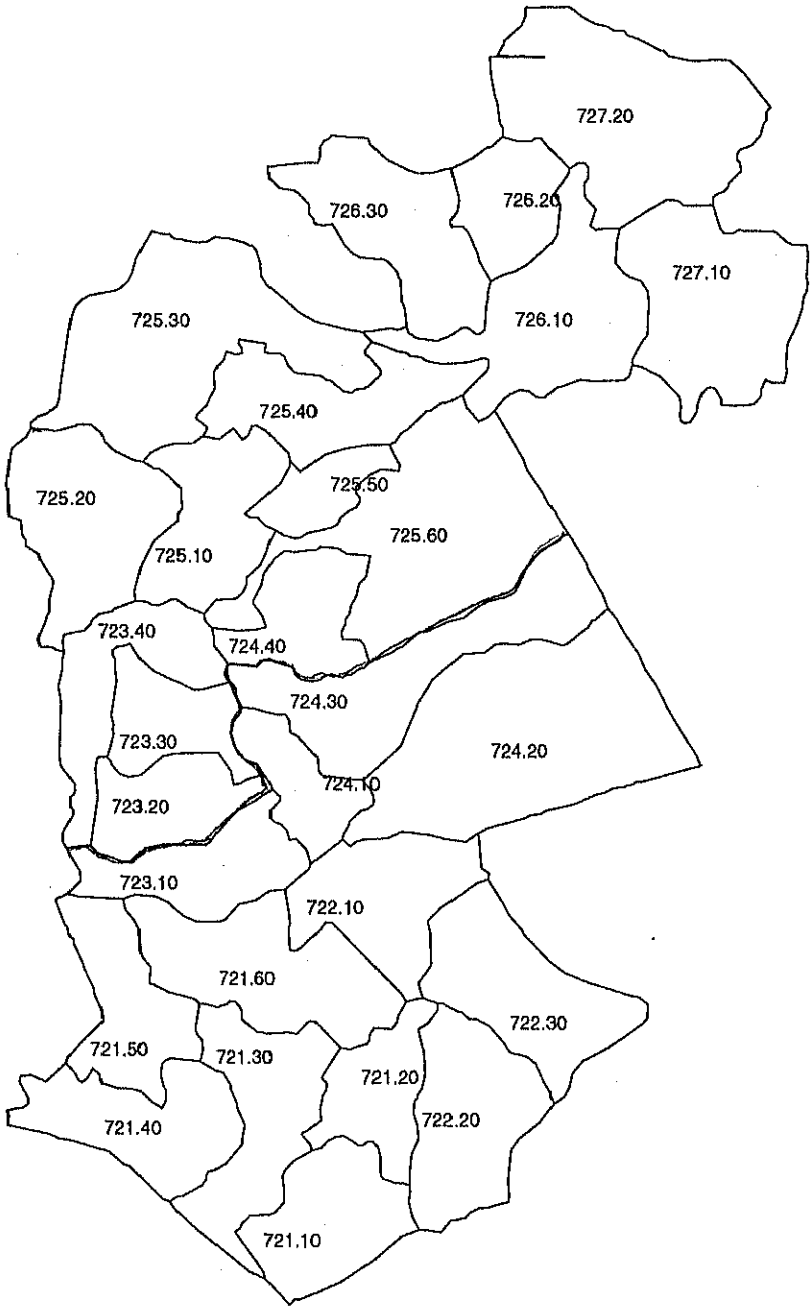
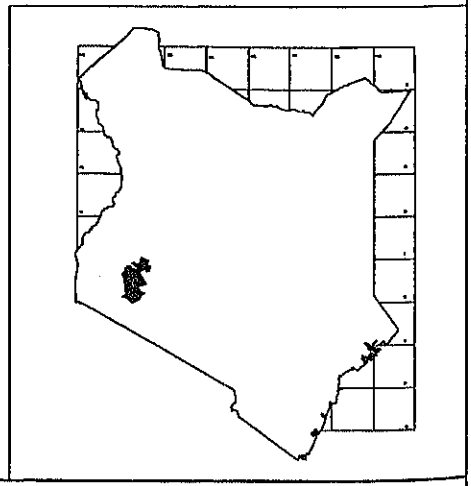
Kericho

District

Fig.



Code	Location	Population
721.1	Sigor South	17,905
721.2	Sigor North	14,865
721.3	Kongasis	24,015
721.4	Abosi	18,447
721.5	Ndanai	18,336
721.6	Mutorokwo	20,316
722.1	Ekwen	32,926
722.2	Longisa	20,429
722.3	Merigi	34,714
723.1	Kapletudo	29,197
723.2	Tachoget	24,953
723.3	Litein	27,161
723.4	Kisiara	20,712
724.1	Mogogosiek	16,573
724.2	Cheptala	15,615
724.3	Kimulot	15,727
724.4	Saosa	18,984
725.1	Waldai	38,615
725.2	Kiplere	37,413
725.3	Soin	19,363
725.4	Mosop	30,083
725.5	Kericho Township	29,603
725.6	Chaik	19,547
726.1	Kipkelion	30,635
726.2	Chilchila	15,403
726.3	Kipchoria	9,627
727.1	Londiani	18,559
727.2	Sorget	13,627



720 Kericho

THE STUDY
ON
THE NATIONAL WATER MASTER PLAN

JAPAN INTERNATIONAL COOPERATION AGENCY

1. Socio-Economic Profile : 720 Kericho District

1-1 Population Projection

(Unit:1000)

Code	Location	Land Area (sq.km)	Town Name	1990 Total	1990 Urban	1990 Rural	2000 Total	2000 Urban	2000 Rural	2010 Total	2010 Urban	2010 Rural
720	Kericho District	4,891		915.6	52.6	863.0	1,187.5	118.5	1,069.1	1,466.5	189.9	1,276.6
721.1	Sigor South	145	Kaboson	25.9	-	25.9	32.8	0.7	32.1	39.3	0.9	38.4
721.2	Sigor North	102		21.5	-	21.5	26.7	-	26.7	31.9	-	31.9
721.3	Kongasis	171		34.8	-	34.8	43.1	-	43.1	51.5	-	51.5
721.4	Abosi	154		26.7	-	26.7	33.1	-	33.1	39.5	-	39.5
721.5	Ndanai	131		26.6	-	26.6	32.9	-	32.9	39.3	-	39.3
721.6	Mutorokwo	203		29.4	-	29.4	36.5	-	36.5	43.5	-	43.5
722.1	Ekwen	155	Bomet	47.7	-	47.7	60.5	1.4	59.1	72.4	1.8	70.6
722.2	Longisa	173	Longisa	29.6	-	29.6	37.4	0.7	36.7	44.8	1.0	43.8
722.3	Merigi	182		50.3	-	50.3	62.3	-	62.3	74.4	-	74.4
723.1	Kepletudo	125	Sotik	48.3	6.0	42.3	63.5	11.1	52.4	79.1	16.5	62.6
723.2	Techoget	104		36.2	-	36.2	44.8	-	44.8	53.5	-	53.5
723.3	Litein	94	Litein	39.4	-	39.4	49.9	1.1	48.8	59.8	1.5	58.2
723.4	Kisiara	132	Roret	30.0	-	30.0	38.9	1.7	37.2	46.7	2.3	44.4
724.1	Mogogosiek	81		24.0	-	24.0	29.7	-	29.7	35.5	-	35.5
724.2	Cheptalal	380		22.6	-	22.6	28.0	-	28.0	33.5	-	33.5
724.3	Kimulot	215		22.8	-	22.8	28.2	-	28.2	33.7	-	33.7
724.4	Saosa	109		27.5	-	27.5	34.1	-	34.1	40.7	-	40.7
725.1	Waldai	151	Sosiot	55.9	-	55.9	70.7	1.4	69.3	84.7	1.9	82.8
725.2	Kiptere	195		54.2	-	54.2	67.2	-	67.2	80.2	-	80.2
725.3	Soin	316		28.1	-	28.1	34.8	-	34.8	41.5	-	41.5
725.4	Mosop	158		43.6	-	43.6	54.0	-	54.0	64.5	-	64.5
725.5	Kericho Township	60	Kericho	41.2	41.2	0.0	88.7	88.7	0.0	144.9	144.9	0.0
725.6	Chaik	322		28.3	-	28.3	35.1	-	35.1	41.9	-	41.9
726.1	Kipkelion	219	Kipkelion	41.2	2.2	39.0	53.1	4.7	48.3	65.4	7.7	57.7
726.2	Chilchila	95		22.3	-	22.3	27.6	-	27.6	33.0	-	33.0
726.3	Kipchoria	177		13.9	-	13.9	17.3	-	17.3	20.6	-	20.6
727.1	Londiani	230	Londiani	23.7	3.2	20.5	32.3	6.9	25.4	41.6	11.3	30.3
727.2	Sorget	312		19.7	-	19.7	24.5	-	24.5	29.2	-	29.2

1-2 GRDP Projection

Item	1990	2000	2010
1) GRDP (K.Pound million)	169.9	296.8	426.2
Percentage to GDP	2.2%	2.1%	2.1%
2) GRDP per Capita (K.Pound)	185.5	249.9	290.6
Ratio to GDP per capita	0.54	0.55	0.57
Urban (K.Pound)	892.7	749.6	715.9
Rural (K.Pound)	142.4	194.6	227.3

1-3 Present District Profile (1990)

1) Agricultural Production (1989)

Product	Production	Unit
Maize	307,562	tons
Sorghum/Millet	3,806	tons
Potato	5,650	tons
Rice	-	tons
Wheat/Barley	1,501	tons
Coffee	1,454	tons
Tea	70,200	tons
Milk	-	tons
Meat	-	tons

2) Number of Manufacturing Establishments (1986)

Type of Industry	Number
Food	37
Textile	1
Wood	11
Paper	3
Chemical	0
Non-metal	2
Metal	0
Machinery	1
Others	3
Total	58

3) Water Supply Schemes in Service Centre

Piped system	35
Communal water points	0
Other sources	19

4) Educational Facilities

Primary school	558
Secondary school	108
Institute	13

5) Medical Facilities

Hospital	8
Health Centre	15
Dispensary	54
Others	2

6) Out-patient of Infective Diseases in Relation to Water Supplies (1985-89 Average)

Diarrhoeal Diseases	26,071
Leprosy	22
Infectious Hepatitis	674
Bilharzia	1,388
Eye Infections	17,379

2. Land and resources

2.1 Present Land Use

Unit : km2

Total Area	Land Area	Water Area	Forest & Park	Swamp	Town	Barrenland	Agriculture Land	Other Land
4,890	4,890	0	1,063	0	300	0	2,330	1,197

2.2 Rain fall

Unit : mm

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
73	74	118	202	161	107	116	138	104	98	114	81	1,393

2.3 River Flow

Unit : m3/sec

Gauge Code	Catchment Area (km2)	Mean Flow	Low Flow Frequency			
			80%	90%	95%	Min.
1JA02	179	3.6	1.5	1.2	1.1	0.9
1JC02	330	5.5	1.0	0.8	0.7	0.5
1JD03	3600	25.8	6.7	4.6	4.1	3.6
1JE02	476	6.8	2.3	1.8	1.6	1.2
1JE06	394	7.1	5.3	4.8	4.3	2.9
1JF01	3287	36.7	2.6	1.8	1.8	1.1
1JF02	3450	56.6	14.7	12.4	10.7	9.0
1LA01	635	9.5	4.3	3.4	2.9	2.3
1LA03	679	10.1	2.7	1.8	1.3	0.8

2.4 Groundwater

Aquifer Characteristics

Elevation (m)	Total Depth (m)	Water Struck (m)	Level Rest (m)	Yield (m3/hr)	Draw Down (m)
2036.9	146.41	105.87	40.33	7.19	55.41

