.0							

KEY: 1st figure represents maximum flow rate
 2nd figure represents mean flow rate
 3rd figure represents minimum flow rate

SOURCE: Ministry of Water Development

22

TABLE 2.4 GROUNDWATER (BOREHOLE YIELD) - KISII DISTRICT

	NAME AND NUMBER OF BOREHOLE	TOTAL DEPTH (M)	DEPTH AT WHICH WATER WAS STRUCK		YIELD	QUALITY/USE
			1ST(M)	2ND(M)		
1.	1.5 km S.E. of Kisii town. 3125	62.18	48.16	N/A	0.27m ³ /hr	good taste
2.	Ditto 3126	121.92	21.95	N/A	11.82m ³ /hr	good
3.	South Mugirango Adm. Centre 4310	200	28	114.3	0.327m ³ /hr	public use temp. 23°C pH 8.2 poor quality
4.	Church of God/Iboni 2989	60.96	41.15	57.0	0.382m ³ /hr	slightly cloudy
5.	Kiamokama Tea Factory Keroka 4303	138.1	9.14	56.5	11.86m ³ /hr	pH 6.4 Good for both domestic use and irrigation
6.	Musa Nyandusi 4490	66	12	48.7	28.64 ³ /hr	sweet, no odour domestic and agricultural use
	Averages	124.8	25.53	85.7	7.653m ³ /hr	

SOURCE: Ministry of Water Development

district. Information on the quality of groundwater suggests that only one of six boreholes has alkaline water (pH 8.2), the rest being of good quality. Borehole water is used for domestic purposes but is also good for agricultural use.

Although basic technical data on surface water quality is lacking, it has been reported that surface water in the district is being polluted, mainly by coffee effluents. Improper waste disposal systems are principally responsible for the coffee effluent problem. Work done by Thitai (1978) shows that 65.1% of the factories inspected had recirculation systems while 51.2% had pits of sufficient capacity.

Since Kisii is an agricultural district producing crops and livestock (with dairying), pollution of soil and water by agricultural fertilizers and pesticides will be of growing concern (see Table 4.5, pg. 41). The use of fertilizers and pesticides to maintain or increase crop yields is likely to increase, and without judicious usage of these agro-chemicals, surface water pollution will occur. In addition, the need to control livestock ecto-parasites such as ticks in order to eliminate tick-borne diseases (see Table 4.8, pg. 47) will enhance the use of acaricides and thus also pose a problem of pollution. Consequently, there is an urgent need to monitor the chemical, biological and physical quality of the water in the district.

2.6 VEGETATION AND ECOLOGY

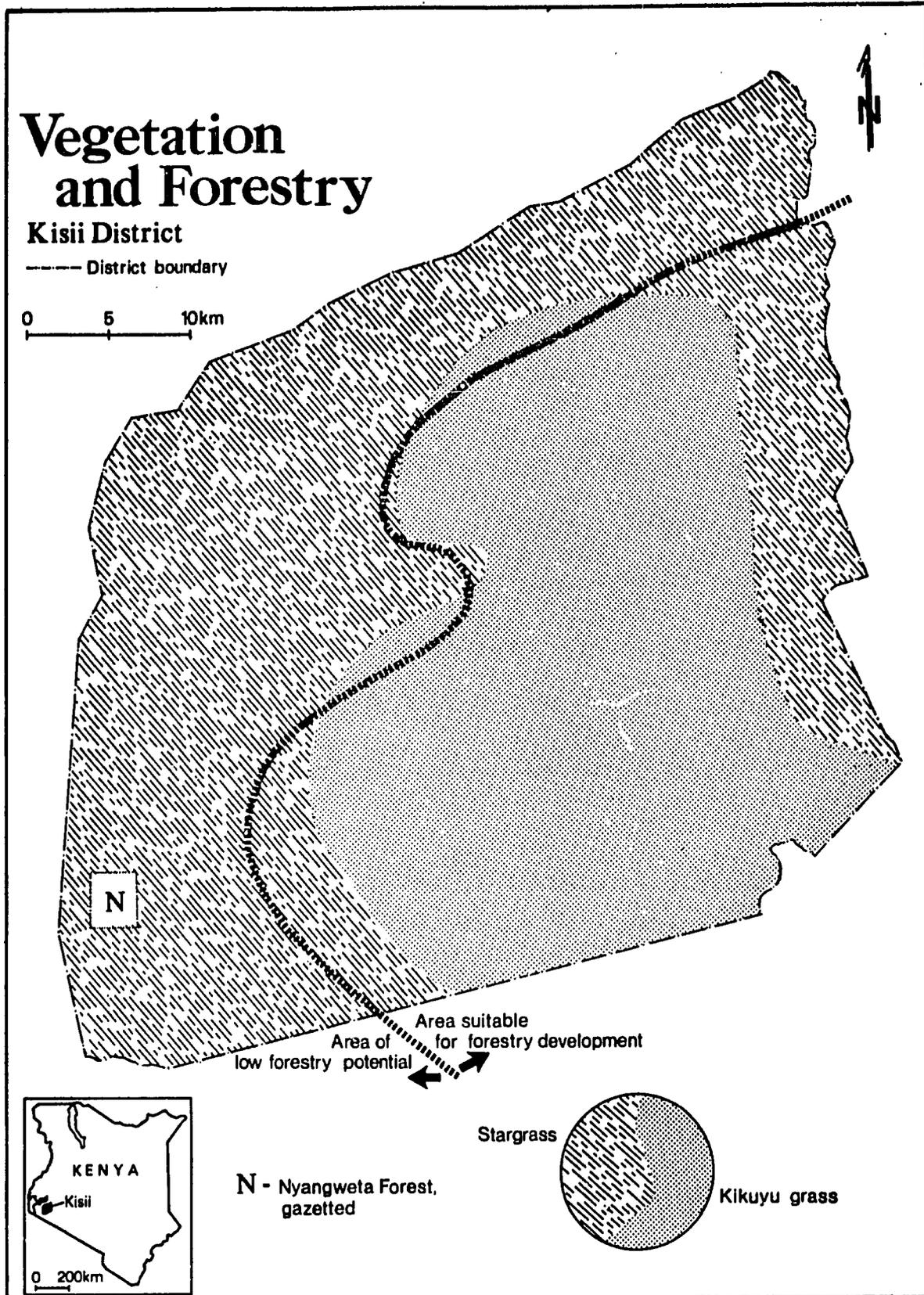
Kisii district is a 'high potential area.' The vegetation of the district is broadly classified as wooded and bushed grassland with scattered or grouped trees. The canopy cover is less than 20%. These trees are mixed with scattered or grouped shrubs also having a canopy cover of less than 20%. Because of impeded drainage, there are several marshy areas which have

characteristic plant communities, including reeds, sedges, rushes, some trees and shrubs, and aquatic species.

The district can be classified into two major ecological zones according to ecological potential and dominant vegetation species (see Figure 5): the Kikuyu grass zone and the star grass zone. The Kikuyu grass zone is found at altitudes above 1,800 metres above sea level and covers the southeastern portion of the district referred to as the Kisii highlands. The vegetation in this area consists of forests and derived grasses and bushes with or without natural glades. The dominant grass species is Kikuyu grass (Pennisetum clandestinum). Potential use of this zone include forestry (with local wildlife and tourist development) and intensive agriculture, including pyrethrum, coffee, tea, vegetables, fruits and potatoes. Maize is not particularly well suited, but the area is also suitable for intensive dairying. The natural grassland, under intensive management, supports one stock unit per one to one and one-half hectares depending on grassland type. The most economical use of the land would be to concentrate on cash crops such as tea, pyrethrum, vegetables and milk and to import maize, which is a staple food here.

The star grass zone is found at altitudes of 1,500 to 1,800 metres above sea level where temperatures are warmer than in the Kikuyu grass zone. The vegetation is of variable cover, consisting of wood, bush or savanna grasses. The trees are characteristically broad-leaved (e.g , combretum), and the larger shrubs are mostly evergreen. The dominant grass here is star grass (Cynodon dactylon). The potential for forestry is poor; however, the agricultural potential is high, with emphasis on ley farming. Under close management, the stock-carrying capacity is less than 2 hectares per stock unit. The area is too dry for tea.

Figure 5



III. HUMAN ENVIRONMENT

3.1 POPULATION

3.1.1 Ethnic Structure

The people of Kisii district are predominantly Kenyan Africans of the Gusii community as the district is their traditional homeland. The other ethnic groups are either engaged in commerce or have come to Kisii as civil servants or because of favorable agricultural condition. Table 3.1 shows the ethnic distribution, including non-Kenyans, as of the 1979 census. The Gusii comprise 98% of the total population.

3.1.2 Population Distribution

The overall 1979 population density for Kisii is 392 persons per km², making it the most densely populated rural district in the country. Population and density by divisions are given in Table 3.2. Even though climate and good soil management ease acute population pressure in some divisions like Irianyi and Bosongo, the agricultural areas are facing ever increasing pressure for available land. (For comparison, the second most densely populated district, aside from Nairobi, is Kakamega, with a 1979 population density of 294 people per km².)

TABLE 3.1 **ETHNIC STRUCTURE - KISII DISTRICT, 1969**

<u>Tribe or National Group</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>
Kenyan African	422,563	445,090	867,653
Kisii	414,306	437,483	851,789
Luo	4,131	3,739	7,870
Luhya	1,297	1,590	2,887
Kikuyu	904	732	1,636
Kamba	455	346	801
Kalenjin	410	314	724
Others	1,060	886	1,946
Kenyan Non-African	289	355	644
Asian	82	82	164
European	1	1	2
Arab	5	3	8
Other Kenyans	201	269	470
Non-Kenyans	598	617	1,215
Africans	343	395	738
Asian	110	91	201
Europeans	64	58	122
Arabs	37	23	60
Others	27	39	66
Not Stated	17	11	28
TOTAL	423,450	446,062	869,512

SOURCE: 1979 Census.

TABLE 3.2 POPULATION DISTRIBUTION AND DENSITY

Division	Area (Km ²)	1969		1979		% Increase in Popula- tion
		Popula- tion	Density (pop/Km ²)	Popula- tion	Density (pop/Km ²)	
Manga	464	191,245	412	214,708	463	12
Irianyi	300	93,781	313	147,419	491	26***
Bosongo	335	85,666	256	118,158	353	38
Nyamira	654	150,032	229	198,308	303	32
Ogembo*	459	148,237	323	190,919	416	29
Kisii Township	3	6,080	2,156	(29,661)**	9,887	388
TOTAL	2,215	675,041	304	869,512	392	29

SOURCE: 1969 Census, 1979 Census

NOTES

- * Ogembo division was formed after 1969. Figures for 1969 are based locations included in the division.
- ** In the 1979 Census, Kisii Township is included in Irianyi Division; in the 1969 Census, it was counted separately.
- *** Percent increase does not include Kisii Township.

Distribution by sex ratios (see Table 3.3 and Figure 6) indicates that significant female majorities begin in the age 15-19 cohort and continue almost up to age 50. This pattern suggests the males in the economically active years leave the district, probably for Nairobi, seeking wage employment.* After their mid-40's they begin to drift back to the district and their families. This migration contributes to the high dependency ratio in the district: almost 57% of the population in 1979 was under 15 or over 60 years of age. The 1969 census showed a comparable dependency ratio of 59%. The age-sex ratios in 1969 also indicated a similar pattern of male outmigration, though not quite as extensive as in 1979: significant female majorities appeared only in the 20-39 age groups. This suggests that migration out of the district in search of employment is beginning in younger age groups and continuing until later in life than was true in the past.

3.1.3 Growth Rate and Population Projection

The 1969 census recorded 675,041 persons in Kisii district with a growth rate of 3.7% and an overall density of 304 persons per square kilometer. According to the recent census of 1979, the district has a population of 869,512 persons, implying a net annual growth rate over the 1969-79 decade of 2.56%. Most likely, the reason the growth rate was lower than predicted was because of outmigration from the district rather than a decline in fertility or increase in mortality. This is stimulated by the high population densities and overcrowding in most of the district, which has caused excessive land fragmentation, a generally lowered standard of services, and environmental degradation. Interestingly, 1969 migration statistics show a net immigration to Kisii district, primarily from Nairobi. Evidently, this pattern changed dramatically in the succeeding decade.

* At the time this report is being written, detailed migration figures from the 1979 census which could indicate the precise extent of outmigration from Kisii district have not yet been made available.

29

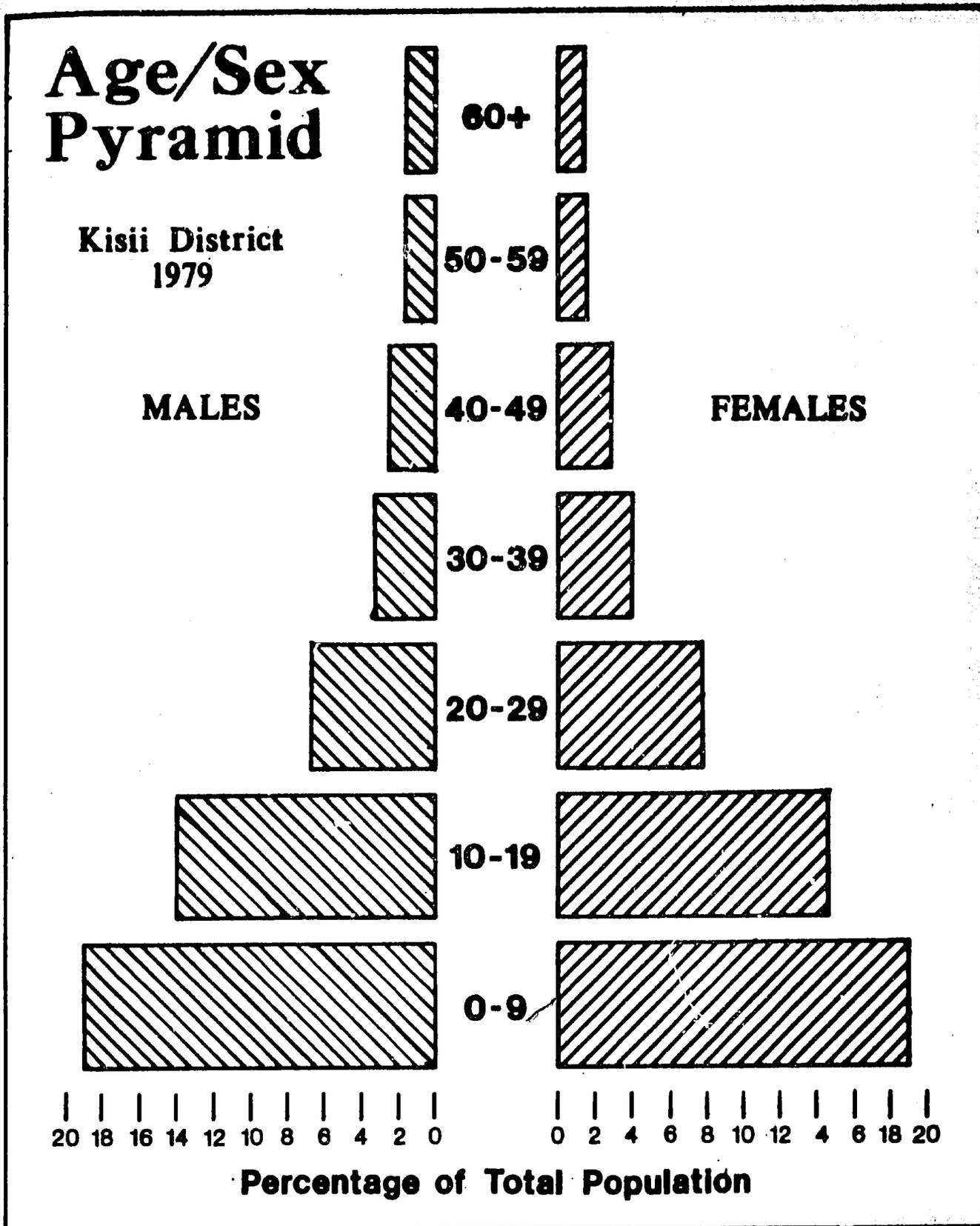


TABLE 3.3

<u>Age</u>	<u>SEX PROPORTIONS</u>					<u>Age Group as % of Total Population</u>
	<u>Males</u>	<u>%</u>	<u>Females</u>	<u>%</u>	<u>Total</u>	
0-4	89,925	49.98	90,008	50.02	179,933	20.69
5-9	75,383	49.72	76,247	50.28	151,630	17.44
10-14	66,942	50.64	65,261	49.36	132,203	15.20
15-19	54,633	47.66	60,000	52.34	114,633	13.19
20-24	34,377	46.08	40,233	53.92	74,610	8.58
25-29	23,053	45.60	27,498	54.40	50,551	5.81
30-34	16,862	46.65	19,280	53.35	36,142	4.16
35-39	12,143	43.61	15,699	56.39	27,842	3.20
40-44	11,578	46.56	13,288	53.44	24,866	2.86
45-49	10,286	48.16	11,073	51.84	21,359	2.46
50-59	13,501	50.07	13,465	49.93	26,966	3.10
69-69	8,362	52.01	7,715	47.99	16,077	1.85
70+	5,655	50.65	5,510	49.35	11,165	1.28
Not stated	750		785		1,535	
TOTAL	423,450	48.70	446,062	51.30	869,512	100.00

SOURCE: 1979 Census data

Projecting that population will continue to increase at a net annual rate of 2.56% gives the following figures:

<u>Year</u>	<u>POPULATION PROJECTION</u> <u>Population in Thousands ('000)</u>
1980	892
1985	1,012
1990	1,143
1995	1,292
2000	1,460

Clearly, however, the rate at which Kisii's population grows will be very sensitive to migration trends.