Safe Abstruction Yield

Unit : m3/year

Borehole	Shallow	Total
1,463,010	1,010,012	2,473,022

2.5 Agriculture

Suitable Area for Major Crops

Unit: km2

Maize	Wheat	Rice	Sorghum	Potato	Coffee	Tea
3,152	559	137	904	2,014	358	596

Area of Irrigation Potential

Unit : ha

Surfce Water		Groundwater	
Upland	Lowland	Upland	Lowland
26,451	5,907	51.7	4.9

Livestock Population

Unit: 1,000

Cattle	Sheep/Goats	Camels	Donkeys
617.15	224.07	-	-

3 Water Demand Projection

Unit: cu.m/day

Location	1990				2000				2010			
	Rural	Urban	Livestock	Industry	Rural	Urban	Livestock	Industry	Rural	Urban	Livestock	Industry
Kericho District	28,892	7,606	17,426	2,541	43,024	17,455	22,142	4,685	68,652	28,510	28,253	6,702
Sigor South	568	0	516	0	771	102	651	0	1,083	140	824	0
Sigor North	619	0	428	0	885	0	538	0	1,339	0	680	0
Kongasis	829	0	692	0	1,141	0	869	0	1,634	0	1,098	0
Abosi	597	0	532	0	819	0	667	0	1,169	0	844	0
Ndanai	677	0	528	0	947	0	663	0	1,389	0	839	0
Mutorokwo	1,020	0	585	0	1,528	0	735	0	2,453	0	929	0
Ekwen	1,732	0	949	0	2,619	200	1,198	0	4,256	275	1,516	0
Longisa	915	0	589	0	1,334	109	743	0	2,069	150	940	0
Merigi	1,825	0	1,000	0	2,760	0	1,256	0	4,487	0	1,588	0
Kepletudo	1,503	867	871	398	2,263	1,640	1,112	738	3,658	2,480	1,423	1,062
Techoget	1,312	0	719	0	1,984	0	903	0	3,225	0	1,141	0
Litein	1,429	0	783	114	2,160	169	988	211	3,510	231	1,250	303
Kisiara	1,033	0	597	0	1,544	250	758	0	2,474	342	959	0
Mogogosiek	871	0	478	0	1,318	0	599	0	2,142	0	758	0
Cheptala	821	0	450	0	1,242	0	565	0	2,018	0	714	0
Kimulot	827	0	453	0	1,250	0	569	0	2,033	0	719	0
Saosa	998	0	547	0	1,510	0	687	0	2,454	0	868	0
Waldai	2,023	0	1,113	0	3,056	207	1,404	0	4,963	284	1,776	0
Kiptere	1,783	0	1,078	0	2,637	0	1,353	0	4,175	0	1,711	0
Soin	975	0	558	0	1,459	0	700	0	2,346	0	886	0
Mosop	1,444	0	867	69	2,141	0	1,088	117	3,400	0	1,376	148
Kericho Township	0	5,958	205	1,871	0	13,065	447	3,457	0	21,756	773	4,961
Chaik	1,028	0	563	0	1,554	0	707	0	2,527	0	894	0
Kipkelion	1,295	319	787	0	1,921	697	998	0	3,054	1,161	1,273	0
Chilchila	810	0	444	0	1,224	0	557	0	1,991	0	704	0
Kipchoria	497	0	277	57	749	0	348	105	1,214	0	440	152
Londiani	744	462	424	26	1,125	1,015	540	46	1,828	1,690	707	61
Sorget	717	0	393	6	1,083	0	493	11	1,761	0	623	15

4 Action Plan

4.1 Urban Water Supply

Urban Name	Population	Present Raw Water Source	Future Raw Water Source	G/P	Pipe line (km)	Pump lift (m)	Cost 1000 US$
Sotik	16,600		Kipsonoi river	p	1.1	70	4,481
Kericho	145,000	River	Dimlitch Dam, Kimugung Dam	p	8.3	60	24,233
Kipkelion	7,800	Kipkelion River	Nyando river	p	0	20	2,083
Londiani	11,300	Londiani River	Londiani dam	g	6.2	0	58,636

g: gravity p; pump

4.2 Small Scale Irrigation Scheme

Scheme Name	Area (ha)	Farmers No (Nos)	Division	Location	Type of Project	Imp. Agency	Cost million Kshs	Basin
-	-	-	-	-	-	-	-	-

4.3 Large Scale Irrigation Project

Project	Area (ha)	Water Source	Water Demand (MCM)	Cost (million)		Major Crops
				US$	K£	
-	-	-	-	-	-	-

4.4 Hydropower Development

Project	Description	Executing Agency	Cost(million)		Implementation Schedule															
			US$	K£	93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10
-	-	-	-	-																		

★ Design ☆ Study ● Construction

4.5 Flood Mitigation Project

Project	Description	Executing Agency	Cost(million)		Implementation Schedule															
			US$	K£	93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10
-	-	-	-	-																		

★ Design ☆ Study ● Construction

4.6 Urban Drainage and Ad-hoc River Improvement Projects

Project	Population	Area (Km2)	Executing Agency	Cost (million)		Implementation Schedule															
				US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Kericho	41,200	1.2	MOLG	9.4	11.8							☆	☆	☆	●	●	●						

★ Design ☆ Study ● Construction

4.7 Dam Development Plan

Damsites	C.A. (km2)	Purpose	FSL (El. m)	Storage (MCM)	Yield (m3/s)	Height (m)	Cost (1,000US$)
Itare	185	W	2400	13.6	1.73	35	21,425
Londiani	71	W	2326	50.9	0.47	50	54,550
Magwagwa	3160	P+I	1665	808.0	82.00	110	169,702

W:Water Supply I:Irrigation P: Power

4.8 Groundwater Development Projects

Proposed Numbers				Executing Agency	Cost (million)		Implementation Schedule																Remarks
Drinking		Livestock																					
(B/H+D)	(S/W+H)	(B/H+D)	(S/W+H)		US$	K£	93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10	
68	324	10	50	MOCSS	17.9	22.6			☆	●	●														Small communication supply

★ Design ☆ Study ● Construction

4.9 Source Development Plan for Rural Water Supply

District	Source Development Plan									Total	Implementation Program (%)	
	Surface Water	Borehole	Shallow Well	Roof Catch	Small Dam	Subsur-face Dam	Sand Dam	Rock Catch	Existing Pipeline		Up to 2000	2001-2010
- Quantity (m3/d)	60,499	2,605	1,641	0	2,678	0	0	0	1,189	68,612	35.5	64.5
- No. of Facilities	0	68	324	0	27	0	0	0	0	419		
- Cost (mill.US$)	0	9.93	1.44	0	1.42	0	0	0	0	12.78		
(mill.K£)	0	12.52	1.81	0	1.79	0	0	0	0	16.12		

4.10 Source Development Plan for Livestock Water Supply

District	Source Development Plan							Total	Implementation Program (%)	
	Surface Water	Borehole	Shallow Well	Small Dam	Subsur-face Dam	Sand Dam	Existing Pipeline		Up to 2000	2001-2010
- Quantity (m3/d)	25,541	281	238	1,148	0	0	0	27,208	43.6	56.4
- No. of Facilities	0	10	50	27	0	0	0	87		
- Cost (mill.US$)	0	1.12	0.22	0.61	0	0	0	1.94		
(mill.K£)	0	1.41	0.27	0.77	0	0	0	2.44		

4.11 Watering Points in Nomadic Pasturage Area

Asumed Nomadic Pasturage Area (km2)	No. of Watering Points (Nos)	Executing Agency	Cost (million)		Implementaion of Watering Points (No.)	
			US$	K£	up to 2000	2001-2010
-	-	-	-	-	-	-

5 Future Water Resources Developmet Potential and Study Proposal

5.1 Potential Water Source for Future Development

Potential Water Source for Future Development	Purpose	Schemes		
		Water Supply	Irrigation	Hydropower
Timbilil Dam	W	Kericho	-	-
Sisei Dam	W	Sotik	-	-

W:Water Supply I:Irrigation P: Power

5.2 River Basin Developmetn Study

Description	Executing Agency	Cost (million)		Implementation Schedule																
		US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Nyando River Basin Study	LBDA	2.5	3.2	☆	☆	☆															

★ Design ☆ Study ● Construction

5.3 District Water Resource Study

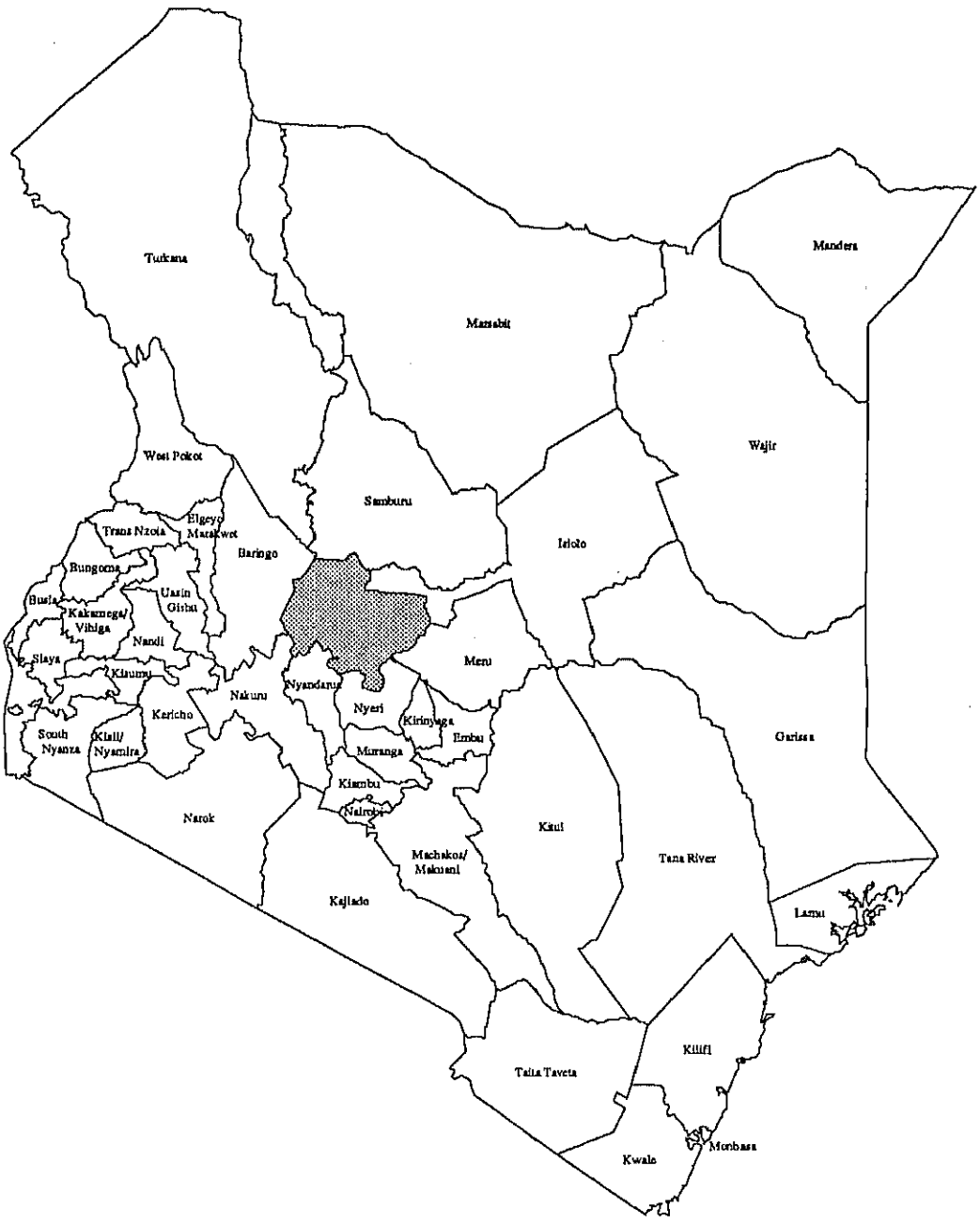
Related Basin Study Proposed	Remarks	Executing Agency	Cost (million)		Implementation Schedule																
			US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
		MOWD	2.5	3.2			☆	☆	☆													

☆ Study

o River Basin Study (proposed under separate programme)

Laikipia

District



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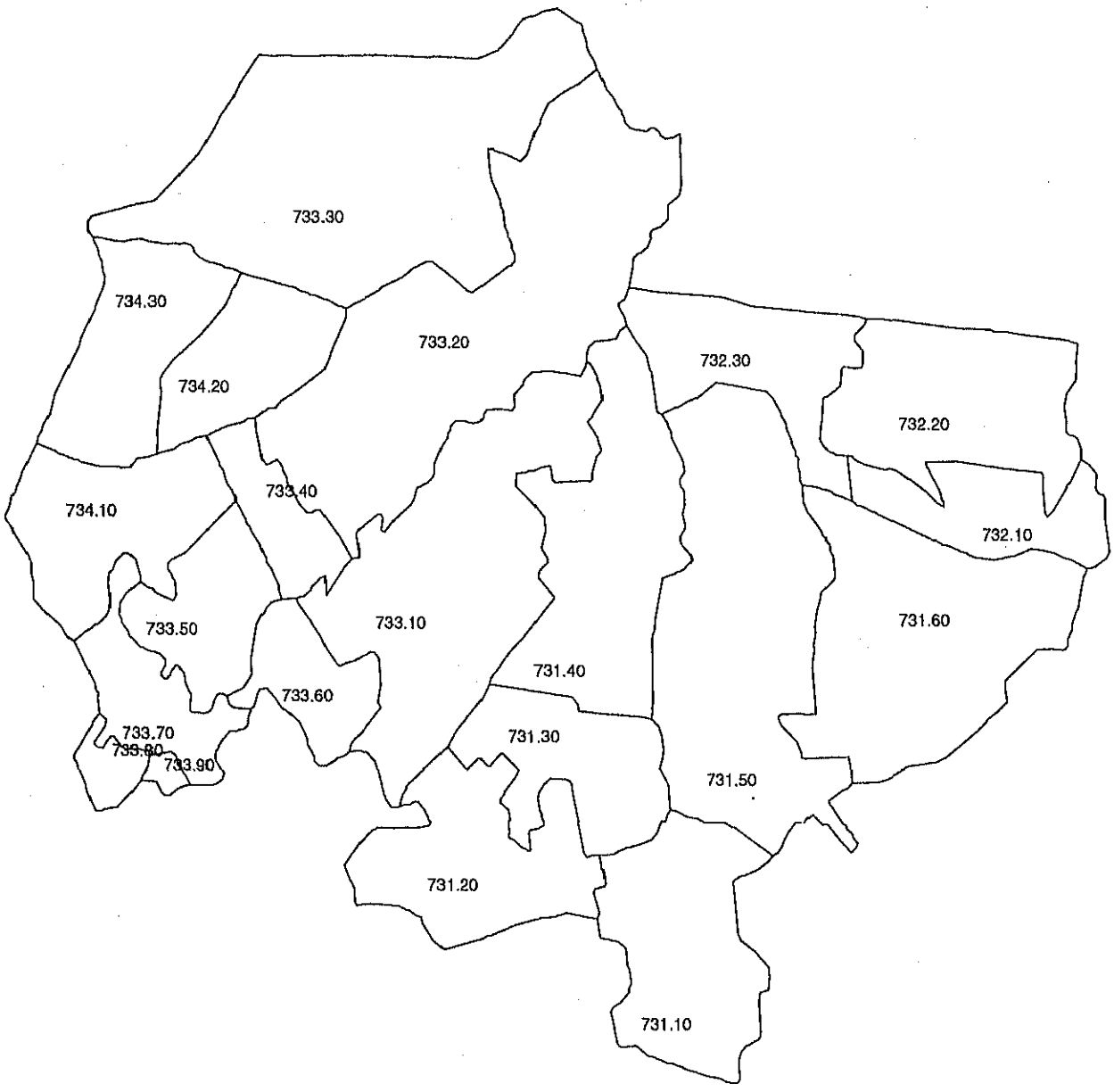
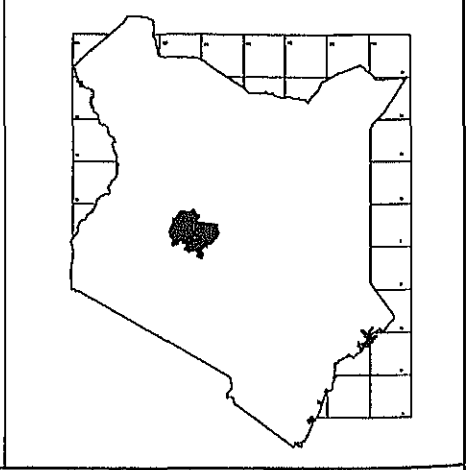


Code	Location	Population
731.1	Tigithi	2,621
731.2	Ngobit	1,747
731.3	Sirima	1,747
731.4	Segera	2,621
731.5	Nanyuki	26,874
731.6	Daiga	6,036
732.1	Ilgwesi	2,170
732.2	Mukogodo	4,661
732.3	Ilndingiri	2,901
733.1	Mutara	7,083
733.2	Sosiani	3,889
733.3	Ol-Moran	2,333
733.4	Rumuruti	2,265
733.5	Marmanet	17,519
733.6	Safama	5,204
733.7	Mutitu	4,253
733.8	Igwamiti	4,274
733.9	Nyahururu Township	11,277
734.1	Gituamba	15,018
734.2	Sipili	6,974
734.3	Kinamba	14,336



730 Laikipia

THE STUDY
ON
THE NATIONAL WATER MASTER PLAN

JAPAN INTERNATIONAL COOPERATION AGENCY

1. Socio-Economic Profile : 730 Laikipia District

1-1 Population Projection (Unit:1000)

Code	Location	Land Area (sq.km)	Town Name	1990			2000			2010		
				Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural
730	Laikipia District	9,722		228.2	41.7	186.5	357.6	104.6	253.0	515.4	185.6	329.8
731.1	Tigithi	485		4.2	-	4.2	5.7	-	5.7	7.5	-	7.5
731.2	Ngobit	444		2.8	-	2.8	3.8	-	3.8	5.0	-	5.0
731.3	Sirima	330		2.8	-	2.8	3.8	-	3.8	5.0	-	5.0
731.4	Segera	593		4.2	-	4.2	5.7	-	5.7	7.5	-	7.5
731.5	Nanyuki	939	Nanyuki	37.8	25.1	12.7	80.8	63.6	17.3	137.4	114.9	22.5
731.6	Daiga	746		9.7	-	9.7	13.2	-	13.2	17.2	-	17.2
732.1	Ilgwesi	268		3.5	-	3.5	4.8	-	4.8	6.2	-	6.2
732.2	Mukogodo	500		7.5	-	7.5	10.2	-	10.2	13.3	-	13.3
732.3	Ilndingiri	353		4.7	-	4.7	6.4	-	6.4	8.3	-	8.3
733.1	Mutara	847		11.4	-	11.4	15.5	-	15.5	20.2	-	20.2
733.2	Sosiani	1,140		6.3	-	6.3	8.5	-	8.5	11.1	-	11.1
733.3	Ol-Moran	1,153		3.8	-	3.8	5.1	-	5.1	6.7	-	6.7
733.4	Rumuruti	157	Rumuruti	6.1	2.4	3.7	10.0	5.1	5.0	14.6	8.2	6.5
733.5	Marmanet	254		28.3	-	28.3	38.4	-	38.4	50.0	-	50.0
733.6	Salama	187		8.4	-	8.4	11.4	-	11.4	14.9	-	14.9
733.7	Mutitu	217		6.9	-	6.9	9.3	-	9.3	12.1	-	12.1
733.8	Igwamiti	58	*Sprawled by Nyahuru	6.9	-	6.9	9.4	-	9.4	14.7	2.5	12.2
733.9	Nyahururu Township	18	Nyahururu	14.2	14.2	0.0	36.0	36.0	0.0	60.0	60.0	0.0
734.1	Gituamba	391		24.2	-	24.2	32.9	-	32.9	42.9	-	42.9
734.2	Sipili	274		11.3	-	11.3	15.3	-	15.3	19.9	-	19.9
734.3	Kinamba	368		23.1	-	23.1	31.4	-	31.4	40.9	-	40.9

1-2 GRDP Projection

Item	1990	2000	2010
1) GRDP (K.Pound million)	57.1	101.2	149.2
Percentage to GDP	0.7%	0.7%	0.7%
2) GRDP per Capita (K.Pound)	250.4	282.9	288.2
Ratio to GDP per capita	0.73	0.63	0.57
Urban (K.Pound)	801.5	604.2	514.6
Rural (K.Pound)	127.2	150.0	159.0

1-3 Present District Profile (1990)

1) Agricultural Production (1989)

Product	Production	Unit
Maize	32,400	tons
Sorghum/Millet	16,380	tons
Potato	15,960	tons
Rice	-	tons
Wheat/Barley	6,974	tons
Coffee	3	tons
Tea	-	tons
Milk	5,460	tons
Meat	9,885	tons

2) Number of Manufacturing Establishments (1986)

Type of Industry	Number
Food	16
Textile	3
Wood	16
Paper	2
Chemical	0
Non-metal	0
Metal	0
Machinery	0
Others	1
Total	38

3) Water Supply Schemes in Service Centre

Piped system	8
Communal water points	0
Other sources	9

4) Educational Facilities

Primary school	163
Secondary school	20
Institute	12

5) Medical Facilities

Hospital	1
Health Centre	6
Dispensary	17
Others	0

6) Out-patient of Infective Diseases in Relation to Water Supplies (1985-89 Average)

Diarrhoeal Diseases	11,182
Leprosy	3
Infectious Hepatitis	63
Bilharzia	216
Eye Infections	6,537

2. Land and resources

2.1 Present Land Use

Unit : km2

Total Area	Land Area	Water Area	Forest & Park	Swamp	Town	Barrenland	Agriculture Land	Other Land
9,718	9,718	0	938	64	187	41	446	8,042

2.2 Rain fall

Unit : mm

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
24	27	57	115	75	40	55	64	35	62	93	43	696

2.3 River Flow

Unit : m3/sec

Gauge Code	Catchment Area (km2)	Mean Flow	Low Flow Frequency			
			80%	90%	95%	Min.
5AB02	412	1.4	0.8	0.7	0.6	0.4
5AB03	319	2.7	1.2	0.9	0.8	0.5
5AB04	109	6.3	2.3	1.7	1.5	1.1
5AC03	878	0.5	0.2	0.1	0.1	0.1
5AC04	2403	0.4	0.2	0.2	0.1	0.1
5AC06	448	0.3	0.1	0.1	0.1	0.1
5AC08	3290	3.5	1.5	1.2	1.0	0.7
5AC10	2590	3.1	1.5	1.2	1.0	0.7
5AC11	868	2.0	0.8	0.8	0.7	0.7
5BB02	405	1.2	0.5	0.4	0.3	0.2
5BC04	1870	73.6	30.2	21.3	19.1	15.4
5BC06	98	1.0	0.3	0.3	0.2	0.2
5BC08	256	0.8	0.4	0.3	0.3	0.2
5BE01	68	0.8	0.3	0.2	0.2	0.2
5BE04	62	0.7	0.5	0.4	0.4	0.4
5BE05	36	0.2	0.1	0.1	0.1	0.1
5BE06	64	0.2	0.1	0.1	0.1	0.1
5BE07	176	1.5	0.8	0.7	0.6	0.5
5BE20	860	20.4	10.4	8.0	7.2	2.9
5D 05	4561	10.3	4.1	3.6	3.3	2.6

2.4 Groundwater

Aquifer Characteristics

Elevation (m)	Total Depth (m)	Water Struck (m)	Level Rest (m)	Yield (m3/hr)	Draw Down (m)
1909.1	126.1	105.18	43.63	5.14	65.41