3.1.4 Population Carrying Capacity

These projections indicate that between 1980 and 2000, the population of Kisii district may increase by more than 60%. The 1979-83 District Development Plan for Kisii estimates that 83% of the population derives their livelihood from agriculture, either as the major income source or from subsistence food crops or both. This implies that the district may be reaching the limit of its ability to supply the subsistence needs of the population. If the minimum area required for subsistence is 0.3 ha per person, and given arable land in the district of 189,100 ha, then about 630,000 people can be supported by subsistence cultivation. In addition, the 240,000 head of cattle in Kisii can support about 60,000 people, bringing the total agricultural carrying capacity to approximately 700,000 people.

Thus, there will be a need over the next two decades for a regular increase in non-agricultural employment opportunities. Otherwise, it is likely that the rate of out-migration from Kisii district will continue to rise.

3.1.5 Family Planning

To date, there has been little interest in family planning in Kisii district despite the high population pressure. There are strong traditional values that constitute a barrier to the acceptance of modern contraceptives. As a result, the district now finds itself facing the problem of excessive population, which has reached a critical stage in relation to available resources.

Although modern family planning methods were introduced in to the district in the early years of independence, little progress has been achieved. Currently, family planning services in the district are provided by the Ministry of Health, and the Family Planning Association of Kenya has five family field education officers in Kisii. There are 15 established family planning clinics, four missionary family planning clinics and 15 centres served by one mobile unit.

The family planning program has a target population (i.e., women aged from 15 to 49) of 146,600. Of these, only 3.7% have shown some interest in family planning. These services are provided alongside other important services such as child-welfare, prenatal care and nutrition training.

There are various problems affecting family planning activities in the district. First, there is a shortage of family planning personnel, which limits the amount of services offered. Second, there are problems of transportation, making access to centres very difficult especially during the rainy season. Third, family planning may not yet have been properly introduced to the people. The current strategy may raise more suspicion than provide comfort to the prospective candidates. Efforts to make people more aware of the benefits of family planning include addressing local barazas and women's groups on family planning issues. There is a need for comprehensive research into the attitudes of Kisii people towards

family planning with a view to devising appropriate methods acceptable to the people.

Improving the standards of living, one method of reducing family sizes, is a slow process in Kisii, as it is elsewhere. Decentralizing services and industrial development in the rural areas are measures that would help to achieve this goal.

3.1.6 Problem Summary

The economic implications of Kisii's high growth rates are:

- (1) The district's capital resources will be strained over the remaining years of this century, as it attempts to develop as rapidly as possible to accommodate population growth.
- (2) Standards of living and the quality of life will also decline.
- (3) The environment will be threatened, e.g., as fragmentation of land in fertile areas reduces land productivity.

3.2 CULTURAL PERCEPTION OF THE ENVIRONMENT

3.2.1 The Environment in History

The Gusii are a small highland Bantu tribe who dwell in the most southerly portion of the cool, fertile western section of the Kenya highlands. Three centuries prior to their establishment on the highlands, the Gusii were predominately pastoralists who also practiced small scale agriculture and fishing in a mixed subsistence economy. Apart from cattle, goats and sheep which the Gusii kept in large numbers, and finger-millet and sorghum which they cultivated, the Gusii also ate root-plants, yams, pumpkins, fowl, vegetables and fruits. With migration to the highlands, a colder and wetter environment, their basic economy underwent a radical change. The highland ecology with heavily forested slopes did not provide

sufficient pasture for their cattle. Large numbers of their cattle were also stolen by their neighbors, while an equally large number died because of the cold and wet conditions. Over time, the Gusii turned increasingly to agriculture which was very successful in the fertile highland country. They were friendly with the neighboring Luo, which left distinct marks on their culture, but were not on friendly terms with the Maasai and Kipsigis.

Famine, disease and natural phenomena marked important dates in their history. People born in those periods are named after the events and many older Gusii tell their age from these events.

TABLE 3.5 HISTORICAL EVENTS

1915	- Rabies
1916	- Plenty of insects
1916	- Ashes or flour fell from heaven and cows ate it
1917	- Great famine in the district. Sakegwa's son misled the Gusii people. He told them that food will come from heaven and therefore they should not prepare their gardens for planting. As a result, great famine occurred in the district. (Sakagwa was a respected seer in Gusii land.)
1927	- Small type of locusts spoilt crops
1928	- Locust invasion
1931	
1934	- A kind of disease called "ekiembenani" appeared
1941	- Local elders started listening to dispute in villages
1948	- Eclipse of the sun
1961	- Floods in Kisii. These floods affected the whole country and this followed great famine in the district.
1962	- Army worms invaded the district

- 1973 - Eclipse of the sun
 1979 - Another eclipse of the sun

3.2.2 Religion

The traditional religion of the Gusii people consists largely of a cult of dead ancestors and supernatural beings whom they believed lived in the sky. There is no priestly hierarchy, and the ritual observances involve commemorative sacrifices to the fathers and grandfathers. The lack of shrines or sacred places in the Gusii religion implies a low level of concern with conservation of trees or other natural features for religious purposes. Traditionally, the Gusii people were nomads and did not preserve burial places. It is therefore common for them to sell lands where their ancestors are buried. Even today, burial places are not especially sacred.

3.2.3 Significant Natural Features

There is no religious prohibition against cutting any particular type of tree, but there are two trees that have special significance in Gusii culture: the Omotembe and Omosabakwa trees. The Omotembe is important because it is where people used to take their oaths. It was also used to mark land boundaries and for healing diseases (e.g., mumps). It was probably because of its traditional medical use that, more than any other tree, the Omotembe was the site of choice for oath taking. The Omosabakwa is believed to give fertility to the soil and is also used for making fire. It is not uprooted or used for building purposes.

There is a particular regard for trees among the Gusii, and most compounds, even if small, have at least two to five trees which are used for domestic purposes such as shelter, building and firewood. The Gusii have also worked hard to replant trees in their shambas to assure a supply of new growth.

3.2.5 Summary

The main observation gathered from the interviews is the Gusii's lack of symbols for cultural reference. This may be related to their nomadic roots. On the other hand, it may well be that source of the traditional practices of this particular group have disappeared with time. The change to intensive agriculture requiring the use of every available piece of land may have precluded preserving sites for historical or cultural heritage.

3.3 CO-OPERATIVE SOCIETIES AND SELF-HELP ACTIVITIES

3.3.1 Co-operative Societies

Co-operatives play an important role in promoting agriculture, particularly cash crop farming, in the district. Table 3.8 shows the number and membership of co-operative societies in Kisii district.

TABLE 3.6 CO-OPERATIVE SOCIETIES IN KISII, 1980

	<u>Type</u>	<u>Number</u>	<u>M E M B E R S H I P</u>	
			<u>Actual</u>	<u>Active</u>
1.	Coffee Societies	26	73183	65159
2.	Pyrethrum	27	57030	40504
3.	Settlement (milk & pyrethrum)	9	1550	1036
4.	Savings Cooperatives	6	13300	13300
5.	Farm purchase	1	1000	1000
6.	Building Construction	1	-	-
7.	Multipurpose (Tea/Dairy)	1	80	80
8.	Consumer Cooperatives	1	30	30
9.	Gesarara Coffee Society	1	3507	3405
	TOTAL	<u>73</u>		

SOURCE: Ministry of Co-operative Development

The above Societies are under the umbrella of three main co-operative unions:

1. Kisii Farmers Co-operative Union, formed by the coffee, settlement, farm purchase and some pyrethrum societies.
2. Masaba Farmers' Co-operative Union, serving mainly the pyrethrum societies of Masaba area.
3. Kenya Union of Co-operative Savings and Credit Society, to which the savings and credit societies in Kisii district are affiliated.

The above unions provide a number of services to the member societies, including accounting services and assistance in the marketing of farmers' proceeds, e.g., with transportation and pricing. They also oversee the day to day work (through inspection and supervision) of affiliated co-operative societies and attend their committee and general meetings in an advisory capacity. Finally, they provide training and education on co-operative matters to co-operative leaders and members through the local farmers' training centres and the co-operative college of Kenya.

Co-operative societies in Kisii face a number of problems. Poor management practices have in some cases resulted in mismanagement of affairs and misappropriation of funds. Interference from local and clan sources, e.g., through nepotism and favouritism in recruitment of personnel, has been a problem and has impeded the smooth running of the societies. Poor transport and communication have limited the work and efficiency of the societies. And finally, fluctuations in agricultural commodity prices have tended to discourage farmers and render planning more difficult.

3.3.2 Self-help Activities

Self-help efforts by local communities have been an important part of the strategy of development in Kenya. In Kisii, self-help activities have been directed towards the improvement of the people's social and economic

welfare, including the provision of basic infrastructural services.

Self-help activities range from small gatherings organized to carry out or raise funds for small local projects to huge fund-raising rallies for major projects such as polytechnics and hospitals.

Much self-help work in the district has been directed towards agricultural projects. These are normally performed by small local groups and involve planting, digging and harvesting of such crops as pyrethrum, tea, and coffee and poultry keeping. Groups undertaking these projects, mainly women, also help to construct houses for their members.

There are also a number of socially oriented self-help activities, such as constructing nurseries or day care centres and primary and secondary schools. There are 196 nurseries in the district, built mainly through the self-help efforts of the local people. In addition, the local communities are responsible for constructing primary and harambee secondary schools. In 1980, external aid to self-help projects amounting to Sh. 118,000 was received from C.A.R.E. (The Co-operative of American Relief Everywhere.)

Nonetheless, the development of such communal facilities as school buildings, dispensaries and water schemes in Kisii has lagged behind that of other districts. Problems facing the self-help activities include financial mismanagement and political squabbles. Many self-help projects are also poorly planned and suffer from a lack of co-ordination and integration with the larger development programmes of the government. As a result of their administrative and financial problems, they are often unable to meet their expenses. There is an urgent need, thus, to improve the planning and co-ordination of the self-help movement in the district.

IV. LAND USES4.1 LAND TENURE AND OWNERSHIP PATTERNS

Land categories in Kisii district are of several types but the predominant category is smallholder units, as indicated in Table 4.1.

TABLE 4.1 LAND TENURE AND OWNERSHIP

	<u>Sq. km</u>	<u>%</u>
Government Land	69	3
Smallholder Freehold	179	8
Trust Land		
Forest	1	-
Townships	29	1
Registered Smallholders	1817	83
Not Yet Registered	<u>101</u>	<u>5</u>
TOTALS	2196	100%

SOURCE: Statistical Abstract, 1979

From the table, it can be seen that all but 5% of the land in Kisii district is already settled or in use. Of this, 91% is in smallholder usage, either as trust or freehold land. One square kilometre is set aside as forest preserve and an additional 29 square kilometres are given over to townships. These figures further explain why the land pressure problem in Kisii is so intense and why additional population growth poses a serious resource problem.

Of the total 221,700 hectares in the district, approximately 40% is in crops, 50% in grass or fallow, and the remaining 10% is comprised of market-places, townships, roads or areas such as rock outcrops, steep slopes and swamps. Land fragmentation is a serious problem with the average holding

only 1.9 hectares. (See section 3.1.5 for a discussion of the land's carrying capacity.)

4.2 AGRICULTURE

4.2.1 Crop Production

Most of Kisii district is high potential land suitable for both crop and livestock production. About 40% of the district is cultivated and another 50% is in grass or fallow. While the southeastern portion of the district, referred to as the Kisii highlands, is suitable for cash crop production, the rest of the district (which is warmer and receives less rain) is more suitable for livestock production and subsistence cropping.

Table 4.2 provides data on agricultural holdings and employment in the district as a whole and the various divisions. The table shows that out of 98,351 farms, only two are large scale farms. While small scale farms average between 1.4 and 2.2 hectares, the large scale farms are as large as 2,126 hectares. Both of the large scale farms are in Nyamira division with multiple ownership of up to seven members.