Safe Abstruction Yield

Unit : m3/year

Borehole	Shallow	Total
3,413,124	2,758,321	6,171,445

2.5 Agriculture

Suitable Area for Major Crops

Unit: km2

Maize	Wheat	Rice	Sorghum	Potato	Coffee	Tea
245	1,025	0	905	334	0	0

Area of Irrigation Potential

Unit : ha

Surfce Water		Groundwater	
Upland	Lowland	Upland	Lowland
10,487	1,882	0.1	0.6

Livestock Population

Unit: 1,000

Cattle	Sheep/Goats	Camels	Donkeys
219.76	472.33	0.79	0.80

3 Water Demand Projection

Unit: cu.m/day

Location	1990				2000				2010			
	Rural	Urban	Livestock	Industry	Rural	Urban	Livestock	Industry	Rural	Urban	Livestock	Industry
Laikipia District	4,122	6,030	8,000	1,223	6,173	15,412	11,662	2,278	9,536	27,857	21,555	3,303
Tigithi	84	0	172	1	123	0	240	2	182	0	429	3
Ngobit	55	0	115	0	82	0	160	0	121	0	286	0
Sirima	55	0	115	0	82	0	160	0	121	0	286	0
Segera	84	0	172	0	123	0	240	0	182	0	429	0
Nanyuki	253	3,629	772	605	369	9,366	1,385	1,133	550	17,246	2,936	1,654
Daiga	193	0	396	0	282	0	552	0	419	0	987	0
Ilgwesi	69	0	142	0	101	0	199	0	150	0	355	0
Mukogodo	149	0	306	0	218	0	426	0	323	0	762	0
Ilndingiri	93	0	190	0	136	0	265	0	201	0	474	0
Mutara	226	0	464	0	331	0	648	0	491	0	1,158	0
Sosiani	124	0	255	0	182	0	356	0	270	0	636	0
Ol-Moran	74	0	153	0	108	0	213	0	162	0	382	0
Rumuruti	72	347	173	114	105	749	260	211	157	1,229	488	303
Marmanet	657	0	1,149	58	985	0	1,603	107	1,532	0	2,865	154
Salama	167	0	341	0	243	0	476	0	361	0	851	0
Mutitu	205	0	279	0	324	0	389	0	545	0	696	0
Igwamiti	250	0	280	0	415	0	391	0	735	376	735	0
Nyahururu Township	0	2,053	144	445	0	5,298	376	825	0	9,007	859	1,189
Gituamba	595	0	985	0	905	0	1,374	0	1,437	0	2,456	0
Sipili	222	0	457	0	326	0	638	0	483	0	1,140	0
Kinamba	495	0	940	0	733	0	1,311	0	1,114	0	2,345	0

4 Action Plan

4.1 Urban Water Supply

Urban Name	Population	Present Raw Water Source	Future Raw Water Source	G/P	Pipe line (km)	Pump lift (m)	Cost 1000 US$
Nanyuki	114,900	Nanyuki River	Liki river	g	5.6	0	18,615
Rumuruti	8,200	Ewaso Narok River	Rumuruti Dam + Borehole	g	120	0	9,203
Nyahururu	60,000	Nyahururu Stream /Equator Streams	Nyahururu dam + Borehole	g	645	0	23,055

g: gravity p: pump

4.2 Small Scale Irrigation Scheme

Scheme Name	Area (ha)	Farmers No (Nos)	Division	Location	Type of Project	Imp. Agency	Cost million Kshs	Basin
Nyakairo	100	0	?	?	Irrigation	?	4.1	?
Wiyumiririe	120	0	?	?	Irrigation	?	4.92	?
Nyariginu	125	0	?	?	Irrigation	?	5.125	?
Sirimon	62	0	?	?	Irrigation	FARMERS	10	?

4.3 Large Scale Irrigation Project

Project	Area (ha)	Water Source	Water Demand (MCM)	Cost (million)		Major Crops
				US$	K£	
-	-	-	-	-	-	-

4.4 Hydropower Development

Project	Description	Executing Agency	Cost(million)		Implementation Schedule																
			US$	K£	93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10
-	-	-	-	-																		

★ Design ☆ Study ● Construction

4.5 Flood Mitigation Project

Project	Description	Executing Agency	Cost(million)		Implementation Schedule																
			US$	K£	93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10
-	-	-	-	-																		

★ Design ☆ Study ● Construction

4.6 Urban Drainage and Ad-hoc River Improvement Projects

Project	Population	Area (Km2)	Executing Agency	Cost (million)		Implementation Schedule																
				US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Nanyuki	25,100	2.0	MOLG	15.6	19.7								☆	☆	☆	●	●	●					

★ Design ☆ Study ● Construction

4.7 Dam Development Plan

Damsites	C.A. (km2)	Purpose	FSL (El. m)	Storage (MCM)	Yield (m3/s)	Height (m)	Cost (1,000US$)
Nyahururu	29	W	2400	10.4	0.26	20	2,943
Rumuruti	673	W	2013	3.0	0.03	16	4,310

W:Water Supply I:Irrigation P: Power

4.8 Groundwater Development Projects

Proposed Numbers				Executing Agency	Cost (million)		Implementation Schedule																Remarks
Drinking		Livestock																					
(B/H+D)	(S/W+H)	(B/H+D)	(S/W+H)		US$	K£	93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10	
113	105	279	360	MORDASA	67.7	85.3	☆	●	●	●	●	●	●	●	●										Rural water supply

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4.9 Source Development Plan for Rural Water Supply

District	Source Development Plan									Total	Implementation Program (%)	
	Surface Water	Borehole	Shallow Well	Roof Catch	Small Dam	Subsur-face Dam	Sand Dam	Rock Catch	Existing Pipeline		Up to 2000	2001-2010
- Quantity (m3/d)	2,819	4,626	722	822	373	63	46	8	0	9,479	37.9	62.1
- No. of Facilities	0	156	145	22,725	19	18	14	1	0	23,078		
- Cost (mill.US$)	0	17.73	0.69	13.71	0.48	0.17	0.09	0.02	0	32.89		
(mill.K£)	0	22.35	0.88	17.29	0.6	0.22	0.12	0.02	0	41.47		

4.10 Source Development Plan for Livestock Water Supply

District	Source Development Plan							Total	Implementation Program (%)	
	Surface Water	Borehole	Shallow Well	Small Dam	Subsur-face Dam	Sand Dam	Existing Pipeline		Up to 2000	2001-2010
- Quantity (m3/d)	6,650	9,227	1,816	943	113	91	0	18,840	27.0	73.0
- No. of Facilities	0	279	360	20	21	18	0	698		
- Cost (mill.US$)	0	35.51	1.75	1.22	0.32	0.19	0	38.99		
(mill.K£)	0	44.77	2.21	1.53	0.4	0.24	0	49.16		

4.11 Watering Points in Nomadic Pasturage Area

Asumed Nomadic Pasturage Area (km2)	No. of Watering Points (Nos)	Executing Agency	Cost (million)		Implementaion of Watering Points (No.)	
			US$	K£	up to 2000	2001-2010
7,530	12	MOWD	1.9	2.4	4	8

5 Future Water Resources Developmet Potential and Study Proposal

5.1 Potential Water Source for Future Development

Potential Water Source for Future Development	Purpose	Schemes		
		Water Supply	Irrigation	Hydropower
Crocodile Jaw Dam	P+W+I	Flow augmentation	Small	Crocodile Jaw
Kirium Dam	P	-	-	Kirium
Kihoto Dam	W+I	Flow augmentation	Small	-

W:Water Supply I:Irrigation P: Power

5.2 River Basin Developmetn Study

Description	Executing Agency	Cost (million)		Implementation Schedule																
		US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Ewaso Ngiro North River Basin Study	ENNRDA	2.5	3.2		☆	☆	☆														

★ Design ☆ Study ● Construction

5.3 District Water Resource Study

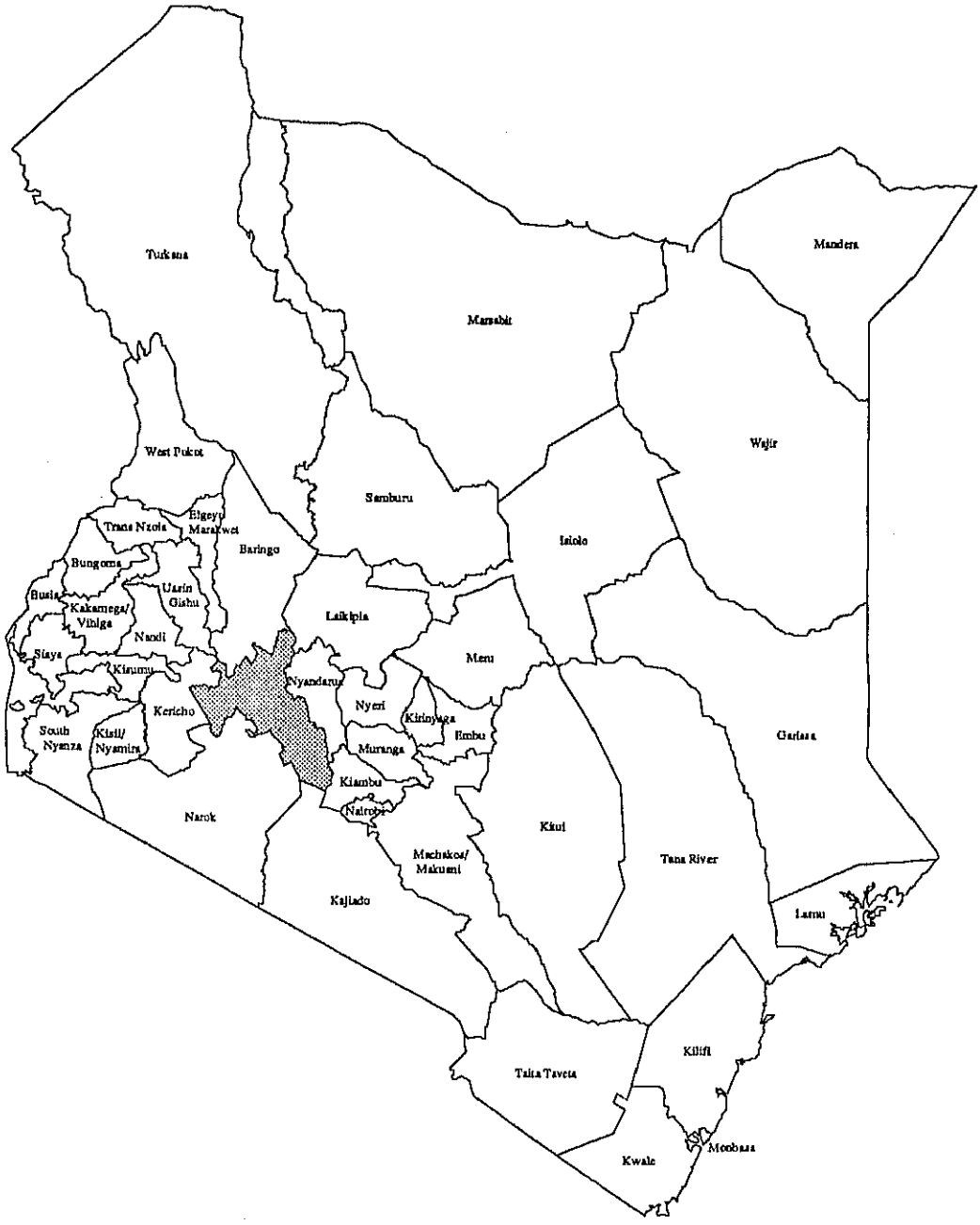
Related Basin Study Proposed	Remarks	Executing Agency	Cost (million)		Implementation Schedule																
			US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Ewaso Ngiro N.	(WRAP completed)	MOWD	-	-																		

☆ Study

o River Basin Study (proposed under separate programme)