Mixed farming is widely practised in the district. This involves mainly cattle/crop, sheep/crop and goat/crop combinations. About 114,783 hectares are under multiple cropping. The main crops grown include coffee, tea, maize (local and hybrid), finger-millet, sorghum, groundnuts, beans, bananas, pyrethrum and many others. The spatial distribution of these crops is shown in Figure 7. While sugar cane and groundnuts are grown in the southwestern end of the district, tea, pyrethrum and passion fruit are grown in the better watered higher Kikuyu grass zone (Kisii highlands) in the southeast. Kisii district is the leading producer of pyrethrum in Kenya, with over 8400 hectares under production. Maize, coffee, and bananas are

Figure 7

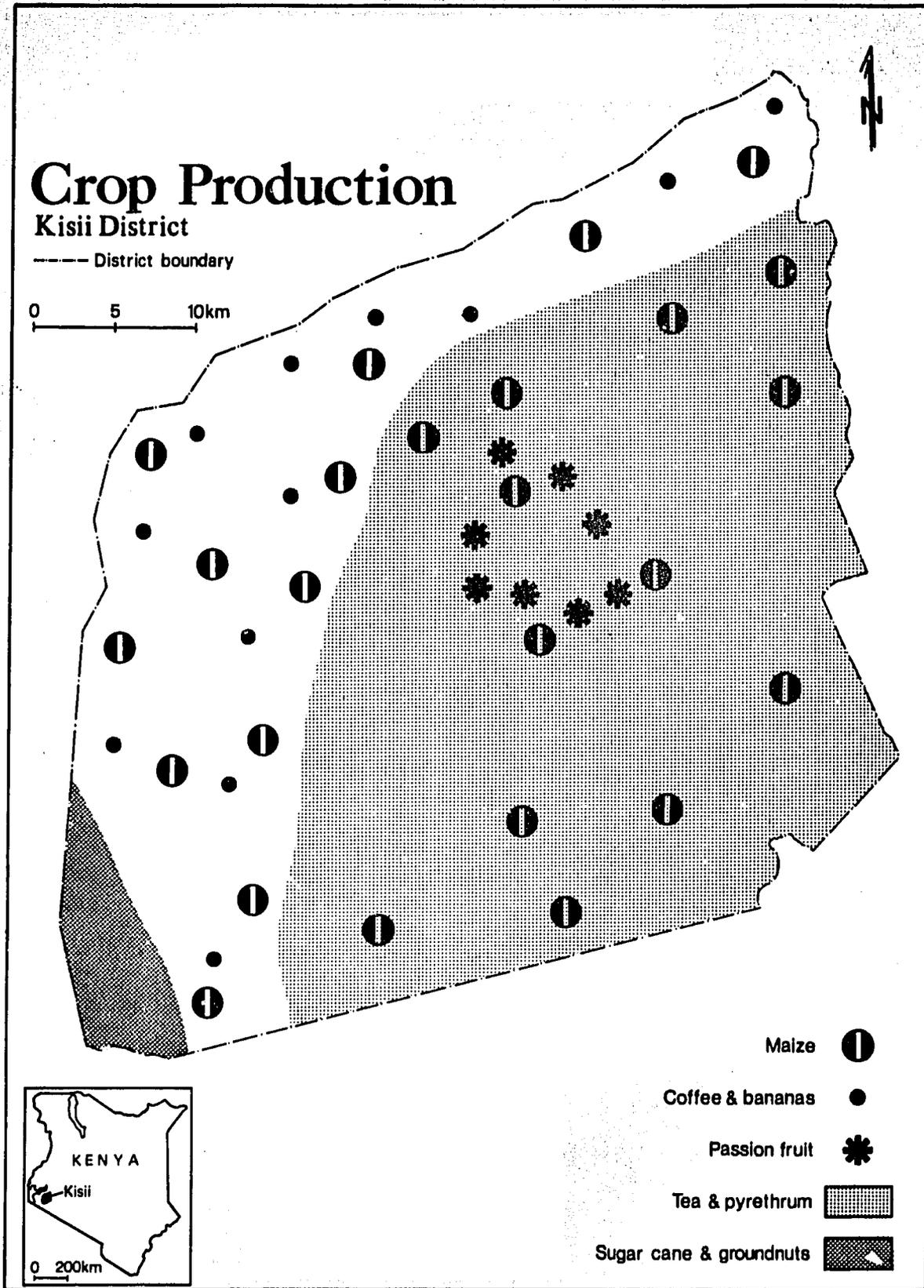


TABLE 4.2 CROP PRODUCTION, LAND USE AND AGRICULTURAL EMPLOYMENT - 1978

	Total District	Nyamira Division	Manga Division	Irianyi Division	Bosongo Division	Ogembo Division
Total area (ha)	221,700	65,500	46,400	30,100	33,500	45,900
Agricultural area (ha) (99%)	219,483	a/s	a/s	a/s	a/s	a/s
Small holdings (number)	98,349	19,873	28,880	13,604	15,210	19,441
Total area of small holdings (ha)	216,423	59,182	46,400	30,100	33,500	45,900
Land under multiple cropping (ha)	114,783	32,550	27,840	18,060	15,075	20,655
Number of permanent non-family workers	12,800	1,000	3,000	2,000	1,300	1,700
Number of large scale farms	2	2				
Peak number of casual non-family workers (small farms)	40,000	8,500	8,500	7,500	6,500	6,500
Number of permanent non-family workers	180					

SOURCES: Ministries of Agriculture and Lands and Settlement

a/s = approximately the same as above

also grown, mainly in the drier, lower star grass zone. Table 4.3 gives the hectareage and number of growers for the main cash crops in the district.

Agriculture in Kisii district is relatively modern. It involves the use of fertilizers, pesticides, improved seeds, crop rotation, soil conservation, tractors, oxploughing, improved traditional tillage methods, and improved marketing systems. Irrigation is not practised in the district. Crop yield levels in the district are relatively high due to high rainfall, fertile topsoil and good husbandry. Information on crop yields is presented in Tables 4.4 and 4.4a.

There are various crop pests and diseases in the district:

Coffee: coffee berry disease, leaf rust, antestia bug, leaf miner and coffee borers

Passion fruit: woodlines and brown spot

Tomatoes: blossom end rot, bacterial wilt and bacterial blight.

Several agricultural pesticides and fertilizers are used in the district to improve crop production. The chemicals used include heavy metals, organochlorines, organophosphates, carbamates and other organic pesticides and nitrogenous, phosphatic and compound fertilizers. There is no complete report on these chemicals; however a partial breakdown of their use in the district as a whole and by various coffee cooperative societies is given in Tables 4.5 and 4.6.

Storage methods in Kisii as in other districts need improvement as much produce is still lost to pests (e.g. weevils and bean bruchid) and through contamination by dust and unclean containers.

Cooperative societies and marketing systems are described above in Section 3.3. The provision of farm inputs and credit for crop development is by the Kenya Farmers' Association(K.F.A.), and technical advice is provided by the Ministry of Agriculture extension staff.

TABLE 4.3 CASH CROP HECTARAGE, KISII DISTRICT

<u>CROP</u>	<u>HECTARAGE</u>	<u>NUMBER OF GROWERS</u>
Coffee	6745	42,053
Tea	7974	30,000
Pyrethrum	8429	51,070
Bananas	650	
Sugar cane	2000	
Groundnuts	800	
Passion fruit	450	

SOURCE: Kisii District Development Plan 1979-83

TABLE 4.4 YIELD LEVELS OF VARIOUS CROPS IN KISII DISTRICT

CROP	AVERAGE YIELD PER HECTARE
Hybrid maize	40 bags
Local maize	30 bags
Sorghum	9 bags
Beans	6 bags
Soyabeans	10 bags
Groundnuts	5 bags
Irish potatoes	120 bags
Sweet potatoes	110 bags
Cassava	2 tonnes
Bananas	30 tonnes
Cabbage (drumhead)	15 tonnes
Kale	20 tonnes
Tomatoes	12 tonnes
Onions	9 tonnes
Carrots	15 tonnes
Pineapples	45 tonnes
Passion fruit	10 tonnes
Citrus	4 tonnes
Finger millet	8 bags

SOURCE: Ministry of Agriculture 1980

TABLE 4.4a CROP HECTARAGE AND YIELD 1977-1978

	HECTARAGE 1977	HECTARAGE 1978	YIELD 1977	YIELD 1978
<u>BOSONGO DIVISION</u>				
Tea		138		31,168 kgs
Pyrethrum		78.5		6,568.5 kgs.
Sugar cane		531		N/A
<u>NYAMIRA DIVISION</u>				
Hybrid maize	7,184	10,861	N/A	925,830 bags
Local maize	155	2,086		52,150 bags
Sorghum, improved	2	30		610 bags
Sorghum, local	41			
Finger millet	323	378		39,700 bags
Sugar cane	146	57		N/A
Soya beans	10	N/A		N/A
Sweet potatoes	370	337		23,590 bags
Dry coco beans	277	N/A		N/A
Local beans	956	N/A		N/A
Bananas	465	152		250,625 bags
Passion fruit	nil	N/A		N/A
Pineapples	45	74		148,750 bags
Cabbages	72	N/A		N/A
Onions	79	9		N/A
Cassava	95	33		N/A
Citrus	25	N/A		N/A
Pyrethrum	1,433	N/A		N/A
Onions	97	116		29,000 bags
Avocados	4	N/A		N/A
Langoes	36	N/A		N/A
Dry potatoes	75	22		N/A
Tomatoes	2	18		N/A
Groundnuts	145	33		N/A
Cattle	14	N/A		N/A
Chilies	1	N/A		N/A
Onions	N/A	3,829		57,435 bags
Carrots	N/A	8		1,230 bags

TABLE 4.4a CROP HECTARAGE AND YIELD 1977-1978 (continued)

	HECTARAGE 1977	HECTARAGE 1978	YIELD 1977	YIELD 1978
NGA DIVISION				
ffee	N/A	N/A	N/A	3,554,057 kgs
rethrum	N/A			1,861,838 kgs
brid maize	2,699.5			N/A
cal maize	205.5			N/A
nger millet	282.5			N/A
ans	982.0			
rghum	174.0			
ssava	38.0			
eet potatoes	76.8			
nanas	321.0			
les	89.0			
bbages	76.0			
matoes	14.6			
oundnuts	36.0			
rrots	5.5			
ssion frutis	202.0			
ions	53.0			
tatoes	47.5			
neapples	12.5			
trus fruits	5.0			
EMBO DIVISION				
ffee	N/A	N/A	N/A	3,504,923 kgs
LANYI DIVISION				
ize	N/A	4937.85	N/A	N/A
nger millet		590		2,950 bags
tatoes		972.45		N/A
ans		905		N/A
a		N/A		2,982,988 kgs
rethrum		N/A		4,539,405 kgs

URCE: Ministry of Agriculture

TABLE 4.5 AGRO-CHEMICAL CONSUMPTION - KISII DISTRICT, 1977-78

<u>AGRO-CHEMICAL</u>	<u>QUANTITY</u>	<u>SOURCE</u>
<u>Fertilizers - 1977</u>		
Single superphosphate	513 bags	K.F.A.
Triple superphosphate	2,299 bags	-do-
Compound fertilizer (20:10:10/23:23:0)	144 bags	-do-
Diammonium phosphate	128 bags	-do-
Calcium ammonium nitrate	388 bags	-do-
" " "	150 bags	Kisii Union
Sulphate of ammonia	200 bags	K.F.A.
<u>Pesticides - 1978</u>		
Aldrin	82 kgs	K.F.A.
Lindane (Agricide) (Vegicide)	126 kgs	-do-
Diazinon	82 litres	-do-
Dimethvate (Rogor E)	43 litres	-do-
Malathion	379 kgs	-do-
Carbaryl (Seruin)	4 kgs	-do-
Fenitrothion	4,860 litres	Kisii Union
Antracol	89 kgs	K.F.A.
Dithane M-45	384 kgs	-do-
Benlate	1 kg	-do-
Ridomil	1.62 kgs	-do-

SOURCE: Ministry of Agriculture 1980

TABLE 4.6 COFFEE AGRO-CHEMICAL CONSUMPTION 1978
KISII DISTRICT

OPERATIVE SOCIETY	SUMITHION LITRES	COPPER 50% (KG)	CAPTAFAL 80%	FENITRO-THION 50% LITRES	C.A.N. 26% (KG)
aka	N/A	1812	nil	240	7900
yambunde	-do-	300	-do-	120	nil
ekero	-do-	-	-do-	-	-do-
yamarambe	110	750	-do-	105	-do-
irango	N/A	1100	-do-	250	3600
	130	1750	-do-	130	nil
esarana	N/A	1000	1100	320	7000
emera	-do-	-	nil	-	7050
iasuta	240	2475	-do-	240	5950
enyenya	N/A	2727	-do-	100	nil
yosia	-do-	75	-do-	60	-do-
enyoro	300	2500	-do-	300	2300
yaturubo	N/A	550	-do-	60	nil
iomooncha	-do-	750	375	180	-do-
	-do-	1075	nil	230	15,250
	-do-	1050	-do-	140	nil
obamba	-do-	1000	-do-	75	-do-
ugunga	-do-	2250	-do-	260	-do-
oromba	-do-	250	-do-	60	-do-
yabomite	-do-	-	-do-	-	-do-
yachenge	200	2375	-do-	200	-do-
yayaguta	N/A	425	-do-	60	-do-
yaigwa	-do-	4850	-do-	245	-do-
ayakegogi	-do-	1850	-do-	500	-do-
yakoe	-do-	375	12.5	-	-do-
yamache	-do-	625	nil	-	-

SOURCE: Ministry of Agriculture

/A = Not available

The problems encountered by crop producers in the district include:

- a. limited availability of improved seeds and fertilizers,
- b. lack of funds for fencing and watering,
- c. lack of good access roads,
- d. lack of technical knowledge,
- e. population pressure, which forces the inhabitants to extend crop production to less suitable areas; this will increase the probability of ecosystem damage,
- f. soil erosion.

Already, in areas of Kegochi, Taranja, Emenwa and Kabosi hills, the ground has been exposed and productive topsoil eroded away by running water and wind. These areas need afforestation measures.

4.2.2 Livestock Production

There were about 26,000 grade cattle, about 205,000 zebu cattle, and 6,400 sheep and goats in Kisii district in 1978. Poultry, fish ponds (about 117 in number), and small numbers of pigs, rabbits, and beehives also are raised in the district. Types of cattle include imported breeds such as Friesian, Guernsey, Ayrshire and Jerseys. Crosses between indigenous and imported cattle are also found in the district. Artificial insemination is used to cross zebras with grade cattle to produce cross breeds that yield more milk and meat than the indigenous cattle and are well suited to the district's ecosystem.

There are only two large ranches in the district, situated in the settlement area. These are the Keneni (2,135 ha) and Ekerubo (1,620 ha) ranches. Keneni ranch has 702 animals while Ekerubo ranch has 646 animals.

Sedentary animal husbandry is widespread in the district while dairying is found only in scattered locations. The stocking rate averages about two animals per hectare which somewhat exceeds the estimated land carrying

capacity of roughly one hectare per livestock unit (500 kg). (The average weight of the animals, though, is 300 kg so that the actual carrying capacity is somewhat higher--three animals per five hectares). However, if fodder production were improved, many more animals could be supported on each unit of land area--up to eight or nine animals per hectare. To reach this target, farmers are being encouraged to plant improved fodder crops such as nappier grass and sweet potato (vines).

Ticks cause a large number of livestock diseases in the district. In 1978, a total of 73,161 animals were dipped. Details concerning cattle dips are given in Table 4.7 according to the locations. Proposed dip projects for the period 1979/80 are also included. The only acaricide used in the district is the organophosphorus-based Delnav DFF.

Table 4.8 gives the types of livestock diseases, the number of reported cases and the mortality by divisions for the year 1978. East coast fever had the highest incidence in 1978, followed by anaplasmosis and black quarter. Trypanosomiasis on the other hand had very low incidence, and no cases of brucellosis were reported during that year. The tick-borne diseases--East coast fever, anaplasmosis and heartwater--occur all over the district. Animals suffer from bracken fern poisoning due to eating of the fern, which is quite common in the district. Foot rot is common in wet parts of the district and in areas where proper sleeping places are not provided. Animals are also affected by liver fluke, and in fact about one third of the livers inspected are condemned each year due to this disease.

The main poultry diseases are newcastle disease, fowl typhoid, fowl pox, coccidiosis and Mareka's disease.

Credit for the purchase of livestock is provided by organizations such as Agricultural Finance Corporation, commercial banks, cooperative banks,

TABLE 4.7 EXISTING AND PROPOSED CATTLE DIPS - 1979

LOCATION	NUMBER OF DIPS	LEVEL OF COMPLETION AND OPERATION
Nyaribari Chache	9	Operating
	5	New site
Bassi Borabu	5	Operating
Nyaribari Masaba	9	Operating
	3	New site
	4	Wall Plate
	2	Hole dug
Majoge Borabu	1	Operating
	2	Wall Plate
	4	New site
	1	Completed
South Mugirango Borabu	1	Hole dug
	4	New site
	1	Completed
Majoge Chacha	3	Operating
	1	Hole dug
	1	Wall plate
	2	New site
South Mugirango Chache	2	Operating
	1	Hole dug
	1	New site
	2	Ground level
Wanjare	1	Operating
	1	Hole dug
	1	Wall plate
	4	New site
	1	Soon to operate
	1	Completed
Bassi Chache	3	Operating
	1	Wall plate
	1	New site
Central Kitutu	3	Operating
	3	New site
	1	Soon to operate
West Kitutu	7	Operating
	1	Wall plate
East Kitutu	9	Operating
	1	Wall plate
	2	New site
North Kitutu	6	Operating
West Mugirango	7	Operating
	7	Wall plate
	5	New site
	1	Ground level

53

TABLE 4.7 EXISTING AND PROPOSED CATTLE DIPS - 1979 (continued)

LOCATION	NUMBER OF DIPS	LEVEL OF COMPLETION AND OPERATION
North Mugirango	5	Operating
	3	Wall plate
	1	Proposed
	6	New site
	1	Soon to operate
Eronge	6	Operating

PROPOSED DIP PROJECTS - KISII DISTRICT 1979/80

LOCATION	NUMBER
South Mugirango Chache	11
South Mugirango Borabu	15
Wanjare	23
Majoge Borabu	10
Majoge Chache	10
Central Kitutu	4
Eronge	6
North Kitutu	5
West Kitutu	8
West Mugirango	13
North Mugirango	4
Nyaribari Masaba	9
Nyaribari Chache	8
Bassi Borabu	8
Bassi Chache	8

SOURCE: Ministry of Agriculture

TABLE 4.8 LIVESTOCK DISEASES 1978

DISEASE	REPORTED CASES	M O R T A L I T Y				
		Nyamira Div.	Bosongo Div.	Ogembo Div.	Manga Div.	Irianyi Div.
East Coast Fever	770	23	11	N/A	57	N/A
Anaplasmosis	398	65	2	-do-	13	-do-
Red Water	26	--	--	-do-	--	-do-
Conjunctivitis	96	N/A	N/A	-do-	N/A	-do-
Foot Rot	31	-do-	-do-	-do-	-do-	-do-
Bloat	22	-do-	-do-	-do-	-do-	-do-
Heart Water	5	-do-	-do-	-do-	-do-	-do-
Trypanosomiasis	1	-do-	-do-	-do-	-do-	-do-
Brucellosis	--	-do-	-do-	-do-	-do-	-do-
Black Quarter	287	-do-	-do-	-do-	-do-	-do-
Photosensitization	9	-do-	-do-	-do-	-do-	-do-
Mastitis	N/A	-do-	-do-	-do-	-do-	-do-
Anthrax	-do-	-do-	-do-	-do-	-do-	-do-
Infertility	-do-	-do-	-do-	-do-	-do-	-do-
Bracken Fern Poisoning	-do-	-do-	-do-	-do-	-do-	-do-
Liver Fluke Infection	-do-	-do-	-do-	-do-	-do-	-do-
Newcastle Disease	-do-	-do-	-do-	-do-	-do-	-do-
Fowl Typhoid	-do-	-do-	-do-	-do-	-do-	-do-
Coccidiosis	-do-	-do-	-do-	-do-	-do-	-do-
Marelias Disease	-do-	-do-	-do-	-do-	-do-	-do-

SOURCE: Ministry of Agriculture

the District Development Committee (DDC), International Development Agency (IDA), Integrated Agricultural Development Project (IADP), general seasonal crop loans, KFW, and cooperative production credit schemes.

Problems associated with livestock development in the district are:

- a. Poor fodder production: few farmers realize the importance of fodder production.
- b. Diseases: tick-borne diseases are still a menace although there are many dips in the district and still more are being constructed and proposed.
- c. Level of literacy: farmers often have difficult understanding and implementing instructions given by the agricultural staff.
- d. Lack of improved breeds: this is due to exorbitant prices of improved breeds and high transportation and insemination costs.
- e. Lack of district funds.

4.3 FORESTRY

There is some potential for forestry development in Kisii district. The most suitable area is the Kikuyu grass zone (Kisii highlands) in the southeast. The rest of the district has low potential for forestry development although the only gazetted forest, Nyangweta forest, is found in the southwestern part of the district. It covers an area of 104 hectares, of which approximately 65 hectares have been planted, mainly to exotic soft woods. The species of trees found in the district belong to the pinus, acacia, eucalyptus and cupresus genera. These are:

cupresus lustanica

Pinus patula

Eucalyptus Calmaldulosis

Acacia Caffra

Cupresus benthami

Cupresus robusta

Nyangweta forest is under the County Council. However, young plantations established by DDC grants are also coming up at places such as Sameta, Insaria and Manga escarpments. People also plant trees in their shambas, including such species as eucalyptus saligna, cypress, pinus patula and acacia mearnsii. In river valleys and some isolated places are found remains of stands of indigenous trees such as mutundu (croton macrostylus), Cordia africana, antians toxicaria (mulundu), albezia species and Fagara macrophylla.

The incidence of fire is very low in the district although 4.2 hectares in Nyangweta forest were burned in 1974. Destruction of forest trees for building poles and charcoal is not a major problem although people often excessively prune trees, especially cypress. This adversely affects plant metabolism and results in premature death of the trees.

The District Development Plan projects that 8,875 hectares, or 4% of the district's total land area, would have to be devoted to eucalyptus forest or equivalent species to supply domestic fuel requirements over the next five years. The current plan of the forestry department is to acquire all the hills from the County Council for afforestation. It is also planned to educate farmers to plant multipurpose trees and to promote agroforestry for conservation and other purposes. The ongoing afforestation programmes include nurseries at Irianyi and Nyamira. Further proposed afforestation work includes:

1. Afforestation schemes in four out of five divisions with DDC funds
2. Establishment of a tree nursery in every division
3. Reafforestation of all the hills
4. Development of woodlots in farmers' shambas
5. Planting of trees along river banks devoid of vegetation (especially along the Kuja River near Ogembo).

The problems facing afforestation in the district are:

1. Lack of funds to raise seedlings
2. Land use conflicts: people often do not surrender land for afforestation
3. Energy demand: people rely on trees for fuelwood.

4.4 HUMAN SETTLEMENTS AND INFRASTRUCTURE

4.4.1. Water Supply

Most households in Kisii continue to use untreated water for domestic purposes, drawn from the numerous streams and springs in the district. The Rural Household Survey, Nyanza Province in 1970/71 found the following distribution of sources of household water supply in Kisii district:

TABLE 4.9 SOURCE OF HOUSEHOLD WATER SUPPLY

	<u>Wet Season %</u>	<u>Dry Season %</u>
Piped	0.5	0.5
Tank	1.6	24.1
Well	24.5	66.3
Stream	54.7	----
Lake	----	9.1
Other	8.5	----
TOTAL	100.0	100.0

SOURCE: Kisii District Development Plan, 1979-83

These figures illustrate the importance of wells, streams, and roof tanks at various seasons for water supply in the district. Water for industrial

purposes is also pumped from streams. Several water supply projects have been initiated as an effort to supply clean water to most homes, both in the urban and rural areas of the district. The agencies responsible for the various water projects include the Ministry of Water Development, Gusii County Council, and self-help groups.

The majority of the water supply projects cater to urban areas and their surroundings. The biggest water supply project is in and around Kisii town, supplying fully treated and piped water to 25,000 people in the area. It consists of both a new Kisii water project, the source of which is the Chucha River at a point called Kegati, and an old water project whose source is at Nyakobisare stream. Both have a daily supply capacity of 1600 m³. There are already 1270 individual connections to the water system.

Other major water schemes include Sameta (partially completed), Nyamira, Keroka, Tombe, Manga and Gesuru. The Sameta water scheme is envisaged to cater to 87,000 people when fully completed. It has its source at Bobarancho Booster, with a daily supply capacity of 700 m³ and a reticulation system of 125 km of pipeline. The Nyamira water scheme has its source at the Awach River in Kabondo, with a reticulation system of 80 km of pipeline and an average daily supply capacity of 130 m³. It supplies water to the newly built Nyamira Hospital as well as Nyamira rural centre and the surrounding areas.

Apart from the above public water supplies, there are several projects supplying water to health centres, missions and schools. These include the Tabaka Mission water supply, Nduru water supply, Nyatieko water supply and Kiambonyoro water supply. There are also water schemes that have been initiated on a self-help basis as shown in Table 4.10. (See also Appendix A1.)

59

TABLE 4.10 REGISTERED SELF-HELP WATER PROJECTS

PROJECT	LOCATION	DIVISION
Keumbu Water Project	Nyaribari Chache	Irianyi
Nyanderema Water Project	North Mugirango	Nyamira
Tabaka Water Project	S. Mugirango Chache	Bosongo
Misesi Water Project	Majoge Chache	Ogembo
Marani Health Centre Water Project	West Kitutu	Manga
Sengera/Geturi Water Project	Central Kitutu	Manga
Amesago	Nyaribari Chache	Irianyi
Riondonga Water Project	Nyaribari Chache	Irianyi
Nduru Water Project	South Mugirano	Bosongo
Gesusu/Enchoro Water Project	Nyaribari Masuba	Irianyi

SOURCE: Ministry of Water Development

Several problems face the existing water supply schemes. First, inadequate transport facilities make the work of checking and maintaining these water projects difficult. Second, the lack of telephones makes it difficult to pass on urgent information on problems relating to the projects. Third, there have been cases of vandalism involving disappearance of valves and taps from the stations.

The above water supply schemes provide only a small proportion of the district water requirements. The goal is to supply piped clean water to every home. The district has a good supply of rainwater and numerous streams and springs which could be tapped, and the existing schemes could be expanded to generate greater supplies. More schemes are needed, particularly in densely populated areas and places where water schemes have not yet been initiated. In many cases, self-help efforts could be marshalled towards this goal. Figure 8 shows the proposed water projects.

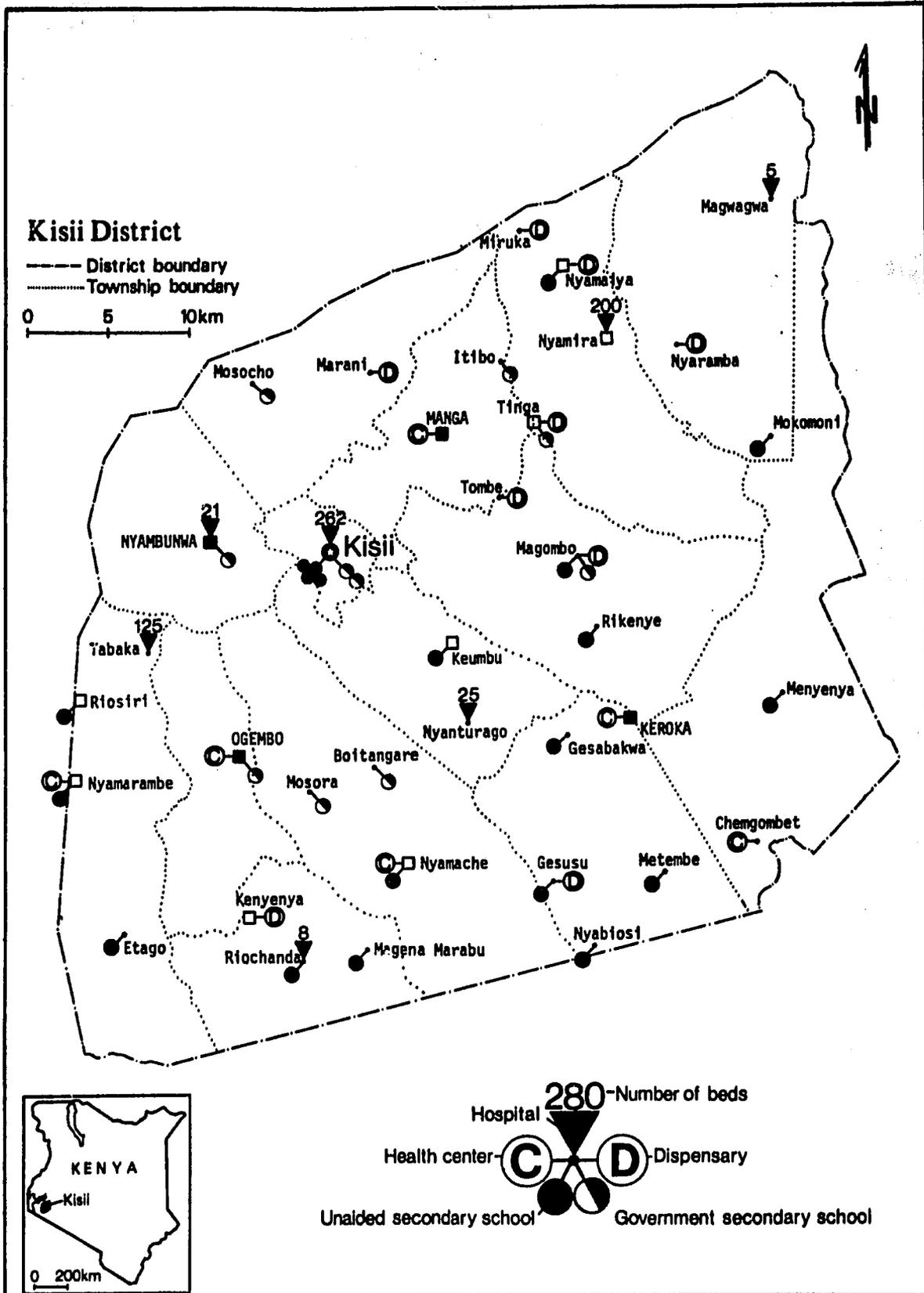
There is also a need to monitor the quality of water supply as there is an increasing threat to the quality of water in the district due to pollution of rivers by coffee factory effluents.

4.4.2. Health Facilities and Human Diseases

Three categories of health facilities are found in Kisii district: hospitals, health centres and dispensaries. These units come under the sponsorship and management of the Ministry of Health, missions and private practitioners. Figure 9 shows the location of the district's health facilities. (See also Appendix Table A2.)

The district has four hospitals, two of them sponsored by the government and two by missions. The number of hospital beds (excluding maternity beds) is 400. This represents 0.461 beds per 1,000 people, compared to the national average of 1.12 beds per 1,000 people. The national target for

Figure 9



62

rural areas, however, is 0.8 beds per 1,000 people, to reach which Kisii district would require 294 additional beds, an increase in capacity of almost 75%. To reach the national average would require 571 additional beds, an increase of over 140%.

There are only ten health centres, seven of them government sponsored and three sponsored by missions. This makes the ratio in Kisii one health centre for 87,000 people, compared to the national target of one health centre for 50,000 people. To attain that target, Kisii requires seven more health centres. There are 24 dispensaries in the district, 18 sponsored by the government and six sponsored by missions. This compares unfavourably with, for instance, Nyeri district which has 32 dispensaries that serve half the population found in Kisii district.

Other medical facilities in the district include rural health training centres and rural demonstration centres. There are two rural training and demonstration centres, at Marani and Nduru, where community nurses, public health technicians, clinical officers and family planning field educators are trained. Enrolled nurses for the district are trained at Kisii District Hospital. Nduru has 18 staff members, and serves a population of about 60,000 people, in three locations: South Mugirango, Borabu and Chache. It has a water supply problem. Marani centre has 26 staff members, and serves about 70,000 people, including 53 primary schools, nine secondary schools, 35 markets, nine day-care centres and four dispensaries.

Figure 9 indicates clearly the uneven distribution of medical facilities in relation to the distribution of population. Areas underserved by hospital beds in relation to the national average include Bosongo, Nyamira (especially the Kibirigo area) and southern parts of Kututu East.

Table 4.11 gives the statistics on various infectious diseases reported in Kisii District Hospital, 1979. The most prevalent diseases are malaria,

TABLE 4.11 INFECTIOUS DISEASES REPORTED IN KISII
DISTRICT HOSPITAL, 1979

TYPE OF DISEASE	CASES	DEATHS
Diarrhea	8361	1
Internal worms	4812	-
Meningitis	197	6
Chicken pox	801	-
Gonorrhoea	2682	-
Whooping cough	1047	1
Acute eye infection	3418	-
Anaemia	186	5
Mumps	303	-
Measles	2949	10
S.T. Malaria	351	1
Malaria	20840	14
Malnutrition	482	4
Tuberculosis (Pul.)	61	1
Tuberculosis (other)	14	-
Tetanus	172	10
L. Pneumonia	2122	-
Blackwater fever	-	-
Brucellosis	-	-
Cerebo-Spinal	-	-
Leprosy	-	-

SOURCE: Ministry of Health

diarrhea, internal worms, eye infections, measles, gonorrhoea and L. pneumonia. The killer diseases are malaria, tetanus, measles, meningitis and anaemia. While the occurrence of these diseases is widespread in the district, the greatest incidence is in areas with poor water supply and where proper sanitary facilities such as latrines are lacking.