Nakuru

District



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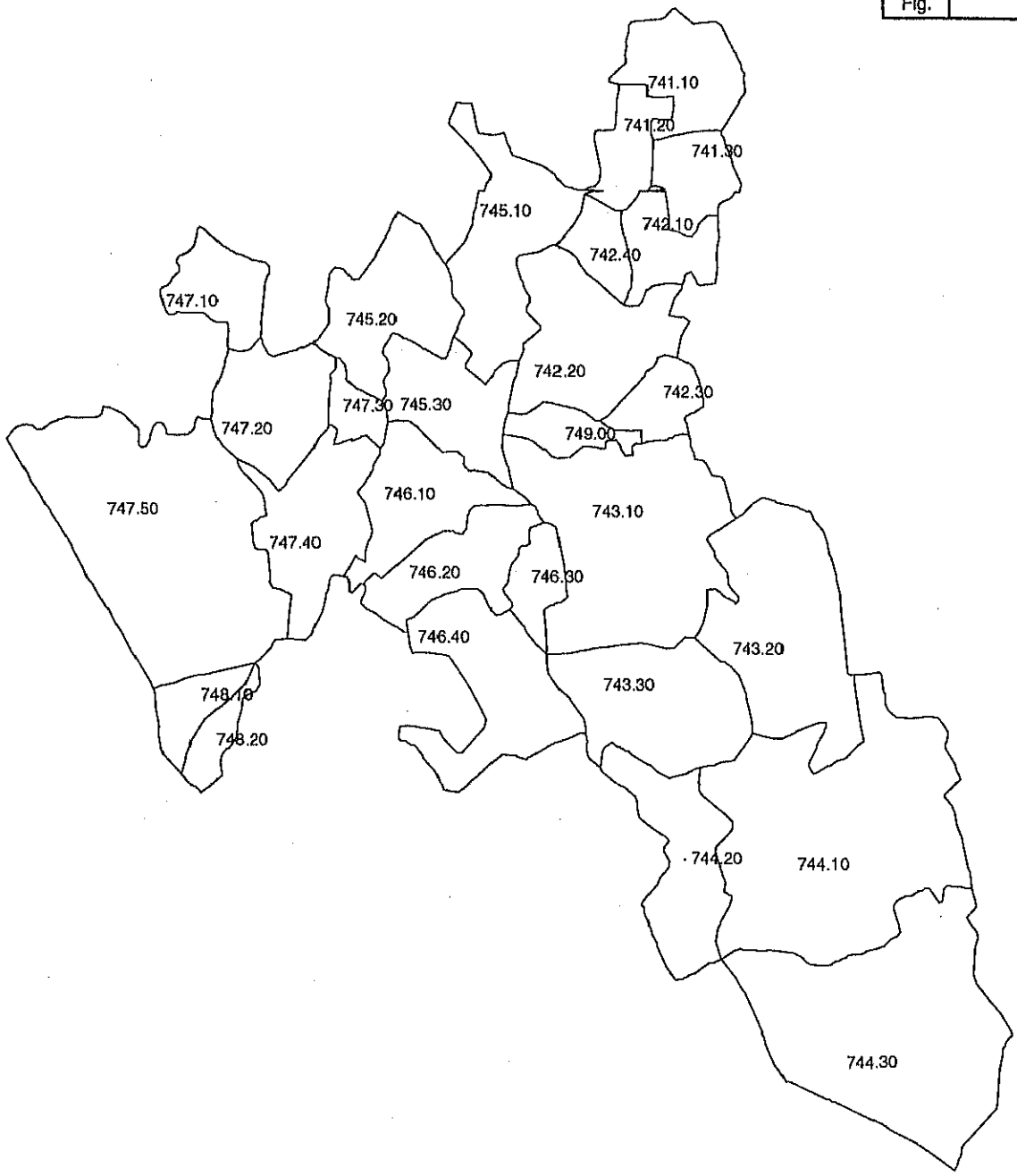
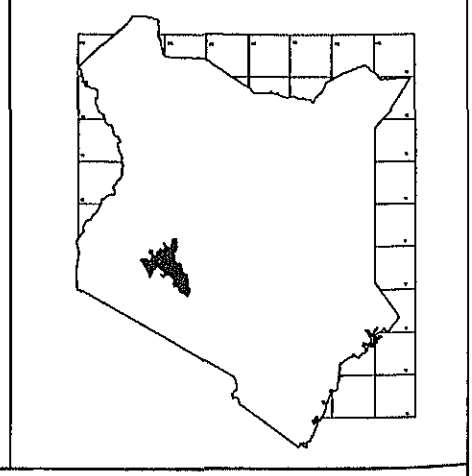


Code	Location	Population
741.1	Weseges	19,471
741.2	Maji Tamu	5,963
741.3	Subukia	9,893
742.1	Kabazi	8,665
742.2	Bahati	25,620
742.3	Dundori	18,626
742.4	Solai	5,963
743.1	Mili Mingi	18,737
743.2	Gilgil	19,597
743.3	Kiambogo	7,561
744.1	Naivasha	46,463
744.2	Maiola	5,198
744.3	Longonot	9,653
745.1	Kampi ya Moto	24,758
745.2	Rongai	13,449
745.3	Shawa	19,367
746.1	Njoro	25,320
746.2	Kihingu	10,828
746.3	Lare	6,799
746.4	Mau Narok	18,213
747.1	Kamara	9,475
747.2	Mau Summit	31,509
747.3	Elburgon	17,500
747.4	Mar Ashioni	4,400
747.5	Molo South	34,145
748.1	Cheptuechi	5,535
748.2	Amalo	7,150
749	Nakuru Municipality	92,851



740 Nakuru

THE STUDY
ON
THE NATIONAL WATER MASTER PLAN

JAPAN INTERNATIONAL COOPERATION AGENCY

1. Socio-Economic Profile : 740 Nakuru District

1-1 Population Projection (Unit:1000)

Code	Location	Land Area (sq.km)	Town Name	1990 Total	1990 Urban	1990 Rural	2000 Total	2000 Urban	2000 Rural	2010 Total	2010 Urban	2010 Rural
740	Nakuru District	7,021		932.9	257.7	675.2	1,544.3	704.8	839.5	2,464.3	1,305.0	1,159.3
741.1	Weseges	175		33.8	-	33.8	42.0	-	42.0	58.0	-	58.0
741.2	Maji Tamu	95		10.3	-	10.3	12.9	-	12.9	17.8	-	17.8
741.3	Subukia	104		17.2	-	17.2	21.3	-	21.3	29.5	-	29.5
742.1	Kabazi	108		15.0	-	15.0	18.7	-	18.7	25.8	-	25.8
742.2	Bahati	302		44.4	-	44.4	55.2	-	55.2	76.3	-	76.3
742.3	Dundori	84		32.3	-	32.3	40.2	-	40.2	55.5	-	55.5
742.4	Solai	72		10.3	-	10.3	12.9	-	12.9	17.8	-	17.8
743.1	Miti Mingi	562	*<---Nakuru	32.5	-	32.5	40.4	-	40.4	155.7	99.9	55.8
743.2	Gilgil	437	Gilgil	32.8	14.6	18.2	62.4	39.8	22.6	105.0	73.8	31.2
743.3	Kiambogo	320		13.1	-	13.1	16.3	-	16.3	22.5	-	22.5
744.1	Naivasha	797	Naivasha	99.1	38.5	60.6	180.4	105.0	75.4	298.6	194.5	104.1
744.2	Maiela	238		9.0	-	9.0	11.2	-	11.2	15.5	-	15.5
744.3	Longonot	712		16.7	-	16.7	20.8	-	20.8	28.7	-	28.7
745.1	Kampi Ya Moto	284		42.9	-	42.9	53.4	-	53.4	73.7	-	73.7
745.2	Rongai	233		23.3	-	23.3	29.0	-	29.0	40.0	-	40.0
745.3	Shawa	188	*<---Nakuru	33.6	-	33.6	41.8	-	41.8	157.6	99.9	57.7
746.1	Njoro	209	Njoro	42.9	9.1	33.8	66.9	24.8	42.1	104.1	46.0	58.1
746.2	Kihingu	175		18.8	-	18.8	23.3	-	23.3	32.2	-	32.2
746.3	Lare	74		11.8	-	11.8	14.7	-	14.7	20.2	-	20.2
746.4	Mau Narok	288	Mau Narok	31.6	-	31.6	41.5	2.2	39.3	57.4	3.2	54.2
747.1	Kamara	117		16.4	-	16.4	20.4	-	20.4	28.2	-	28.2
747.2	Mau Summit	202		54.6	-	54.6	67.9	-	67.9	93.8	-	93.8
747.3	Elburgon	50	Elburgon	27.7	12.4	15.3	52.8	33.8	19.0	88.8	62.6	26.2
747.4	Mar Ashioni	246		7.6	-	7.6	9.5	-	9.5	13.1	-	13.1
747.5	Molo South	752	Molo	60.8	10.9	49.9	91.8	29.7	62.1	140.8	55.1	85.7
748.1	Cheptuechi	75		9.6	-	9.6	11.9	-	11.9	16.5	-	16.5
748.2	Amalo	54		12.4	-	12.4	15.4	-	15.4	21.3	-	21.3
749.0	Nakuru Municipality	68	Nakuru	172.2	172.2	0.0	469.5	469.5	0.0	670.0	670.0	0.0

1-2 GRDP Projection

Item	1990	2000	2010
1) GRDP (K.Pound million)	355.31	612.09	892.49
Percentage to GDP	4.6%	4.4%	4.4%
2) GRDP per Capita (K.Pound)	380.89	396.34	362.17
Ratio to GDP per capita	1.12	0.88	0.71
Urban (K.Pound)	670.76	463.78	383.56
Rural (K.Pound)	270.25	339.73	338.09

1-3 Present District Profile (1990)

1) Agricultural Production (1989)

Product	Production	Unit
Maize	154,395	tons
Sorghum/Millet	1,948	tons
Potato	35,440	tons
Rice	-	tons
Wheat/Barley	62,865	tons
Coffee	-	tons
Tea	564	tons
Milk	102,503	tons
Meat	5,149	tons

2) Number of Manufacturing Establishments (1986)

Type of Industry	Number
Food	33
Textile	13
Wood	81
Paper	7
Chemical	10
Non-metal	5
Metal	1
Machinery	13
Others	1
Total	164

3) Water Supply Schemes in Service Centre

Piped system	13
Communal water points	7
Other sources	19

4) Educational Facilities

Primary school	333
Secondary school	-
Institute	2

5) Medical Facilities

Hospital	2
Health Centre	14
Dispensary	35
Others	0

6) Out-patient of Infective Diseases in Relation to Water Supplies (1985-89 Average)

Diarrhoeal Diseases	24,499
Leprosy	18
Infectious Hepatitis	1,279
Bilharzia	210
Eye Infections	10,945

2. Land and resources

2.1 Present Land Use

Unit : km2

Total Area	Land Area	Water Area	Forest & Park	Swamp	Town	Barrenland	Agriculture Land	Other Land
7,200	7,024	176	1,460	94	946	173	4,122	229

2.2 Rain fall

Unit : mm

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
42	43	70	144	123	71	80	98	71	68	81	53	949

2.3 River Flow

Unit : m3/sec

Gauge Code	Catchment Area (km2)	Mean Flow	Low Flow Frequency			
			80%	90%	95%	Min.
2FC05	125	1.4	0.6	0.5	0.4	0.3

2.4 Groundwater

Aquifer Characteristics

Elevation (m)	Total Depth (m)	Water Struck (m)	Level Rest (m)	Yield (m3/hr)	Draw Down (m)
2087.91	135.29	106.58	69.55	8.56	27.2