The standard of environmental health is lowest in the urban areas, including Kisii town, market places, and along rivers subject to pollution from factory effluents. Reports of the district public health officer on environmental sanitation indicate that, through the whole of 1978, the drainage system in Kisii town was not working, toilets were poorly maintained, and the market place was filthy. Spillover from blocked sewers, lagoons and the storm-water drainage channels contribute to pollution of nearby rivers and streams.

The disposal site for solid refuse in Kisii town is improperly maintained and situated close to the residential area. It is also very near the newly opened Sansora bakery. The town sewer at Baraja-Mbili is open and is not properly staffed. In the rural areas, the major problem is lack of latrines, which has resulted in high incidence of diseases such as dysentery, typhoid and intestinal diseases. The Government is attempting to enforce general health regulations and to encourage the construction of pit-latrines in the rural areas. Sugar-cane chewing is already banned in Kisii town because of the resulting refuse.

Environmental pollution is becoming a health hazard in the district. Water pollution is caused by untreated sewage, untreated effluents from coffee factories, oil leakages, and pesticides and fertilizers used on the farms. Air and noise pollution are not critical problems at the moment, although there is evidence of their increase in places like Kisii town, market centres, and in the factories.

The overall health strategy in the district aims at improving human health conditions. Programmes on health education encourage people to become aware of health problems and ways of solving them. The programmes consist of demonstrations and lectures to various audiences such as school children, patients, women's groups, the public and individuals.

The improvement of health conditions and environmental sanitation is constrained by several problems in the district: first, there is inadequate transport service for medical staff. Kisii district has only one ambulance, and the delivery vans are occasionally out of operation. Second, the district has a shortage of medical staff and medical equipment. Third, some places in the district are difficult to reach. Fourth, the health centres are few in relation to the population in the district.

4.4.3 Housing

The standard of housing in Kisii is high compared to the surrounding districts. As in most rural areas in Kenya, the responsibility for constructing residential houses lies with individual families. Hence families with greater economic resources tend to have better homes. About 20% of the homes have good brick walls or are roofed with corrugated iron sheets. Recent high prices of coffee, tea, and consequent high per capita incomes in the district have contributed to improvement of housing quality. Kisii district is very scenic with rural homes situated on a patchwork of neatly laid-out farms.

The policy of the Ministry of Housing and Social Services is to assist with funds where people cannot provide shelter for themselves on their own initiative or from their own financial resources. The technical, financial, and administrative and implementation aspects of this policy lie with the National Housing Corporation (NHC). The present strategy of NHC is to

allocate 95% of its funds to designated urban centres, and 4.7% to rural areas in Kenya.

In Kisii district, a total of Shs. 1,470,000 was proposed for development of rural housing (to be allocated as loans to individuals or cooperative housing societies) in the period 1974-1978. However, much of this was diverted to other projects, as applications for the funds were not made.

A total of Shs. 1,877,000 was proposed for housing in Kisii town by the district development committee in the period 1974-1978. Only part of this was committed, however, as funds were not available. Kisii town is one of 38 urban centres designated for development of housing by the National Housing Corporation. In the 1974-1978 development plan, a project was earmarked for Kisii town, at the cost of Shs. 2,900,000 for 168 site and service housing units. This project has not yet been constructed; however, a site has been acquired and plans for beginning the project are well advanced. The NHC has chosen to develop site and service schemes as they are relatively inexpensive for the government and encourage harambee spirit among the people.

With a large number of people unable to find adequate land or employment in farming, it is likely that many will seek employment in urban areas such as Kisii. Rental housing is in short supply, and the problem is likely to deteriorate in Kisii town. Thus, it is important that projects for housing be re-examined and implementation speeded up.

4.4.4 Education

Educational facilities are the most widely distributed of the social services in Kisii district. 50% of the district's recurrent expenditure is spent in providing educational services, compared with the national rate of

31%. Table 4.12 shows a breakdown of the type, sponsorship and number of educational institutions in the district. Figure 9 shows the location of the secondary schools.

The table indicates that 58.9% of the day care centres in the district are sponsored and funded by parents, while 37.6% are supported by the Gusii County Council. The distribution of the day care centres is fairly even over the district. Total enrollment is 6,895, which gives an average enrollment of 35 children per day care centre.

Assuming the potential nursery age population is 5% of the district population (the national average, in the 1969 census), the present enrollment represents only 16% of the children entitled to nursery education. The present average enrollment of 35 children per day care centre is not optimum and could be increased to 45 to absorb an additional 2,000 children. This would also require that substandard buildings and equipment at these centres be improved. Even with such an increased enrollment, the district would still require about 692 additional classes.

The primary school enrollment is 179,964. This represents only about 60% of the potential primary age population in the district of age.* This rate is on a par with the national average of 61.6%. However, it means that 40% of the potential primary age population is not benefiting from the free national basic education.

The average size class is 36 pupils. This is below the level of 45-50 considered a tolerable maximum by the Ministry of Education. If average enrollment were raised to 45 pupils per class the total district enrollment would constitute 78% of the potential primary age population. This would,

* Estimating that about one third of the total population of 870,000 is between the ages of seven and thirteen.

170

TABLE 4.12 EDUCATIONAL FACILITIES IN KISII, 1979

Type	Sponsorship							Total
	Government	Gusii County Council	Kisii Town Council	Self-Help (Harambee)	Mission	N.C.C.K.	Private & Others	
Day Care Centres		74	3	116			4	197
Primary Schools	686				16		33	735
Secondary Schools	31			92	16		33	172
Teachers' Colleges	1							1
Village Polytechnics	8			5		1		14
Adult Education Centres	31	4		24			31	90
College of Technology				1				1

SOURCES: Ministry of Basic and Higher Education
 Ministry of Social Services

however, require improving the facilities of the present schools. At present, the majority of their buildings are substandard as well as understaffed and underequipped.

There are 400 primary school teachers in the district. Of these, over 50% are untrained. The teacher-student ratio in the district is 1:45. These relatively unfavourable conditions are critical constraints in the district's endeavour to improve educational services.

Primary schools are fairly evenly distributed in the district. In a few locations, however, pupils travel over 10 km to schools. These locations include Wanjare, Borabu and North Mugirango, all of which are comparatively sparsely populated.

The number of fully established secondary schools in the district is 172, the majority of which are harambee and private schools. These face numerous problems: The buildings are generally very poor. They are manned by low-grade teachers, who are generally few in relation to the number of pupils. They are also poorly equipped and have alarming rates of failure. The present enrollment of secondary schools is less than 10% of the potential secondary age population in Forms V and VI. Hence there is a large deficit in the enrollment for secondary education in the district. It is imperative that this be considered a priority problem in the development of educational services in the district.

Other educational facilities in the district include technical schools and colleges, village polytechnics and adult education centres. Kisii Teachers' College is situated near Kisii town. The number of fully operating Village Polytechnics (VPs) is 14. The 1974-8 District Development Plan projected an increase in the number of VPs to 190 by the end of 1978. This goal has not been realized due to financial constraints. Training in VPs is seen as a move towards an education for self-employment. Their

41

curriculum includes training in skills and techniques such as masonry, tinsmithing, typing, carpentry, dressmaking, agricultural skills, civil training, business training and bookkeeping in addition to general education (Maths and English). (See Appendix Table A3.)

There are 90 adult education classes operating in the district. These are sponsored by various agencies, as follows:

Government-aided	31
Sponsored by Gusii County Council	4
Diocese of Kisii sponsors	17
Lutheran Church of Kenya sponsors	14
Self-help	24

For 1978 and 1979, the total enrollment was 1,657 with 62% of the attendants women. (See Appendix Table A4.)

The main problems facing VPs and adult education centres include lack of qualified teachers and training facilities.

4.4.5 Transport and Communication

The transport and communication system in Kisii District is an important element supporting all facets of economic development. The district lies outside the direct road and railway line from Mombasa-Nairobi to Kisumu. However, it is well connected with adjacent districts by trunk roads and a telephone line. A tarmac road connects Kisii town with Kericho and Kisumu, and the main urban centres in the district are served by good gravel roads. However, the main part of the district road network consists of dry-weather feeder roads and special access roads for tea and coffee farms. Table 4.13 shows the existing road length by divisions in Kisii district.

TABLE 4.13 ROADS IN KISII

<u>Division</u>	<u>Existing Road Length (km)</u>
Bosongo	253.5
Nyamira	148.0
Manga	142.16
<u>Irianyi</u>	<u>207.21</u>

SOURCE: Ministry of Transport and Communication

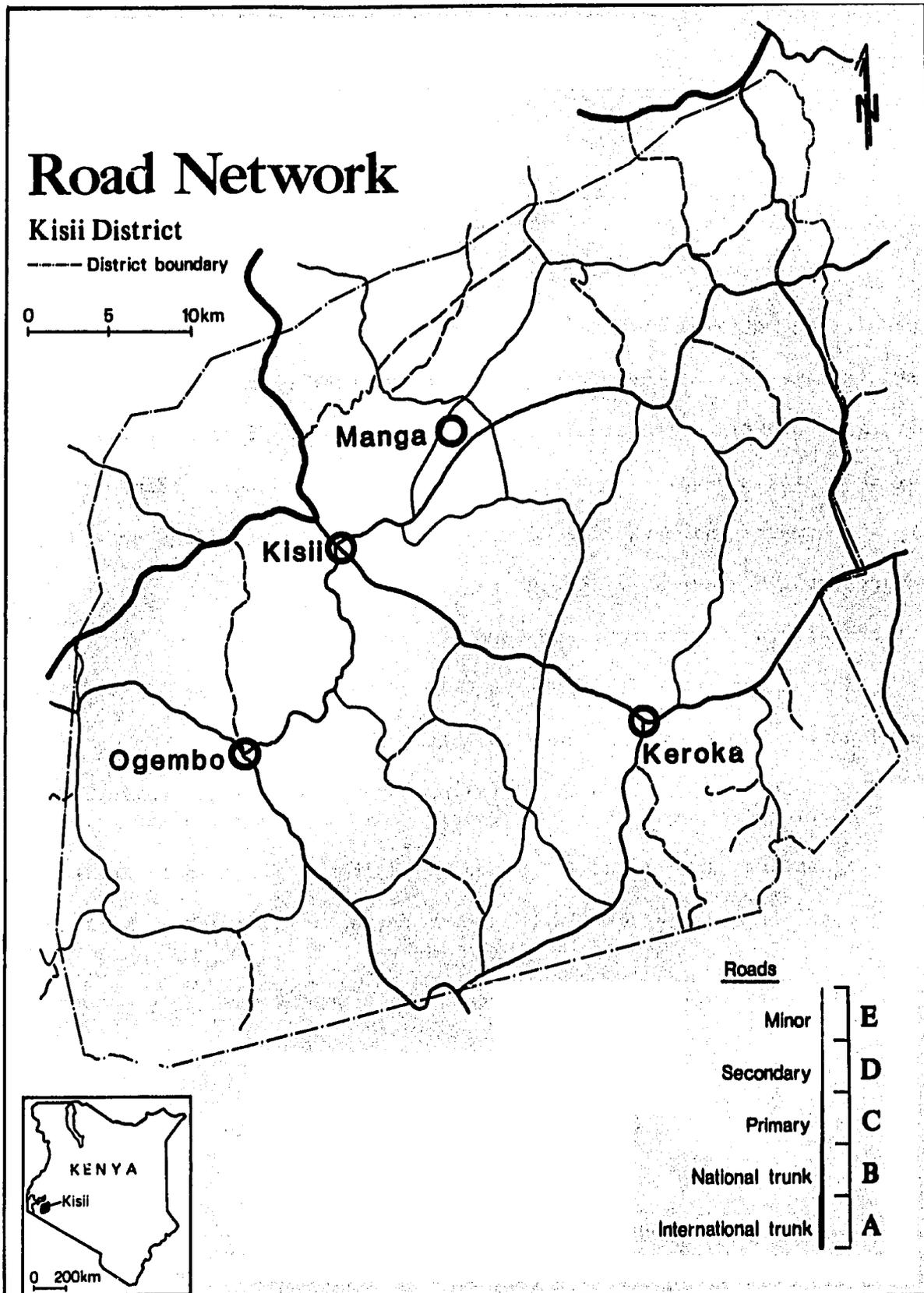
The undulating terrain, high rainfall, and clay soils in the district combine to make many of the roads difficult and costly to maintain. As a result, communications are regularly cut in most parts of the district during the rainy season. The state of the road network makes transportation costly and hampers the marketing of agricultural produce and the provision of government and other services in the district.

The Ministry of Transport and Communications has worked out a classified road network system to be developed in the district. The proposed network is shown in Figure 10. It consists of:

1. An international trunk road (A1) of high standard tarmacking, connecting Kakamega - Kisumu - Oyugis - Kisii - Rongo to Tanzania.
2. A national trunk road (B.3) tarmacked from Kisii town to Sotik.
3. A primary road system, with either tarmac or good gravel surfaces (B.16 - C43), serving all rural centres.
4. Secondary and minor roads (feeder and access roads) to be brought up to all-weather standards.

The district is not connected with a railway line, nor is there a fully established airport. Kisii town only has an airstrip. There is need for a railway line connecting the district with the main railway line from Nairobi to Kisumu to assist in transportation and marketing of the district's agricultural produce.

Figure 10



4.4.6 Energy

The main source of energy in rural areas of the district is firewood. The Integrated Rural Survey, published in 1974-75, found that 99.5% of domestic fuel needs in Kisii were supplied by firewood, 0.4% by charcoal, and 0.1% by other sources. In urban areas, charcoal and paraffin form the main sources of energy. Electricity is provided in Kisii town.

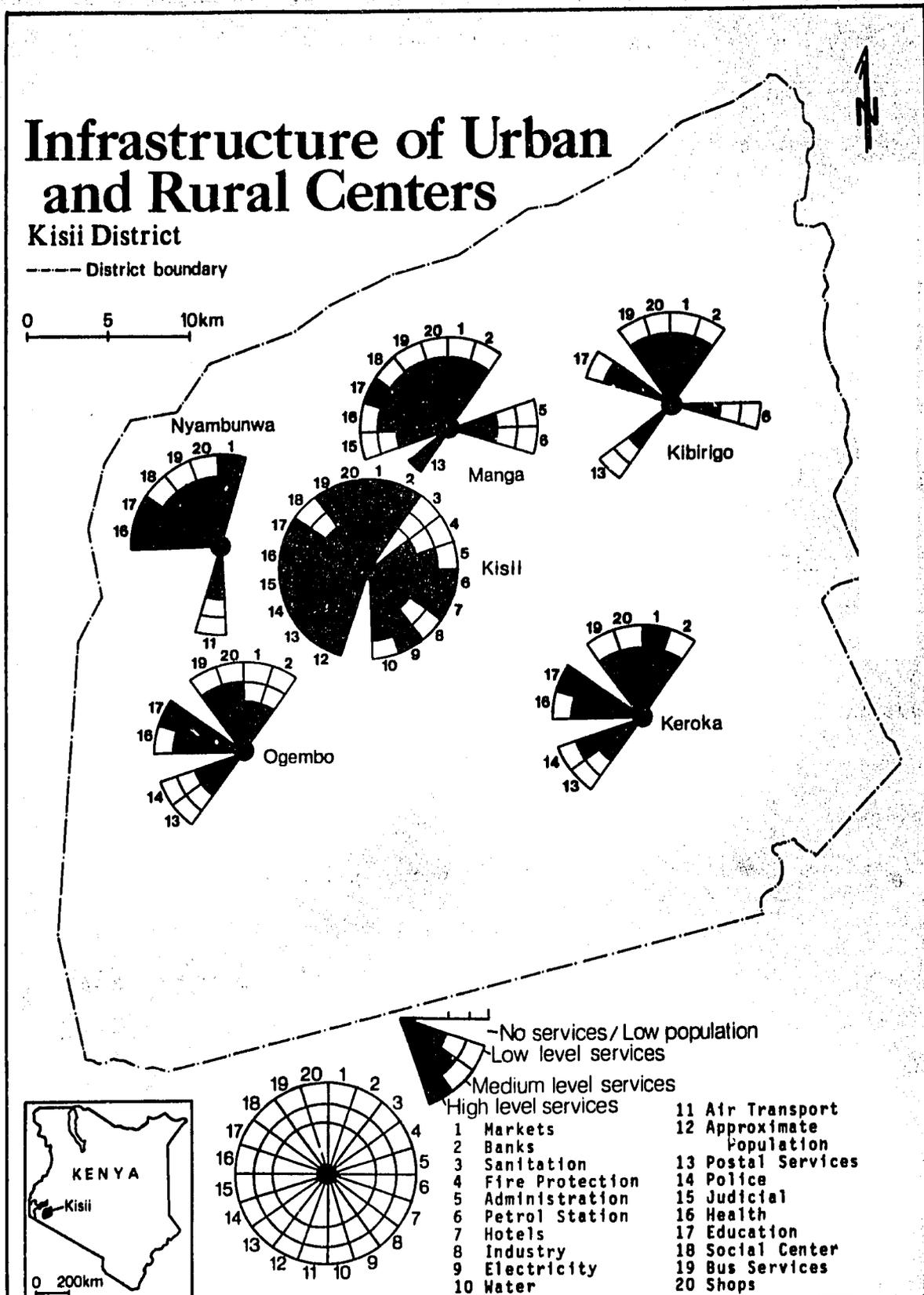
The rivers are not suitable for hydroelectric power development so the district must rely primarily on wood for its domestic fuel supply. As discussed in Section 4.3 on forestry, the 1979-83 District Development Plan estimates that the district's 1980 domestic fuel requirements will be of the order of 1.065 million m³. However an equivalent amount of forest is not being replanted to replenish what is used.

4.4.7 Service Centres

The above infrastructural services tend to be concentrated in a few service centres. The tendency for services to concentrate over space is an expression of market forces of supply and demand. From the point of view of the consumer, a wide range of goods is accumulated in a single convenient place, minimizing his aggregate travel costs, while from the point of view of the trader, demand is concentrated in one place, hence maximizing profits.

A survey was done in early 1970s in Kisii district on the range and level of services in various centres using a point system analysis (Kisii District Development Plan, 1974-8). Service centres were then categorized as local centres, market centres, rural centres, and urban centres on the basis of their point scores of the range and level of available services. The district was found to have one urban centre (Kisii town), two rural centres, two market centres and 40 local centres. Compared

Figure 11



to other areas, thus, Kisii has a relatively low level of development of service centres, and considerable infrastructural input is needed at strategic places to offset the existing imbalances and deficiencies.

Local centres are designated to serve a catchment area of approximately 5,000 people (within walking distance) with lower level facilities, namely: a full primary school, several shops, a dispensary, a public water supply and an open market, and they should be served with at least a minor road.

Each market centre is designated to serve a catchment rural population of 15,000 and a resident population of 2,000 with the following facilities and services:

- public water supply;
- a health centre;
- both primary and secondary schools;
- a sub-post office;
- telephone facilities and at least a minor road;
- a police post;
- a local bus service, and other social, commercial and local administrative services.

The market centres are designed to be collecting and marketing centres for local produce.

A rural centre is designated to serve a catchment area with a rural population of 40,000 and a resident population of over 2,000. In addition to all the facilities found in a market centre, they require electricity supply, a sewage disposal system, banking facilities, a mobile library, and they must be served by at least secondary roads. The availability of the above services enable the centres to fulfil their role as service centres to the rural economy and in this way encourage the development of rural industries.

41

Finally, Kisii town, the one urban centre, is designed to serve a catchment area of 100,000 to 150,000 people, and a residential population of 5,000. At the above scale, Kisii district would require five more urban centres.

Kisii town is ten times larger than the second-largest centres (Keroka and Manga) and twenty times larger than the third group of centres (Ogembo, Kebirigo and Nyambunwa). This indicates that the town has a monopoly of essential services in the district; i.e., trade and income tend to flow to the one centre, and people have no alternative but to travel long distances to Kisii town to buy essential goods. As a result, prices of commodities and services in the town are unduly inflated.

The prominence of Kisii town in the hierarchy of services comes out clearly. It is the hub of the district administrative and security services, but it is underserved in fire protection and ambulance services. With respect to social services, it has high level health and educational facilities, but it is underserved in library and social hall facilities. In communication services, it is well served with high level postal services, petrol stations and bus services, but it lacks railway and air transport facilities. It also has high level of commercial services: shops, markets, banks and hotels. It is supplied with electricity but has not developed any significant industries. There is a fair supply of piped water, but the general sanitation of the town is low. The town is centrally located in the district, with a densely populated catchment area.

On the whole, Kisii town is well served by most of the necessary infrastructure except a library, social centre, railway and air services, good sanitation and industries. There is need to encourage the location of industries in the town, considering the availability of cash crops and the large market in the district.

The other five centres record a very low score of services. They offer only medium-level health, education and commercial services. They are conspicuously deficient in administrative and protective services, other social and communication facilities, and in industry, electricity, water supply and sanitation.

Figure 8 (see page 54) shows the service centres due for upgrading. Little progress has been made towards achieving the goals outlined in the recent development plans. Lack of funds has been a critical constraint to the realization of development proposals. Furthermore, not all development agencies (government ministries, private developers and harambee groups) have adhered to the development plans. The allocation of many projects is often determined more by political will than considerations of overall viability. Thus there is need for greater funding from the government, self-help, and foreign and private sources and greater co-ordination of development processes in the district.

4.5 COMMERCE AND INDUSTRY

This sector, is the second largest source of employment in the district. The primary commercial and industrial activities in the district are the marketing and processing of local agricultural produce.

4.5.1 Commerce

The numbers of employees in the various commercial activities in the district are indicated in Table 4.14 below:

TABLE 4.14 REGISTERED TRADERS IN KISII

<u>Trade</u>	<u>Number of Traders</u>	
	<u>1978</u>	<u>1979</u>
1. Wholesale	77	81
2. Catering	395	301
3. Motor Vehicle	19	27
4. Retail Trade	3,738	3,126
5. Miscellaneous	15	31
6. Manufacturers	54	10
TOTAL	<u>4,298</u>	<u>3,576</u>

SOURCE: Ministry of Commerce and Industry

In addition there are about 1,000 non-registered traders in the district. Retailing is by far the biggest category of trade. In many cases, it constitutes a part-time occupation for either farmers or employees in formal wage employment. The decline in the number of traders in 1979, especially in catering, retail trade and manufacturing has been attributed to economic recession after the 1978 boom and the recent crackdown on the number of beer halls in the country.

Banking facilities in the district are concentrated in Kisii town. There are five bank branches of the Standard, Barclays, Grindlays, Commercial Bank, and a Cooperative bank. Outside Kisii town, there is only one branch of the Commercial Bank at Kerokar market. Mobile bank services to rural areas are infrequent.

While most of the district's trade is based on private entrepreneurship, the government plays an important supportive and promotive role in the following ways:

1. Licensing all trading activities in the district;
2. Providing training opportunities in accounting and general techniques at Kisii Farmers Trading Centre and Kisii Community Development Centre;
3. Providing loan facilities, through the District Trade Development Loans Scheme, to small traders. About Sh. 160,000 are loaned annually, in amounts of a minimum of Sh. 2,000 to a maximum of Sh. 10,000 to traders;
4. The district trade officers advise traders on Industrial and Commercial Development Corporation (ICDC) loans, in conjunction with ICDC officers at Kisumu;
5. The Kenya National Trading Corporation appoints agents and distributors of various commodities in the district;
6. There are branches of government parastatal bodies such as the Maize and Produce Board, Coffee Board and Tea Development Authority.

There is great scope for the expansion of commercial activities in the district to absorb the large part of the population unable to participate in farming owing to shortage of land. Presently, trade is concentrated in Kisii town, and shopping facilities in the rest of the market centres are only temporary mud structures offering a very low level of services. This creates a problem of unavailability of basic services at convenient distances from consumers, so that most travel unnecessarily long distances to Kisii town to obtain the services.

Interdistrict trade between Kisii and adjacent districts is minimal. Kisii supplies the adjacent districts with foodstuffs such as maize and potatoes, while from outside, Kisii mainly gets manufactured goods. One way of promoting interdistrict trade is by improving the currently poor transport network between the adjacent districts.

The main constraints to the development of commercial activities in the district include:

1. Lack of commitment and interest in trade among the Gusii people. For example, although they own most of the trading

establishments in Kisii town, they have rented many of these to other communities, especially Kikuyus and Asians. Outside Kisii town, there are few permanent trade premises.

2. Lack of business experience and training, often leading to failure of business ventures.
3. Poor road and communication networks hampering movement in the district especially during the wet seasons. Presently, there is a single tarmac road from Kericho via Kisii town to Kisumu. The red volcanic soils in the district become impassable in the wet seasons.
4. Unavailability of capital (money) for traders, partially owing to the strict terms required by most lending institutions.

4.5.2 Industry

The district has a small variety of industries essentially concerned with the processing of the main cash crops: tea and coffee. Pyrethrum is mainly delivered to Nakuru for processing. Table 4.15 shows the number and size (in terms of employees) of industries in Kisii district. In addition, the soft stone industry is world renown for the soft stone carvings from a rare locally mined type of stone. Most of the industries are small scale, with a handful of regular employees plus varying numbers of casual and seasonal workers. Types of industries include food processing (e.g., coffee and tea factories, sugar jaggeries, grain mills, and bakeries) as well as tanning firms, construction companies and other local industries.

Input factors for food processing industries include water, which is either tap water or is pumped from local streams, and food crops such as coffee and tea.

Energy supply is a major constraint to industrial development. Electricity for industrial purposes is only available at Kisii town; most of the above industries utilize human labour and generators.

Waste products from both food and non-food processing industries are often improperly discharged. For example, effluents from coffee factories

TABLE 4.15 INDUSTRIES, KISII DISTRICT, 1979

TYPE OF ESTABLISHMENT	NUMBER	EMPLOYEES*
Tea factories	4**	300
Coffee factories	64	864
Power mills (maize and millet grinding)	248	400
KCC dairy factory (Sotik)	1	31
Local butcheries	171	300
Bakeries	3	60
Jaggeries (sugar processing)	10	40
Tannery/hide and skin dealers	1/10	15
Carpenters		110
Shoemakers		18
Tailors (full-time)		20
Printing	1	15
Motor repair garages	15	120
Building and construction	1	

SOURCE: Kisii District Development Plan, 1979-83

* Includes permanent regular employees only, not casual and seasonal employees.

** Two new tea factories are currently planned, increasing total employment to about 400.

normally are discharged, untreated, into nearby streams from which domestic water for surrounding homes is also obtained. These effluents constitute an unchecked source of river pollution in the district. There is a lack of concern about this problem, even by water officers in the district. There is need to enforce proper and environmentally sound discharge treatment mechanisms on all factories operating in the district.

4.6 EMPLOYMENT

Presently, agriculture contributes the majority of employment opportunities in Kisii district (see Table 4.2). However, with the acute shortage of land, this sector cannot be expected to absorb any further significant labour force. The majority of these workers are casually employed, indicating a serious problem of employment uncertainty and instability facing agricultural workers in the district. Formal wage employment opportunities--primarily in retail and wholesale administration, community services and construction--are concentrated in Kisii town.

Tables 4.16 and 4.17 show wage employment and earnings for Kisii district for 1971-79 and 1975-79 respectively. They indicate a steady growth in employment and earnings over the decade. Table 4.18 shows wage employment by industry in Kisii town, which contains about 15% of wage employment opportunities in the district. The large majority (60-70%) of these are in community, social, and personal services.

Table 4.19 shows gross domestic product (GDP) by major employment sectors in the district as of 1972.

TABLE 4.16 WAGE EMPLOYMENT, KISII DISTRICT, 1971-79

<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>
9,601	11,788	11,830	16,620	17,164	17,670	17,854	19,105	20,486

SOURCE: Statistical Abstract 1980

TABLE 4.17 EARNINGS OF WAGE EMPLOYEES, KISII DISTRICT 1975-79 (K [pounds] '000')

<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>
4,787.6	6,167.8	6,764.6	9,376.6	10,163.7

SOURCE: Statistical Abstract 1980

4

TABLE 4.18 WAGE EMPLOYMENT BY INDUSTRY, KISII TOWN, 1975 & 1979

	Agriculture & Forestry	Mining	Manufac- turing	Electricity and Water	Construc- tion	Wholesale & Retail Trade, Restaurants & Hotels	Transport & Communi- cations	Finance, Insurance, Real Estate, & Business Services	Community, Social & Personal Services	TOTAL
1975	145	—	56	5	191	456	40	145	1631	2669
1979	274	—	—	18	34	244	93	224	2008	2895

SOURCE: Statistical Abstract 1980

TABLE 4.19 GROSS DOMESTIC PRODUCT, KISII DISTRICT, 1972

	GDP	
	Shs. 1000	Percentage
Agriculture	173,750	76.5
(Monetary)	(98,950)	(43.6)
(Non-Monetary)	(74,800)	(32.9)
Non-Agricultural		
Private Sector	13,350	5.9
Public Sector	40,140	17.6
TOTAL	227,240	100.0
MONETARY TOTAL	152,440	67.1

SOURCE: Ministry of Labour

Agriculture provides more than 70% of the income in the district, and 90% of the employment opportunities. 95% of the female labour force is involved in agriculture, compared to 85% of the male labour force. Since the average farm size per family (6-10 people) is only about one hectare, the opportunities for increasing agricultural income and employment are limited. To address this need, the District Development Committee plans to start a large number of small-scale industries to provide further employment opportunities and income in the district.

4.7 RECREATION AND TOURISM

Tourist activities in Kisii district are presently at a low level of development. There is no national park or game reserve in the district, and much of the tourist business involves a small number of tourists en route from Masai Mara to Western Kenya.

There are two registered tourist hotels in the district: Kisii Hotel and the newly built Mwalimu Hotel, both situated in Kisii town. Since the volume of tourists is small and varies seasonally, these hotels are largely supported by local customers and visiting government senior officers. In

addition to the above two hotels, Kisii town has several medium standard hotels.

Because of its low level, the impacts of tourism in the district, both beneficial and adverse, are small. Limited benefits include the employment provided to local people in the hotels and the retail sales to tourists in transit.

A number of tourist opportunities exist in the district, namely:

1. The soft-stone industry at Tabaka. Soft stone carvings are very popular in Nairobi and Mombasa. Some tourists visit the mining sites where the soft stone is excavated.
2. A landscape revealing advanced farming techniques such as found in the Kerokar area.
3. Manga Hills, especially the site of occasional volcanic steam eruptions.

V. ANALYSIS OF TRENDS AND IDENTIFICATION OF ENVIRONMENTAL PROBLEMS

5.1 ANALYSIS OF TRENDS

This section examines changes in the Kisii district environment over time. The information can then be used to measure improvements in the environment due to development activities as well as to identify problems in their early stages so that preventive actions can be taken.

In the physical and natural environment, soil erosion, a potentially severe problem given the hilly topography, has been generally controlled by the widespread use of soil conservation measures. Similarly, plans for afforestation are underway and people plant trees on their shambas so that deforestation, so prevalent in other parts of the country, is not a major problem here. Nevertheless current planting is not keeping up with consumption so unless planting is increased or an alternative domestic fuel found, there will be significant shortages in the near future. It is important, thus, to monitor both the tree/fuelwood supply and soil erosion trends in the district.