Safe Abstruction Yield

Unit : m3/year

Borehole	Shallow	Total
1,992,360	1,349,013	3,341,373

2.5 Agriculture

Suitable Area for Major Crops

Unit: km2

Maize	Wheat	Rice	Sorghum	Potato	Coffee	Tea
1,239	1,849	0	808	1,433	0	5

Area of Irrigation Potential

Unit : ha

Surfce Water		Groundwater	
Upland	Lowland	Upland	Lowland
17,144	158	27	0.2

Livestock Population

Unit: 1,000

Cattle	Sheep/Goats	Camels	Donkeys
289.40	319.29	Not Null	Not Null

3 Water Demand Projection

Unit: cu.m/day

Location	1990				2000				2010			
	Rural	Urban	Livestock	Industry	Rural	Urban	Livestock	Industry	Rural	Urban	Livestock	Industry
Nakuru District	18,999	37,265	13,795	9,922	27,475	103,851	21,379	16,996	48,574	195,879	52,317	21,989
Weseges	798	0	630	0	1,113	0	884	0	1,869	0	2,041	0
Maji Tamu	223	0	193	0	304	0	271	0	492	0	625	0
Subukia	527	0	320	0	773	0	449	0	1,392	0	1,037	0
Kabazi	540	0	280	0	818	0	393	0	1,534	0	909	0
Bahati	1,231	0	829	0	1,758	0	1,163	0	3,059	0	2,686	0
Dundori	1,084	0	602	0	1,616	0	845	0	2,975	0	1,953	0
Solai	274	0	193	0	390	0	271	0	677	0	625	0
Miti Mingi	704	0	606	0	960	0	850	0	1,563	15,000	2,844	0
Gilgil	384	2,112	407	145	520	5,865	686	254	835	11,071	1,750	339
Kiambogo	299	0	245	0	414	0	343	0	690	0	793	0
Naivasha	1,348	5,567	1,311	404	1,842	15,466	2,139	729	3,000	29,192	5,379	1,018
Maiela	198	0	168	0	273	0	236	0	447	0	545	0
Longonot	360	0	312	0	493	0	438	0	799	0	1,012	0
Kampi ya Moto	877	0	801	0	1,180	0	1,123	0	1,878	0	2,596	0
Rongai	483	0	435	57	652	0	610	105	1,042	0	1,410	152
Shawa	838	0	626	0	1,166	0	879	0	1,953	15,000	2,910	0
Njoro	1,028	1,316	674	105	1,497	3,655	1,016	201	2,673	6,900	2,451	299
Kihingu	610	0	350	0	904	0	491	0	1,653	0	1,135	0
Lare	306	0	220	0	437	0	309	0	757	0	713	0
Mau Narok	1,118	0	589	1	1,688	326	838	2	3,153	484	1,938	3
Kamara	596	0	306	0	905	0	430	0	1,701	0	993	0
Mau Summit	1,885	0	1,019	1	2,830	0	1,430	2	5,249	0	3,304	3
Elburgon	405	1,793	342	102	567	4,982	577	191	962	9,402	1,474	278
Mar Ashioni	272	0	142	1	413	0	200	2	773	0	461	3
Molo South	1,812	1,576	982	186	2,750	4,379	1,463	347	5,170	8,264	3,504	504
Cheptuechi	349	0	179	0	529	0	251	0	994	0	580	0
Amalo	450	0	231	0	683	0	324	0	1,284	0	750	0
Nakuru Municipality	0	24,900	803	8,920	0	69,177	2,470	15,163	0	100,567	5,899	19,390

4 Action Plan

4.1 Urban Water Supply

Urban Name	Population	Present Raw Water Source	Future Raw Water Source	G/P	Pipe line (km)	Pump lift (m)	Cost 1000 US$
Gilgil	73,800	Molendat River	Turasha P/L & Malewa Dam	g	0	0	43,257
Naivasha	194,500	Boreholes	Turasha P/L & Malewa Dam	g	30.3	0	48,997
Njoro	46,000	Boreholes	Itare Dam	p	67.1	350	27,299
Elburgon	62,700	Boreholes	Itare Dam	p	49.2	350	26,365
Molo	55,100	Boreholes	Itare Dam	p	36.9	350	21,409
Nakuru	869,900	Borehole /Shallow Well(3nos.)	Turasha P/L + Malewa Dam + Itare Dam	p	90.5	350	212,021

g: gravity p: pump

4.2 Small Scale Irrigation Scheme

Scheme Name	Area (ha)	Farmers No (Nos)	Division	Location	Type of Project	Imp. Agency	Cost million Kshs	Basin
Njoro	200	?	?	?	Drainage	?	8.2	2FC

4.3 Large Scale Irrigation Project

Project	Area (ha)	Water Source	Water Demand (MCM)	Cost (million) US$	Cost (million) K£	Major Crops
-	-	-	-	-	-	-

4.4 Hydropower Development

Project	Description	Executing Agency	Cost(million) US$	Cost(million) K£	Implementation Schedule 93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10
-	-	-	-	-																		

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4.5 Flood Mitigation Project

Project	Description	Executing Agency	Cost(million) US$	Cost(million) K£	Implementation Schedule 93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10
-	-	-	-	-																		

★ Design ☆ Study ● Construction

4.6 Urban Drainage and Ad-hoc River Improvement Projects

Project	Population	Area (Km2)	Executing Agency	Cost (million) US$	Cost (million) K£	Implementation Schedule 93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Naivasha	38,500	0.9	MOLG	7.2	9.1		☆	☆	☆	●	●	●											
Nakuru	172,200	13.0	MOLG	51.8	65.3		☆	☆	☆	●	●	●											

★ Design ☆ Study ● Construction

4.7 Dam Development Plan

Damsites	C.A. (km2)	Purpose	FSL (El. m)	Storage (MCM)	Yield (m3/s)	Height (m)	Cost (1,000US$)
-	-	-	-	-	-	-	-

W:Water Supply I:Irrigation P: Power

4.8 Groundwater Development Projects

Proposed Numbers Drinking (B/H+D)	Proposed Numbers Drinking (S/W+H)	Proposed Numbers Livestock (B/H+D)	Proposed Numbers Livestock (S/W+H)	Executing Agency	Cost (million) US$	Cost (million) K£	Implementation Schedule 93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10	Remarks
292	34	470	277	MORDASA	120.4	151.7	☆	●	●	●	●	●	●	●	●	●	●	●							Rural water supply

★ Design ☆ Study ● Construction

4.9 Source Development Plan for Rural Water Supply

District	Source Development Plan: Surface Water	Borehole	Shallow Well	Roof Catch	Small Dam	Subsur-face Dam	Sand Dam	Rock Catch	Existing Pipeline	Total	Implementation Program (%): Up to 2000	2001-2010
- Quantity (m3/d)	18,557	14,086	298	2,629	1,547	166	98	72	11,058	48,511	28.7	71.3
- No. of Facilities	0	409	31	63,406	21	24	19	8	0	63,918		
- Cost (mill.US$)	0	52.93	0.15	38.18	1.26	0.48	0.2	0.13	0	93.33		
(mill.K£)	0	66.75	0.19	48.15	1.59	0.6	0.26	0.17	0	117.69		

4.10 Source Development Plan for Livestock Water Supply

District	Source Development Plan: Surface Water	Borehole	Shallow Well	Small Dam	Subsur-face Dam	Sand Dam	Existing Pipeline	Total	Implementation Program (%): Up to 2000	2001-2010
- Quantity (m3/d)	19,604	14,484	2,694	1,925	182	117	1,762	40,768	19.7	80.3
- No. of Facilities	0	470	277	26	25	22	0	820		
- Cost (mill.US$)	0	56.82	1.44	1.64	0.52	0.24	0	60.66		
(mill.K£)	0	71.65	1.81	2.07	0.66	0.3	0	76.49		

4.11 Watering Points in Nomadic Pasturage Area

Asumed Nomadic Pasturage Area (km2)	No. of Watering Points (Nos)	Executing Agency	Cost (million)		Implementaion of Watering Points (No.)	
			US$	K£	up to 2000	2001-2010
-	-	-	-	-	-	-

5 Future Water Resources Developmet Potential and Study Proposal

5.1 Potential Water Source for Future Development

Potential Water Source for Future Development	Purpose	Schemes		
		Water Supply	Irrigation	Hydropower
-	-	-	-	-

W:Water Supply I:Irrigation P: Power

5.2 River Basin Developmetn Study

Description	Executing Agency	Cost (million)		Implementation Schedule																
		US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Nakuru and Environs Integrated Water Use Study	NWCPC	3.0	3.8	☆	☆	☆															

★ Design ☆ Study ● Construction

5.3 District Water Resource Study

Related Basin Study Proposed	Remarks	Executing Agency	Cost (million)		Implementation Schedule																
			US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Nakuru		MOWD	2.0	2.5	o	o	o	☆	☆													

☆ Study

o River Basin Study (proposed under separate programme)