A trend in vegetation change of greater concern is the reclamation program which is draining swampy areas. Lowered water levels change the vegetation radically. Yet, the effects on the groundwater table and flood have not been studied. Some suspect that trees planted in these swamps have reduced the water flow in the river, but this has not been investigated. Given adverse experiences in similar circumstances in other parts of the world, environmental impacts of this program should be studied.

Although water in the form of rainfall, rivers, streams and springs is plentiful, the continuing good quality of this water for domestic and live-

stock consumption is not assured. Effluents from coffee factories are already causing pollution problems. The increased use of fertilizers and pesticides for agricultural crops and pest control can be expected to contaminate water and soils in portions of the district. Regular water quality sampling is needed to detect these pollutants before they become a health hazard.

In the human environment, population has increased by 29% over the last ten years from 1969 to 1979. At the same rate of growth, the population of Kisii district may further increase by more than 60% by the year 2000. Furthermore, since over 80% of the people in Kisii derive their living from farming the soil, land holdings have been severely fragmented, and the density of population approaches and often exceeds the carrying capacity of the land. This can lead to serious environmental and economic stress, particularly in years of less than optimal climatic conditions. Moreover, with limited non-agricultural employment opportunities in the district, young and middle-aged males in particular have been forced to migrate to other areas in search of employment.

Despite the fact that Kisii is one of the fastest growing districts in the country, the people have not yet addressed the issue of family size. Without planned reduction in numbers of children and in the absence of programs to settle the population elsewhere, the standard of living and quality of life in Kisii may decline in the years ahead. Resources within the district probably cannot support the projected increase in population at current standards of living.

Land use changes in Kisii district have had a significant effect on both the physical and human environment. Historically the Gusii people were

pastoralists but when they migrated to the area they gradually shifted to an agricultural economy. Currently 95% of the district is in agricultural use, 40% of which is cultivated crops with the remainder grazing land. This intensive use of the land has increased the potential for soil erosion and represents a significant vegetation change. The smallholder farms (averaging 1.9 hectares) are more intensively used than elsewhere in the nation but are also producing higher crop yields due to good rainfall, fertilizer use, soil conservation, pesticides and better cropping methods. Furthermore, on small as well as large farms, the acreage devoted to cash crops has been steadily increasing.

Livestock in the district are numerous, averaging over two animals per hectare. This exceeds the estimated land carrying capacity of approximately one hectare per livestock unit (500 kg.). As a result, the animals weigh less, averaging 300 kg. No information is available on trends in numbers of livestock or mortality from diseases. However the percentage of grade cattle has increased, and there is a rising demand for dairy products.

Improvements in infrastructure in the district have been significant, but in most cases they have been unable to keep up with the increasing numbers of people. Water supply and health facilities have fallen behind. No information is available on trends in environmental health and nutrition, but it can be assumed that the national improvement in health has also been reflected in Kisii district. Even so, in the urban areas poor sanitation, improper solid waste disposal, factory pollution of the water supply, and overflowing drainage pipes have created health hazards which are exacerbated by the increasing numbers of people moving to the urban areas.

The standard of dwelling houses in Kisii rural areas is high compared to the surrounding districts. However, an accelerated program of housing

construction is needed in the town to accommodate the predicted influx of people.

Education in the district has improved, and educational facilities are widely distributed throughout the district. In the various age categories, nursery schools serve 16% of the age group and primary schools 60%. This ratio is close to the national average.

There has been significant improvement in roads connecting the district with adjacent districts, but the internal roads are often impassable during the rains. With the move from subsistence farming to a wage economy, transport to market centers will be in greater demand. Services in Kisii town are good, but the other five centers are low in overall services. Again the change to a wage economy will require a higher level of services in these centers.

The trend in employment is moving away from subsistence farming toward wage employment in commerce and industry. Apart from the recession following the 1978 boom and the crackdown on beer parlors, the commercial and industrial sector has been continually expanding. It is expected that this expansion will continue.

In summary, a continuation of these trends indicates that in the future Kisii district will have improved roads and services in scattered locations. It is uncertain whether health and education services will be able to keep up with the growing population. Crop yields and livestock quality should continue to improve with better farming methods and effective soil conservation. Tree planting, however, must be accelerated to supply the required domestic fuel. Land plots will be smaller as the land is further subdivided among children, and more people will migrate to the urban areas seeking wage employment, increasing the pressure on the services in these locations.

As most of Kisii district derives its living directly from the soil, sound resource management is critical for its well being. Yet there is not now a systematic effort to monitor trends in critical resources such as soil, water, vegetation and tree supply. In the absence of this resource information, it is difficult to assess the impact of existing projects or to design new development efforts. The following section summarizes the district's major environmental issues, problems and constraints which development projects should address.

5.2 IDENTIFICATION OF ENVIRONMENTAL PROBLEMS

5.2.1 Population Pressure on Land

Population in Kisii district increased 29% from 1969 to 1979. Since over 80% of the people are farmers deriving their living from the land, having a large enough piece of land is extremely important. Currently fragmentation is a growing problem and the average holding is only 1.9 hectares. Furthermore, the 1979-83 District Development Plan indicated that there were 59,000 landless males, only 20,000 of whom were in regular paid employment.

5.2.2 Poverty

Of the 59,000 landless males, it is estimated that 30,000 to 38,000 are forced to rely on the informal sector, casual farm employment or working a small area of land as tenants for their livelihood. This group, together with their dependents, approximate 20% of the district's population and constitute most of the district's poor. For the entire population, low education and low nutritional standards make the people's productive efficiency low as well as contribute to unemployment. In addition, most of the farm income is used to support the extended family so that there is

little savings to be used for improving existing ventures or starting new ones. Business activity and initiative are also limited by the lack of appropriate training opportunities for people in the district.

5.2.3 Services

Despite the development of new services, the district is experiencing difficulty keeping pace with the population growth. In some areas the level and quality of services may actually be declining. Market services are concentrated in Kisii town, and the people must travel far, often on bad roads, to obtain these services. Smaller market centres serve the communities in their area, but trips to Kisii town are required for many items.

5.2.4 Physical and Natural Resource Constraints

Besides the land constraints mentioned in Section 5.2.1, limited energy supply restricts industrial growth and development. Also the topography and rainfall pattern make most of the rural roads impassable during the rains.

5.2.5 Industrial Discharges

Water supplies are being degraded by industrial discharges. Effluents from coffee factories have polluted many rivers and streams, and holding ponds often flood, allowing the effluents to run directly into the river.

5.2.6 Sanitation and Environmental Health

In the urban areas, particularly in Kisii town, the drainage and sewerage systems sometimes overflow and pollute nearby rivers and streams. Toilets have been poorly maintained as well as the solid refuse disposal site which is very near the residential area in Kisii town. Limited rental housing has produced overcrowding which exacerbates the problems. In the

rural areas the lack of latrines has resulted in high incidences of dysentery, typhoid and intestinal diseases.

5.2.7 Education

Most secondary schools are harambee schools housed in poor buildings and serviced by teachers a majority of whom are untrained . Less than 10% of the potential secondary school age population attends schools. Of those who do attend, failure rates are high. Educated personnel are needed not only in the school system but also in the government and private sectors.

5.2.8 Transport

Roads and transport are a constraint for many public and private employees. The unavailability of transport hinders officers in serving the people as well as limiting market development. It also represents a major obstacle in the provision of prompt and effective health care to the rural population. The district's topography and rains make road maintenance expensive, and poor design of drainage on many roads necessitates maintenance after every rainy season.

5.2.9 Energy

Electricity from the national electrical grid is available only in Kisii town. The district's rivers are not now used for hydroelectric power and thus the people must rely on wood for domestic fuel consumption. Forestry projects have been accelerated but still are insufficient to meet the future demand for fuel.

VI. RECOMMENDATIONS

This chapter presents options for addressing some of the issues described in Chapter 5. A short description of the advantages and disadvantages of the various options is also included. Where one option seems preferable, recommendations have been made. The recommendations generally follow the issues as outlined in Chapter 5.

6.1 MONITORING TRENDS

Little hard data is available for assessing positive and negative trends in the environment. In many cases background level data is needed to assess the environmental impact of a development action or lack of action. Of the main trends described in Section 5.1 it is recommended that the district officers of the various ministries, with technical assistance from the National Environment Secretariat, selected priority sites for monitoring as follows:

1. Soil erosion

On sites with soils representative of the district, erosion losses should be monitored from both mismanaged and well managed sites. Sampling should be done before and after each rainy season.

2. Water pollution

On a site proposed for a coffee factory, water quality should be sampled before the factor is built and afterwards on a regular basis. Frequency of sampling should be quarterly. Sampling should also be undertaken at one or more existing factories to maintain an ongoing record of water quality. Priority for sampling should be assigned to factories on waterways that are used for public water supply.

A suitable site or sites should also be selected for monitoring possible water pollution by agrochemicals, particularly pesticides.

6.2 ENVIRONMENTAL PROBLEMS

6.2.1 Population Pressure on Land

Several options are suggested to address the issue of population pressure on land (see Section 5.2.1):

- (a) improve the land's productivity by better crop and grazing land management (see 6.5 below);
- (b) provide settlement areas outside of the district;
- (c) increase off-farm employment opportunities and train workers to make them employable;
- (d) reduce the rate of population increase.

Discussion:

It is not known whether or not (b) is feasible as high potential land in other districts is experiencing the same population pressure.

Recommendation:

Some combination of (a), (c), and (d) are probably the best available means of resolving this issue.

6.2.2 Poverty

Several options are suggested to meet the needs of the district's poor (see Section 5.2.2):

- (a) increase off-farm employment activities and train workers to make them employable;
- (b) encourage cooperative ownership of farms to allow the landless to purchase a share;
- (c) provide settlement areas outside of the district;
- (d) reduce the rate of population increase.

Discussion:

Again, as productive areas available for settlement are few, some combination of (a), (b) and (d) are the best approach. The 1979-83 District Development Plan recommends (a) and (d) as long term solutions and suggests (b) as an interim solution.

6.2.3 Lack of Business Training

Options to address this problem include:

- (a) adult education programs to improve skills of current business owners and managers;
- (b) including mandatory courses in basic business skills in the secondary school curriculum;
- (c) encouraging the establishment of harambee technical schools to train school leavers.

Discussion:

There are needs for business training at many levels: for existing businessmen, for young people who leave school after CPE, KJSE, 'O' Level or 'A' Level examinations as well as those still in school. Thus, training and encouragement needs to be provided at all the levels mentioned in options (a), (b) and (c).

6.2.4 Services

In order to improve the level of services in the face of a rapidly expanding population, the district has several options:

- (a) allocate a larger portion of the district's budget to services;
- (b) increase taxes to increase funds available for services;
- (c) encourage more harambee projects;
- (d) require people to maintain contributions to harambee projects to meet recurrent expenses;

- (e) begin charging for services previously provided without charge;
- (f) reduce the rate of population increase.

Discussion:

Options (a), (b) and (e) contradict the district's development objective which is to increase production in the agricultural and economic sectors in order to increase personal incomes. The District Development Plan gives priority to those services needed for economic development in order to further the goal of improving the wananchi's income and standard of living. These options would reduce their incomes. Since harambee projects are voluntary by nature, option (d) is not really feasible as a requirement, but nevertheless should be encouraged. Option (f) is a long term solution and, in the meantime the government and self-help projects will have to find some means to finance the development and maintenance of needed services.

6.2.5 Natural Resources Constraints

Resource constraints identified in Section 5.2.4 include land, energy, topography, rainfall intensity and productivity. Options for mitigating these constraints are as follows:

- (a) research into development technologies specifically suited to these physical conditions;
- (b) training for farmers, government officers and businessmen in more efficient and environmentally beneficial uses of these resources.

Discussion:

Resources such as those listed above are finite, and thus short term benefits from their use cannot be taken at the expense of long term productive capacity. Planning, research and training is needed to best use and maintain these basic resources for future use.

6.2.6 Industrial Discharges

Contamination of drinking water by industrial discharges is a problem not yet commonly recognized in the district. Options for dealing with this problem are as follows:

- (a) requiring factories to treat their effluents before discharging them;
- (b) government-financed treatment of drinking water for the wananchi;
- (c) provision of alternative drinking water sources such as roof catchments and boreholes.

Discussion:

Only option (a) provides clean water in the rivers and streams. Options (b) and (c) require the people to treat the water before they use it. Most people either do not or cannot afford to treat the water (e.g., the expense of a treatment system or even the fuel cost for boiling it), and thus the effluents from the factory are a general health hazard. Treating the water through holding ponds or other technologies should be made part of the basic costs of industry. Then wananchi can benefit from the employment and products of the industry without losing one of their most basic health needs, clean water.

6.2.7 Sanitation and Environment Health

Problems with sanitation and waste disposal are common in crowded sections of developing urban areas. Options for addressing the sanitation problem in Kisii town include:

- (a) individual household systems, e.g., pit latrines;
- (b) communal systems, e.g., latrines;
- (c) communal flush systems with septic tanks or comparable treatment systems;
- (d) communal flush systems with sewage treatment.

Options for waste disposal include:

- (a) burning;
- (b) burial;
- (c) composting for fertilizer;
- (d) burning for fuel.

Discussion:

For sanitation, a study of the soil types needs to be performed so that it can be determined whether option (c) is feasible. Option (d) is the most costly. Further study of the specific area in Kisii town is needed so that certain systems can be recommended. For waste disposal, one of the options which uses the wastes beneficially (either [c] or [d]) is preferred.

6.2.8 Education

Although education has received a great deal of attention and investment in the district in the past, there is still need for improvement. Options for addressing this need include:

- (a) teacher training, including environmental training;
- (b) more harambee secondary schools;
- (c) harambee polytechnics;
- (d) more government secondary schools.

It is recommended that the district implement all of these options to expand educational opportunities.

6.2.9 Transport

Options for improving transport include:

- (a) upgrading roads;
- (b) improving drainage on existing roads;
- (c) increasing the number of vehicles available for public use.

161

transport;

- (d) strictly enforcing rules on public vehicle maintenance and overcrowding.

Discussion

The steep topography and rainfall regime of the district make road maintenance difficult. More emphasis should be put on designing road drainage with follow-up after the first rains to make adjustments. The district should continue to upgrade roads as funds are available.

6.2.10 Energy

Options to supply the district's energy requirements include:

- (a) increasing forest plantings;
- (b) exploring renewable energy sources such as wind power and solar energy.

Discussion:

The number of trees planted at present is fewer than the number cut each year for domestic fuel. Until an alternative energy source is found, individuals and the government must increase tree planting. Meanwhile, alternative technologies should be tried at schools, hospitals, industries and service centers.

TABLE A1: WATER PROJECTS SPONSORED AND MAINTAINED BY CENTRAL AND LOCAL GOVERNMENT IN KISII

<u>Name and Location</u>	<u>Type of Facility</u>	<u>Sponsoring Agency</u>	<u>Maintaining Agency</u>	<u>People of Area Served</u>	<u>Level of Completion/Operation</u>
Kisii Urban Water Supply Nyaribari Cache Loc. Irianyi Div.	Fully treated piped supply	Ministry of Water Development	Ministry of Water Development	Kisii Township 25,000 people	Complete and in full operation
Sameta Rural Water Supply Nyaribari Cache Loc. Irianyi Div. S. Mugirango Cache Loc. Bosongo Div.	Fully treated piped supply	Ministry of Water Development	Ministry of Water Development	c. 87,000 people	Not operational, about 80% complete
Keroka Rural Water Supply Nyaribari Cache Loc. Irianyi Div.	Fully treated piped supply	Ministry of Water Development	Ministry of Water Development	6,000 (1973)	Completed and fully operational
Manga Rural Water Supply Central Kitutu Loc. Manga Div.	Untreated spring water	Gusii County Council	Ministry of Water Development	c. 3,000 people	Complete and in operation
Nyamira Rural/Urban W/S. West Mugirango Loc. Nyamira Div.	Fully treated piped water	Ministry of Water Development	Ministry of Water Development	c. 1,000 people	Complete and in full operation
Tombe Rural Water Supply East Kitutu Loc. Manga Div.	Untreated spring water	Gusii County Council	Ministry of Water Development	c. 1,000 people	Complete and in operation
Gesusu Rural W.S. Nyaribari Masaba Loc. Irianyi Div.	Untreated spring water	Gusii County Council	Ministry of Water Development	c. 1,000 people	Complete and in operation
Tabaka Water Supply S. Mugirango Cache Loc. Bosongo Division	Untreated spring water	Gusii County Council	Catholic Mission	c. 2,000 people	Complete and in operation
Rangemyo Water Supply W. Mugirango Location Nyamira Div.	Untreated spring water	Gusii County Council	--	--	Not in operation
Kermbu Water Supply Nyaribari Cache Loc. Irianyi Div.	Untreated spring water	Gusii County Council	Amasago Sec. School	over 400 people	In operation

WATER PROJECTS SPONSORED AND MAINTAINED BY CENTRAL AND LOCAL GOVERNMENT IN KISII

Name and Location	Type of Facility	Sponsoring Agency	Maintaining Agency	People of Area Served	Level of Completion/Operation
Nduru Water Supply S. Muqirango Cache Loc. Bosongo Div.	Untreated spring water	Ministry of Health	Nduni Secondary School	c. 1,000 people	In operation
Marani Water Supply West Kitutu Loc. Manga Division	Untreated spring water	Gusii County Council	Gusii County Council	c. 2,000 people	--
Kiambonyoro Water Supply N. Muqirango Loc. Nyamira Division	Untreated spring water	Gusii County Council	Kiambonyoro Sec. School	c. 200 people	--
Sengera Water Supply Majoge Cache Loc. Ogembo Division	Untreated spring water	Ministry of Health Sengera Sec. School	--	--	Not complete
Ogembo Water Supply Majoge Cache Loc. Ogembo Division	Untreated piped water	Gusii County Council	Gusii County Council	c. 1,500 people	In operation
Nyatieko Water Supply Kitutu West Loc. Manga Div.	Untreated spring water	Ministry of Health	Nyatieko Sec. School	c. 1,000 people	In operation
Gakere Water Supply Majoge Cache Loc. Ogembo Div.	Untreated spring water	Gusii County Council	Gusii County Council	c. 1,000 people	Not in operation
Birongo Water Supply Nyaribari Cache Loc. Irianyi Div.	Untreated spring water	Ministry of Health	--	--	Not in operation

Source: Ministry of Water Development, 1980.

TABLE A 2: HEALTH FACILITIES, KISII DISTRICT

<u>Name of Facility</u>	<u>Location</u>	<u>Capacity</u>	<u>Sponsor-Funding</u>	<u>Problems/Modernity/Needs</u>
Kisii Hospital	Kisii Town	262 beds (314 with the completion of the 2 new wards)	Government	10 wards (Medical, Surgical, paediatric, T.B., Isolation, Eye, Casualty, Maternity, Amenity) 2 more wards to be completed
Nyamira Hospital	W. Mugirango	200 beds	Government	
Keroka H.C.	E. Kitutu and serves Mwamosioma, Nyansiongo, Bombea Sub-locations	11 beds	Government	7 maternity beds, 4 exam beds
Ibenu H.C.	Nyaribari Chache Loc. serves Bobaria sub- location	21 beds	Government	19 maternity beds, 1 delivery bed, 1 family plan. bed
Marani Rural Health Training Centre	W. Kitutu Loc. Mwagichana sub-location	16 beds	Government	14 maternity beds, 1 delivery bed and 1 exam bed
Nyamache H.C.	Bassi Bosigi sub-location	12 beds	Government	5 maternity, 1 delivery and 3 exam beds
Ogembo H.C.	Majoge Chache Kanyibo sub-location	12 beds	Government	9 maternity, 1 delivery bed
Nduru R.H.T.C.	Bogirango Bogitanga sub-location	16 beds		2 examination beds

TABLE A 2: H E A L T H F A C I L I T I E S (continued)

<u>Name of Facility</u>	<u>Location</u>	<u>Capacity</u>	<u>Sponsor-Funding</u>	<u>Problems/Modernity/Needs</u>
Esani Dispensary	E. Kitutu Bonyamondo sub.		Government	Enrolled nurses, community nurses and patients' attendants present
Ekerenyo Dispensary	N. Mugirango Boisanga sub.		Government	Enrolled nurses, patients' attendants, mid-wives/enrolled nurses and health technician present
Magombo Dispensary	N. Kitutu Bonyaikoma sub.		Government	Enrolled nurse, patients' attendant, health technician
Nyangena Dispensary	North Kitutu		Government	Enrolled nurse and patients' attendant
Kegogi Dispensary	Eronge Bokingoia sub.		Government	2 patients' attendants
Tinga Dispensary	W. Mugirango Bosamoro sub.		Government	1 enrolled nurse and 2 patients attendants being enlarged into a sub-health centre. Family planning carried out on Mobile Basis.
Nyamaiya Dispensary	W. Mugirango Bomabacho sub.		Government	(as above) also under promotion to a sub-H/C
Etego Dispensary	S. Mugirango		Government	Enrolled nurse, patients' attendant and health technician, no staff houses available
Kenya Dispensary	Majoge Borabu Mageche sub.		Government	1 health technician and 2 patients' attendants
Kiogoro Dispensary	Nyaribari Chache Bogisiqa sub.		Government	2 enrolled nurses, 2 patients' attendants and 1 health technician

TABLE A 2: H E A L T H F A C I L I T I E S (continued)

<u>Name of Facility</u>	<u>Location</u>	<u>Capacity</u>	<u>Sponsor-Funding</u>	<u>Problems/Modernity/Needs</u>
Ramasha Dispensary	Nyaribari Masaba Bomobe sub.	-	Government	1 enrolled nurse, 1 patients attendant, 1 health technician. Needs promotion to a sub-H/C because of casualties due to clashes between Maasai and Kisii.
Iranda Dispensary	W. Kitutu Bomatara sub.	-	Government	1 enrolled nurse, 1 patients' attendant and 1 health technician
Magwagwa Dispensary	N. Mugirango Magwagwa sub.	-	Government	(as above) "
Isoga Dispensary	Borabu N. Borabu sub.	-	Government	(as above) "
Iyabe Dispensary		-	Government	(as above) "
Kiamokama Dispensary		-	Government	as above but no health technician
Riana Dispensary	Wanjare Getembe sub.	-	Government	(as above) "
Tabaka Mission Hospital	S. Mugirango Bosinange sub.	125 beds 4 wards	Mission (Catholic)	Maternity wards, female and male wards children's wards, 8 rooms for amenity beds
Sengera Mission Hospital	Majoge Bokimonge sub.	30 beds	Mission (Catholic)	22 maternity beds, 8 children's beds
Rangenyo Mission Dispensary	W. Mugirango Bogichora	-	Mission	1 enrolled mid wife, 1 patients' attendant

107

108

TABLE A 2: H E A L T H F A C I L I T I E S (continued)

<u>Name of Facility</u>	<u>Location</u>	<u>Capacity</u>	<u>Sponsor-Funding</u>	<u>Problems/Modernity/Needs</u>
Nyamagwa Dispensary	Baasi	4 maternity beds 12 children's beds	Mission	1 clinical officer, 1 enrolled midwife, 1 enrolled nurse, 5 patients' attendants, 4 general attendants
Lutheran H.C. (Matongo Health Centre)	N. Mugirango Bokeira sub.	28 beds	Mission	4 general beds, 2 coats, 20 maternity beds 2 delivery beds
Lutheran Itierio H.C.		21 beds	Mission	14 maternity beds, 7 general beds, no doctor
Monianku Lutheran H.C.		6 maternity beds	Mission	staff nurse, ungraded nurse, general attendant
Gesusu Dispensary (S.D.A.)	Nyaribari Masaba Boquche sub.	2 examination beds	Mission	2 enrolled nurses, 2 patients' attendant
Itibo Dispensary		3 beds	Mission	2 maternity, 1 examination bed
Riokindo Dispensary (S.D.A.)		-	Mission	Currently closed
Kenya Mission (S.D.A.) Disp.	W. Mugirango Bogichora	-	Mission	1 clinical officer, 1 enrolled nurse and 2 patients attendant
Nyabururu Disp. (Catholic)	W. Kitutu Bomatara sub.	-	Mission	1 R.N., 1 general attendant
Magenche Dispensary	Majoge Borabu Magenche sub.		Mission	1 patients' attendant, 1 sister in charge

TABLE A 2: H E A L T H F A C I L I T I E S (continued)

<u>Name of Facility</u>	<u>Location</u>	<u>Capacity</u>	<u>Sponsor-Funding</u>	<u>Problems/Modernity/Needs</u>
Dr. Munduku's Maternity and Nursing Home	Central Kitutu	69 beds	Private	10 maternity, 2 delivery, 57 general beds, x-ray machine is present and lab with microscope. Has been closed down.
Chrienne Morie Nursing Home	Nyaribari	51 beds	Private	50 general, 1 examination bed. Laboratory is present.
Dr. D.M. Bid		1 bed	Private	Examination bed only. Microscopes for routine work.
Dr. D.R. Singh		1 bed	Private	Examination bed only.
Dr. Pajwani		1 bed	Private	Examination bed and microscope for routine work.
Dr. Patez		1 bed	Private	Examination bed and microscope for routine work.

Source: Ministry of Health

100

TABLE A 3: VILLAGE POLYTECHNICS IN KISII, 1978
Enrollment for 1978

Village Polytechnic	Carpentry	Masonry	Tailoring & Dressmaking		Health Science	Leather	Stone-Carving	Bakery	Engineering	Plumbing
			Boys	Girls						
Kenyanya	21	41	8	-	4	12	-	5	-	1
Misambi	11	10	9	13	15	-	-	-	-	-
Nyaore	12	16	11	1	-	-	-	-	-	3
St. Stephens	23	26	-	-	37	-	-	-	-	5
Mirwanda	24	27	18	9	-	-	-	-	-	-
Getichaki	16	10	11	1	8	-	5	-	-	-
Masongo	16	23	13	2	-	-	-	-	13	-
Nyeturumbasi	15	10	4	-	-	-	-	6	-	-
Bobembe	7	3	6	1	-	-	-	-	-	-
Mkerubo	10	8	7	2	-	-	-	-	-	-
Nyansembe	-	10	10	4	-	-	-	-	-	-
Enchoro	7	8	3	2	-	-	-	-	-	-
Entanke	10	7	8	-	-	-	-	-	-	-
TOTALS	172	199	108	35	64	12	5	11	13	9

TABLE A 4: ADULT LITERACY CLASSES, KISII DISTRICT, 1978 and 1979

Center	Location	Enrollment for 1978			Enrollment for 1979			Number of Staff	Sponsor
		Men	Women	Total	Men	Women	Total		
Ekerubo	W. Mugirango	3	30	31				1	Govt. Aided
Nyamue		-	25	25				1	- do -
Mariwa		3	13	16				1	- do -
Nyangweta		-	18	18				1	- do -
Ritumbe		1	23	24				1	- do -
Itumbe	Ogembo Div.	8	12	20				1	- do -
Keera	W. Mugirango	-	20	20				1	- do -
Gesicho		-	26	26				1	- do -
Kirwa		-	14	14				1	- do -
Gesabakwa	Nyaribari Basaba	-	23	23	4	47	51	1	- do -
Nyanderema		-	20	20				1	- do -
Amasago		-	20	20				1	- do -
Geturi		4	17	21				1	- do -
Getionko		-	17	17				1	- do -
Itibo	Ogembo Div.	2	15	17				1	- do -
Kuja		-	18	18				1	- do -
Rigoma		3	14	17				1	- do -
Siara		-	19	19				1	- do -
Riamoni		-	20	20				1	- do -
Enchoro		-	19	19				1	- do -
Tindereti		-	20	20				1	- do -
Nyaronde		-	20	20				1	- do -
Makairo		-	24	24				1	- do -
Bosose		-	21	21				1	- do -
Viongozi Senta	N. Mugirango	8	12	20				1	- do -
Koroba		4	18	22				1	- do -
Nyagokiari	N. Mugirango	-	20	20				1	- do -
Nyabikomu		-	20	20				1	- do -
Kowidi	N. Mugirango	10	17	27				1	- do -
Nyaututu	N. Mugirango	-	20	20				1	- do -
Mokomoni		-	14	14				1	- do -

TALBE A 4: ADULT LITERACY CLASSES (continued)

Center	Location	Enrollment for 1978			Enrollment for 1979			Management/Sponsor
		Men	Women	Total	Men	Women	Total	
Nyairango		-	15	15				L.C.K.*
Kenयोरो		-	19	19				- do -
Erandi		-	16	16				- do -
Nyamwetuřeko		-	32	32				- do -
Bobembe		-	21	21				- do -
Eronge		-	20	20				- do -
Kiabiraa		-	20	20				- do -
Nyaramba		5	15	20				D.O.K.**
Obwari		-	13	13				- do -
Nyanchoka		-	17	17				- do -
Nyakomima		3	10	13				- do -
Ensoko		2	18	20				- do -
Kiomogoko		-	12	12				- do -
Hagwagwa	Nyamira Div.	-	14	14				- do -
Mokomoni		-	9	9				- do -
Sosera		-	23	23				- do -
Rangenyo		2	17	19				- do -
Kamasara		-	10	10				- do -
Embonga		4	12	16				- do -
Nyakoora		3	18	21				- do -
Moseria		2	14	16				- do -
Nyakoera		2	15	17				- do -
Nyanyi		-	20	20				- do -
Nyakongo	C. Kitutu	2	22	24	6	50	56	- do -
Hotonto	Eronge Loc.	-	-	-	20	80	100	
Bogwendo	N. Kitutu Loc.	-	-	-	8	65	73	
Rianyabaro	Wanjare Loc.	-	-	-	9	86	95	
Nyabwaroba	Eronge Loc.	-	-	-	20	50	70	
Nyamioho	Wanjare Loc.	-	-	-	-	-	125	
Tinga	W. Mugirango Loc.	-	-	-	31	54	85	

* Lutheran Church of Kenya
 ** Diocese of Kisii

TABLE A 4: A D U L T L I T E R A C Y C L A S S E S (continued)

Center	Location	Enrollment for 1978			Enrollment for 1979			Management/Sponsor
		Men	Women	Total	Men	Women	Total	
Eronge	Nyamira Div.							
	North Mugirango	2	21	23	12	43	65	Self Help
Bonyaiguba		-	11	11				- do -
Ikonge		-	13	13				- do -
Ensako		2	20	22				- do -
Nyanchomoria		-	10	10				- do -
Nyakoora		2	14	16				- do -
Ngenyi		-	14	14				- do -
Mosaria		3	15	18				- do -
Nyasabakwa		-	25	25				- do -
Isoge		-	21	21				- do -
Nyaisa		-	20	20				- do -
Kura	Nyamira Div.	-	12	12				- do -
Mongonga		2	24	26				- do -
Kenyamwaro		-	28	28				- do -
Maji Mazuri		3	13	16				- do -
Sameta		-	20	20				- do -
Kiogutwa		3	17	20				- do -
Irianyi	Manga Div.	-	30	30				- do -
Emesa		-	23	23				- do -
Nyamagena								- do -
Mabariri		9	27	36				- do -
Nyatwoni		-	29	29				- do -
Emenwa		-	30	30				- do -
Riontweka		7	38	45				- do -
Nyakumbati		-	20	20				- do -
Komoso		-	39	39				L.C.K.
Itierio		-	32	32				- do -
Nyamerako		-	28	28				- do -
Matongo		-	35	35	5			- do -
Gesura	W. Mugirango	-	25	25	5	78	83	- do -
Gesigoro		-	19	19				- do -
Magwagwa		-	23	23				- do -

1/2