Narok

District

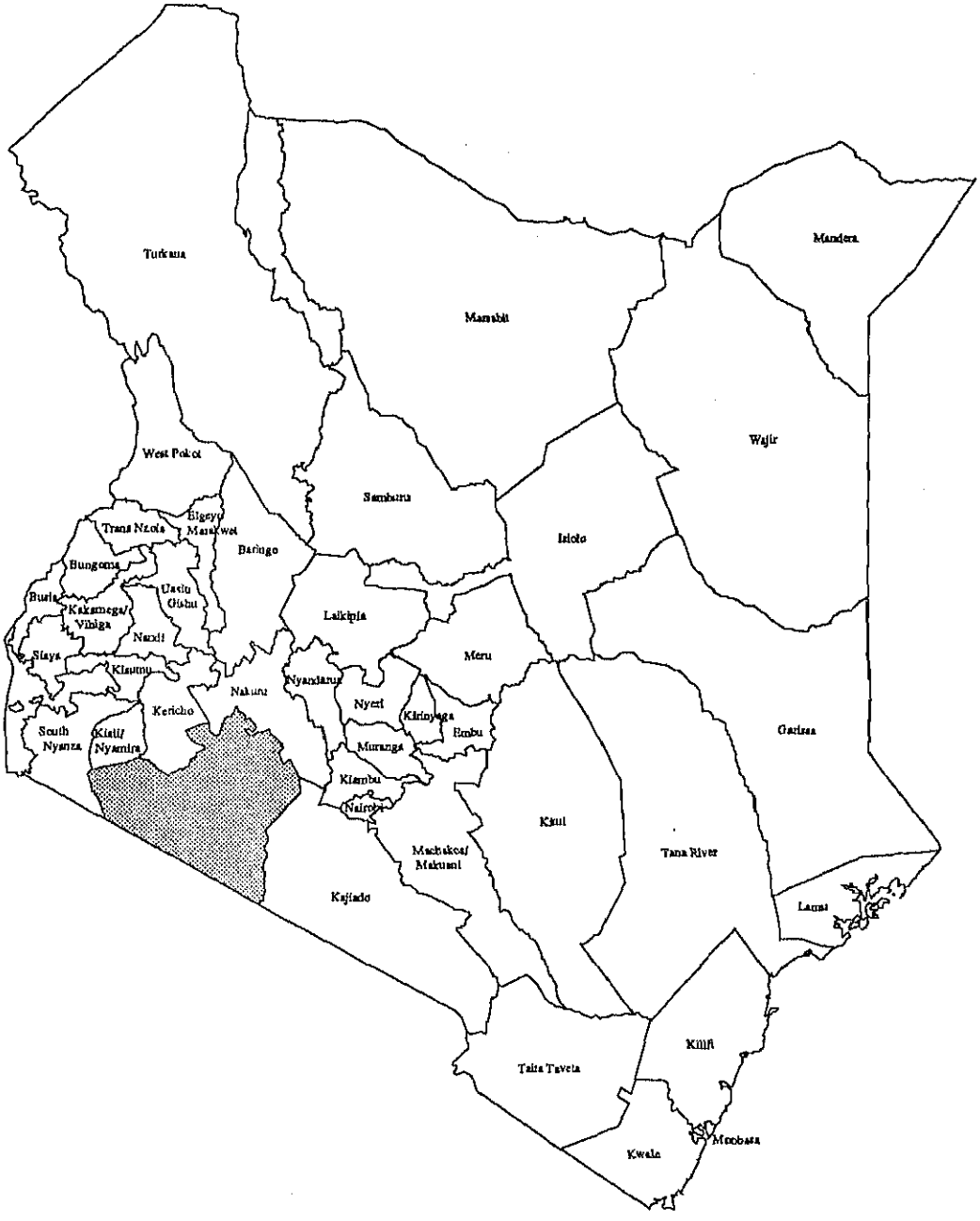
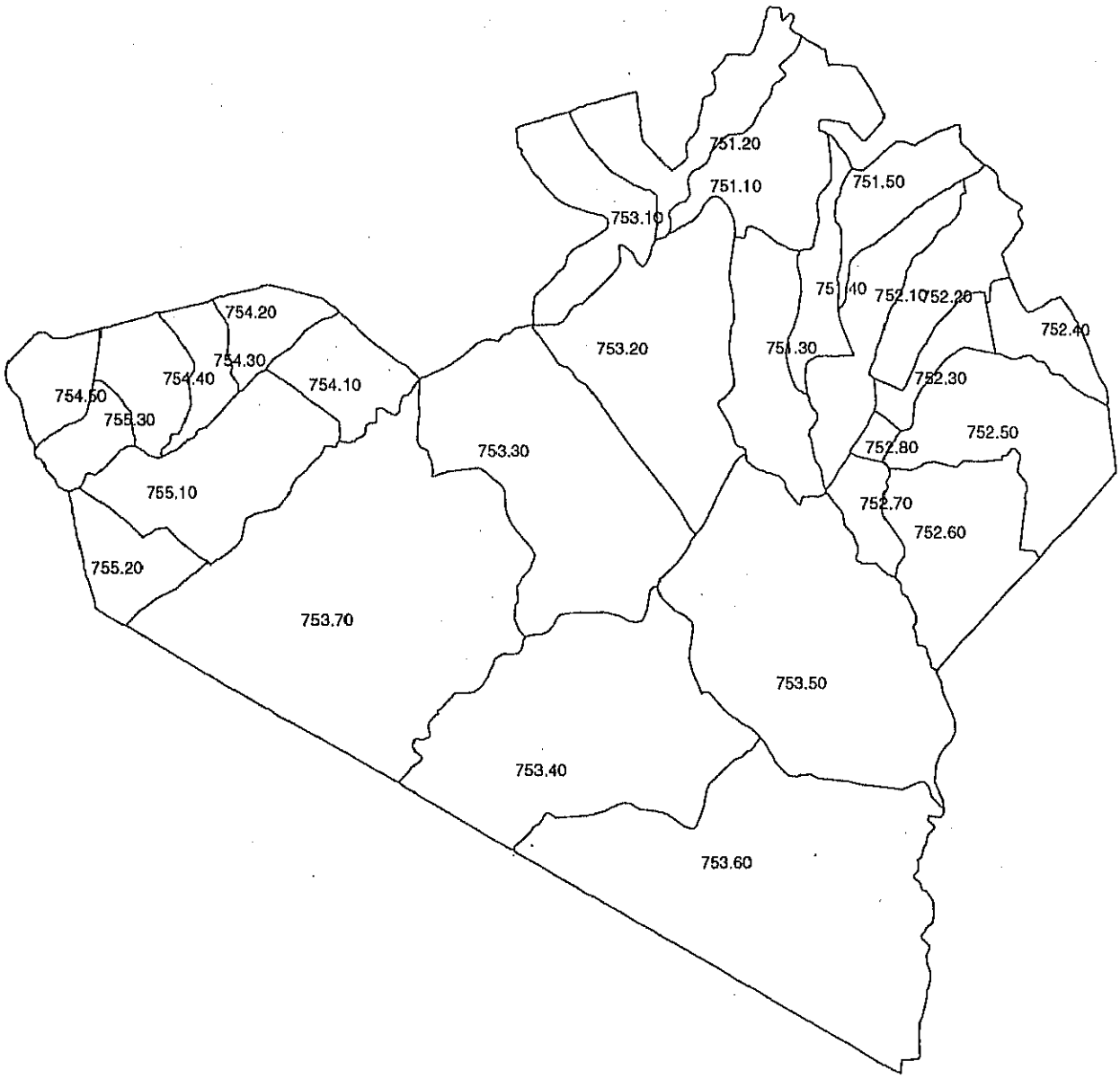
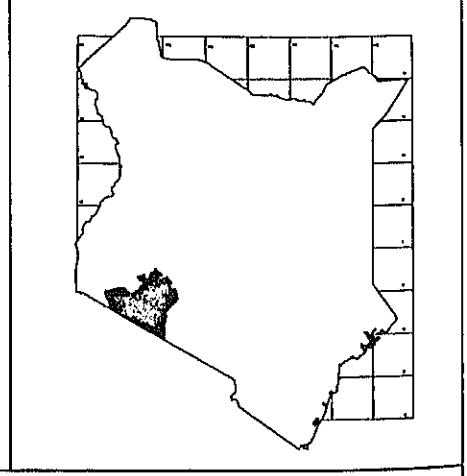


Fig.



Code	Location	Population
751.1	Olokurto	8,766
751.2	Olpusmoru	2,391
751.3	Nkareta	7,306
751.4	Enabelbel	4,402
751.5	Olomopil	3,306
752.1	Lower Melili	12,130
752.2	Upper Melili	6,909
752.3	Ololpironito	3,404
752.4	Enoosupukia	8,795
752.5	Keekonyokie	9,181
752.6	Mosiro	5,855
752.7	Oletukat	1,059
752.8	Ildamat	769
753.1	Mulot	10,597
753.2	Olulunga	13,640
753.3	Olkinyie	8,414
753.4	Naikara	6,564
753.5	Naroosura	8,815
753.6	Loita	9,682
753.7	Masai Mara	6,119
754.1	Emarti	18,856
754.2	Moitanik East	13,851
754.3	Moitanik West	5,500
754.4	Uasin Gishu East	7,171
754.5	Uasin Gishu West	4,041
755.1	Siria East	10,507
755.2	Siria Central	6,117
755.3	Siria West	4,159



750 Narok

THE STUDY
ON
THE NATIONAL WATER MASTER PLAN

JAPAN INTERNATIONAL COOPERATION AGENCY

1. Socio-Economic Profile : 750 Narok District

1-1 Population Projection

(Unit:1000)

Code	Location	Land Area (sq.km)	Town Name	1990			2000			2010		
				Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural
750	Narok District	18,511		424.6	17.5	407.1	702.4	58.1	644.3	953.2	112.6	840.6
751.1	Olokurto	625		18.3	-	18.3	29.0	-	29.0	37.9	-	37.9
751.2	Olpusmoru	424		5.0	-	5.0	7.9	-	7.9	10.3	-	10.3
751.3	Nkareta	538		15.3	-	15.3	24.2	-	24.2	31.6	-	31.6
751.4	Enabelbel	234		9.2	-	9.2	14.6	-	14.6	19.0	-	19.0
751.5	Olorropil	300		6.9	-	6.9	10.9	-	10.9	14.3	-	14.3
752.1	Lower Melili	442	Narok	25.5	12.0	13.5	64.0	42.7	21.3	113.5	85.7	27.8
752.2	Upper Melili	403		14.5	-	14.5	22.9	-	22.9	29.8	-	29.8
752.3	Ololpironito	160		6.1	-	6.1	9.6	-	9.6	12.5	-	12.5
752.4	Enoosupukia	222		15.7	-	15.7	24.8	-	24.8	32.4	-	32.4
752.5	Keekonyokie	786	Nairangi Enkare	2.6	0.5	2.1	4.6	1.4	3.2	6.7	2.4	4.2
752.6	Mosiro	649	(North Enkare)	12.2	-	12.2	19.4	-	19.4	25.3	-	25.3
752.7	Oletukat	159		2.2	-	2.2	3.5	-	3.5	4.6	-	4.6
752.8	Ildamat	43		1.6	-	1.6	2.5	-	2.5	3.3	-	3.3
753.1	Mulot	406		22.2	-	22.2	35.1	-	35.1	45.8	-	45.8
753.2	Olulunga	1,103		28.5	-	28.5	45.2	-	45.2	58.9	-	58.9
753.3	Olkinyie	1,404		17.6	-	17.6	27.9	-	27.9	36.3	-	36.3
753.4	Naikara	1,637		17.9	-	17.9	28.4	-	28.4	37.0	-	37.0
753.5	Naroosura	1,839		18.4	-	18.4	29.2	-	29.2	38.1	-	38.1
753.6	Loita	2,230		20.3	-	20.3	32.1	-	32.1	41.8	-	41.8
753.7	Masai Mara	2,511		12.8	-	12.8	20.3	-	20.3	26.4	-	26.4
754.1	Emarti	306		39.4	-	39.4	62.4	-	62.4	81.4	-	81.4
754.2	Moitanik East	205		29.0	-	29.0	45.9	-	45.9	59.8	-	59.8
754.3	Moitanik West	178		11.5	-	11.5	18.2	-	18.2	23.8	-	23.8
754.4	Uasin Gishu East	289	Kilgoris	18.3	3.3	15.0	33.0	9.2	23.7	47.1	16.2	31.0
754.5	Uasin Gishu West	225		8.5	-	8.5	13.4	-	13.4	17.5	-	17.5
755.1	Siria East	729	Lolgorian	23.7	1.7	22.0	39.5	4.8	34.8	53.7	8.3	45.4
755.2	Siria Central	289		12.8	-	12.8	20.3	-	20.3	26.4	-	26.4
755.3	Siria West	175		8.7	-	8.7	13.8	-	13.8	18.0	-	18.0

1-2 GRDP Projection

Item	1990	2000	2010
1) GRDP (K.Pound million)	29.8	49.1	70.6
Percentage to GDP	0.4%	0.4%	0.3%
2) GRDP per Capita (K.Pound)	70.1	69.9	74.0
Ratio to GDP per capita	0.21	0.16	0.15
Urban (K.Pound)	642.2	365.9	289.0
Rural (K.Pound)	45.5	43.2	45.2

1-3 Present District Profile (1990)

1) Agricultural Production (1989)

Product	Production	Unit
Maize	116,280	tons
Sorghum/Millet	14	tons
Potato	72,000	tons
Rice	-	tons
Wheat/Barley	168,300	tons
Coffee	-	tons
Tea	-	tons
Milk	289	tons
Meat	1,613	tons

2) Number of Manufacturing Establishments (1986)

Type of Industry	Number
Food	4
Textile	0
Wood	0
Paper	0
Chemical	0
Non-metal	0
Metal	0
Machinery	0
Others	0
Total	4

3) Water Supply Schemes in Service Centre

Piped system	8
Communal water points	10
Other sources	11

4) Educational Facilities

Primary school	200
Secondary school	15
Institute	1

5) Medical Facilities

Hospital	2
Health Centre	10
Dispensary	36
Others	0

6) Out-patient of Infective Diseases in Relation to Water Supplies (1985-89 Average)

Diarrhoeal Diseases	12,389
Leprosy	6
Infectious Hepatitis	84
Bilharzia	503
Eye Infections	7,414

2. Land and resources

2.1 Present Land Use

Unit : km2

Total Area	Land Area	Water Area	Forest & Park	Swamp	Town	Barrenland	Agriculture Land	Other Land
18,513	18,513	0	2,887	69	13	89	1,300	14,155

2.2 Rain fall

Unit : mm

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
78	72	105	154	106	58	46	54	58	51	96	89	972

2.3 River Flow

Unit : m3/sec

Gauge Code	Catchment Area (km2)	Mean Flow	Low Flow Frequency			
			80%	90%	95%	Min.
1LB02	697	5.0	1.9	1.7	1.4	1.3
2K 01	688	4.0	0.4	0.4	0.3	0.3
2K 03	832	5.7	3.1	3.1	3.1	3.1
2K 06	581	2.7	1.1	1.0	0.9	0.9

2.4 Groundwater

Aquifer Characteristics

Elevation (m)	Total Depth (m)	Water Struck (m)	Level Rest (m)	Yield (m3/hr)	Draw Down (m)
3037.92	147.39	82.36	56.43	4.44	38.22

Safe Abstruction Yield

Unit : m3/year

Borehole	Shallow	Total
4,127,782	8,553,310	12,681,092

2.5 Agriculture

Suitable Area for Major Crops

Unit: km2

Maize	Wheat	Rice	Sorghum	Potato	Coffee	Tea
4,033	3,734	10	3,051	3,405	225	256

Area of Irrigation Potential

Unit : ha

Surfce Water		Groundwater	
Upland	Lowland	Upland	Lowland
59,179	6,502	199.9	8.1

Livestock Population

Unit: 1,000

Cattle	Sheep/Goats	Camels	Donkeys
853.10	1,675.80		100.32

3 Water Demand Projection

Unit: cu.m/day

Location	1990				2000				2010			
	Rural	Urban	Livestock	Industry	Rural	Urban	Livestock	Industry	Rural	Urban	Livestock	Industry
Narok District	10,715	2,530	32,127	228	19,472	8,559	44,700	422	31,929	16,903	54,809	606
Olokurto	646	0	1,432	0	1,240	0	1,969	0	2,185	0	2,389	0
Olpusmoru	179	0	391	0	344	0	537	0	609	0	651	0
Nkareta	414	0	1,193	0	756	0	1,641	0	1,246	0	1,991	0
Enabelbel	298	0	719	0	562	0	989	0	967	0	1,200	0
Olorropil	249	0	540	0	481	0	743	0	853	0	901	0
Lower Melili	393	1,736	1,286	114	726	6,293	2,171	211	1,218	12,858	3,106	303
Upper Melili	448	0	1,128	0	839	0	1,552	0	1,430	0	1,882	0
Ololpironito	181	0	474	0	337	0	652	0	567	0	791	0
Enoosupukia	363	0	1,224	0	644	0	1,684	0	1,017	0	2,042	0
Keekonyokie	45	72	170	0	78	206	244	0	120	368	306	0
Mosiro	243	0	956	0	413	0	1,315	0	615	0	1,596	0
Olctukat	43	0	173	0	75	0	238	0	111	0	289	0
Ildamat	31	0	126	0	54	0	173	0	82	0	210	0
Mulot	794	0	1,731	114	1,529	0	2,380	211	2,706	0	2,888	303
Olulunga	753	0	2,228	0	1,367	0	3,064	0	2,243	0	3,717	0
Olkinyie	357	0	1,374	0	611	0	1,890	0	916	0	2,293	0
Naikara	355	0	1,399	0	604	0	1,924	0	899	0	2,334	0
Naroosura	365	0	1,440	0	621	0	1,980	0	925	0	2,402	0
Loita	446	0	1,581	0	779	0	2,175	0	1,207	0	2,638	0
Masai Mara	253	0	999	0	431	0	1,374	0	642	0	1,667	0
Emarti	832	0	3,080	0	1,434	0	4,235	0	2,176	0	5,138	0
Moitanik East	844	0	2,262	0	1,556	0	3,111	0	2,600	0	3,774	0
Moitanik West	349	0	898	0	647	0	1,235	0	1,089	0	1,499	0
Uasin Gishu East	471	477	1,236	0	880	1,359	1,767	0	1,499	2,427	2,209	0
Uasin Gishu West	299	0	660	0	575	0	908	0	1,016	0	1,101	0
Siria East	537	246	1,749	0	949	701	2,441	0	1,495	1,251	2,995	0
Siria Central	291	0	999	0	511	0	1,374	0	793	0	1,667	0
Siria West	236	0	679	0	429	0	934	0	703	0	1,133	0

4 Action Plan

4.1 Urban Water Supply

Urban Name	Population	Present Raw Water Source	Future Raw Water Source	G/P	Pipe line (km)	Pump lift (m)	Cost 1000 US$
Narok	85,700	Engare Narok River	Upper Narok Dam	g	14.9	0	30,943
Nairagie Ngare	2,500	Lolongo Stream/Dam	Nasampolai river	g	5	0	1,774
Kilgoris	16,200	Poroko River	Poroko river	p	1.9	130	4,282
Lolkorian	8,400	Spring	Migori river	p	7.2	160	3,734

g: gravity p: pump

4.2 Small Scale Irrigation Scheme

Scheme Name	Area (ha)	Farmers No (Nos)	Division	Location	Type of Project	Imp. Agency	Cost million Kshs	Basin
-	-	-	-	-	-	-	-	-

4.3 Large Scale Irrigation Project

Project	Area (ha)	Water Source	Water Demand (MCM)	Cost (million)		Major Crops
				US$	K£	
-	-	-	-	-	-	-

4.4 Hydropower Development

Project	Description	Executing Agency	Cost (million) US$	Cost (million) K£	Implementation Schedule 93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Oldorko	Hydropower 72MW (Ewaso Ngino South river) -Irrigation included	KPC	71	89		☆	☆		★	★	●	●	●	●								

★ Design ☆ Study ● Construction

4.5 Flood Mitigation Project

Project	Description	Executing Agency	Cost(million) US$	Cost(million) K£	Implementation Schedule 93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10
-	-	-	-	-																		

★ Design ☆ Study ● Construction

4.6 Urban Drainage and Ad-hoc River Improvement Projects

Project	Population	Area (Km2)	Executing Agency	Cost (million) US$	Cost (million) K£	Implementation Schedule 93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Narok	12,000	0.8	MOLG	6.4	8.1												☆	☆	☆	●	●	●	

★ Design ☆ Study ● Construction

4.7 Dam Development Plan

Damsites	C.A. (km2)	Purpose	FSL (El. m)	Storage (MCM)	Yield (m3/s)	Height (m)	Cost (1,000US$)
Upper Narok	516	W	1986	10.1	1.20	29	13,192

W:Water Supply I:Irrigation P: Power

4.8 Groundwater Development Projects

Proposed Numbers Drinking (B/H+D)	Proposed Numbers Drinking (S/W+H)	Proposed Numbers Livestock (B/H+D)	Proposed Numbers Livestock (S/W+H)	Executing Agency	Cost (million) US$	Cost (million) K£	Implementation Schedule 93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10	Remarks
199	818	392	2326	MORDASA	131.2	165.3	☆	●	●	●	●	●	●	●	●	●	●	●	●						Rural water supply

★ Design ☆ Study ● Construction

4.9 Source Development Plan for Rural Water Supply

District	Source Development Plan: Surface Water	Borehole	Shallow Well	Roof Catch	Small Dam	Subsur-face Dam	Sand Dam	Rock Catch	Existing Pipeline	Total	Implementation Program (%): Up to 2000	2001-2010
- Quantity (m3/d)	13,271	6,889	6,433	3,911	900	86	79	0	279	31,848	41.3	58.7
- No. of Facilities	0	245	1,128	60,853	28	13	13	0	0	62,280		
- Cost (mill.US$)	0	26.44	5.47	36.62	0.72	0.24	0.16	0	0	69.66		
(mill.K£)	0	33.34	6.9	46.18	0.91	0.31	0.2	0	0	87.84		

4.10 Source Development Plan for Livestock Water Supply

District	Source Development Plan: Surface Water	Borehole	Shallow Well	Small Dam	Subsur-face Dam	Sand Dam	Existing Pipeline	Total	Implementation Program (%): Up to 2000	2001-2010
- Quantity (m3/d)	25,717	11,730	13,201	1,954	151	139	77	52,969	55.4	44.6
- No. of Facilities	0	392	2,326	28	22	21	0	2,789		
- Cost (mill.US$)	0	44.52	11.27	1.63	0.43	0.29	0	58.14		
(mill.K£)	0	56.14	14.22	2.05	0.54	0.37	0	73.32		

4.11 Watering Points in Nomadic Pasturage Area

Asumed Nomadic Pasturage Area (km2)	No. of Watering Points (Nos)	Executing Agency	Cost (million)		Implementaion of Watering Points (No.)	
			US$	K£	up to 2000	2001-2010
13,481	22	MOWD	3.2	4.0	7	15

5 Future Water Resources Developmet Potential and Study Proposal

5.1 Potential Water Source for Future Development

Potential Water Source for Future Development	Purpose	Schemes		
		Water Supply	Irrigation	Hydropower
Amala Dam	W+P	Greater Nakuru	-	Oldorko Dam
Leshota Dam	P+W	Rural	-	Leshota

W:Water Supply I:Irrigation P: Power

5.2 River Basin Developmetn Study

Description	Executing Agency	Cost (million)		Implementation Schedule																	
		US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Ewaso Ngiro South River Basin Study	ENSRDA	2.5	3.2			☆	☆	☆													

★ Design ☆ Study ● Construction

5.3 District Water Resource Study

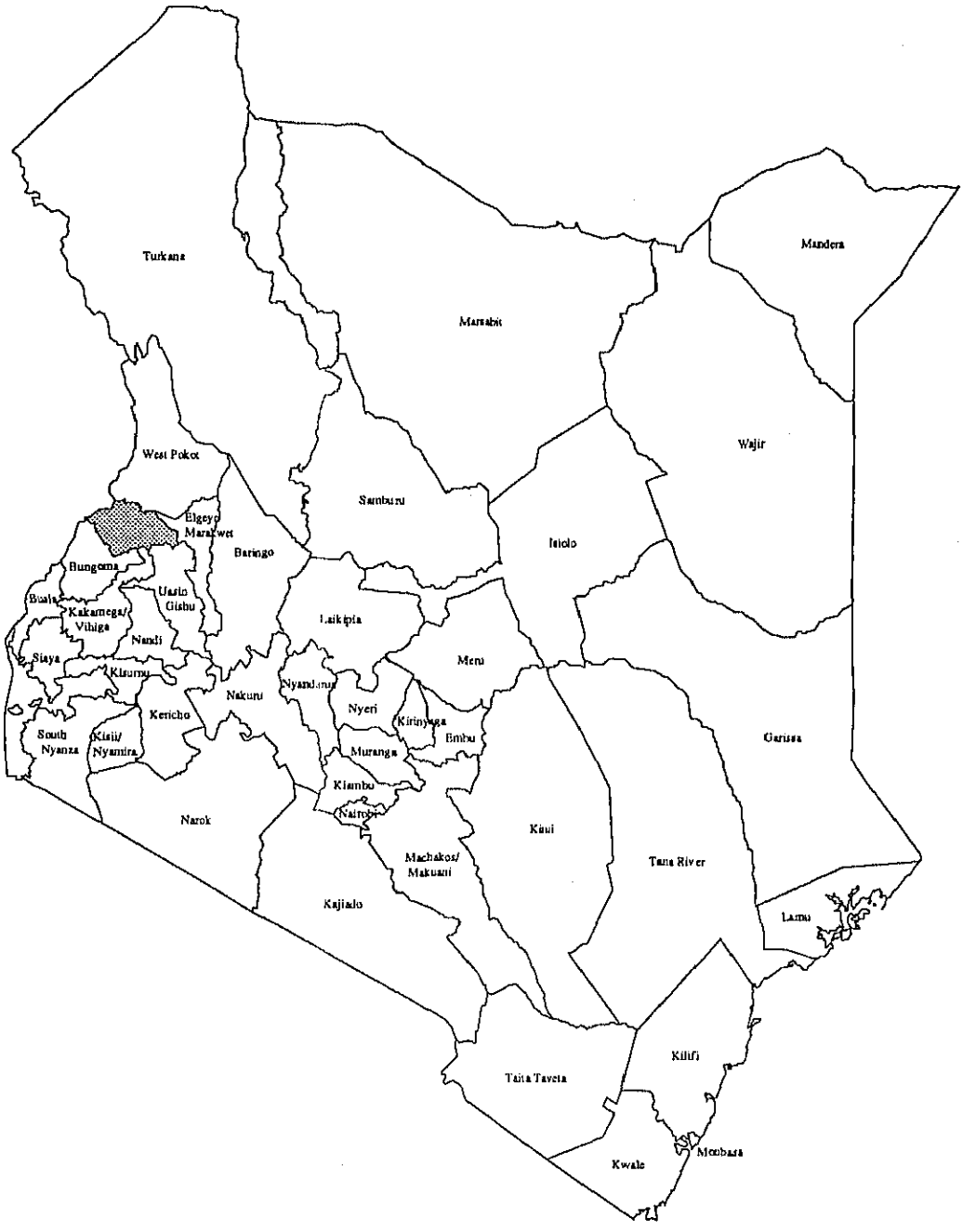
Related Basin Study Proposed	Remarks	Executing Agency	Cost (million)		Implementation Schedule																
			US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Ewaso Ngiro N.		MOWD	2.5	3.2			o	o	o	☆	☆											

☆ Study

o River Basin Study (proposed under separate programme)

Trans Nzoia

District



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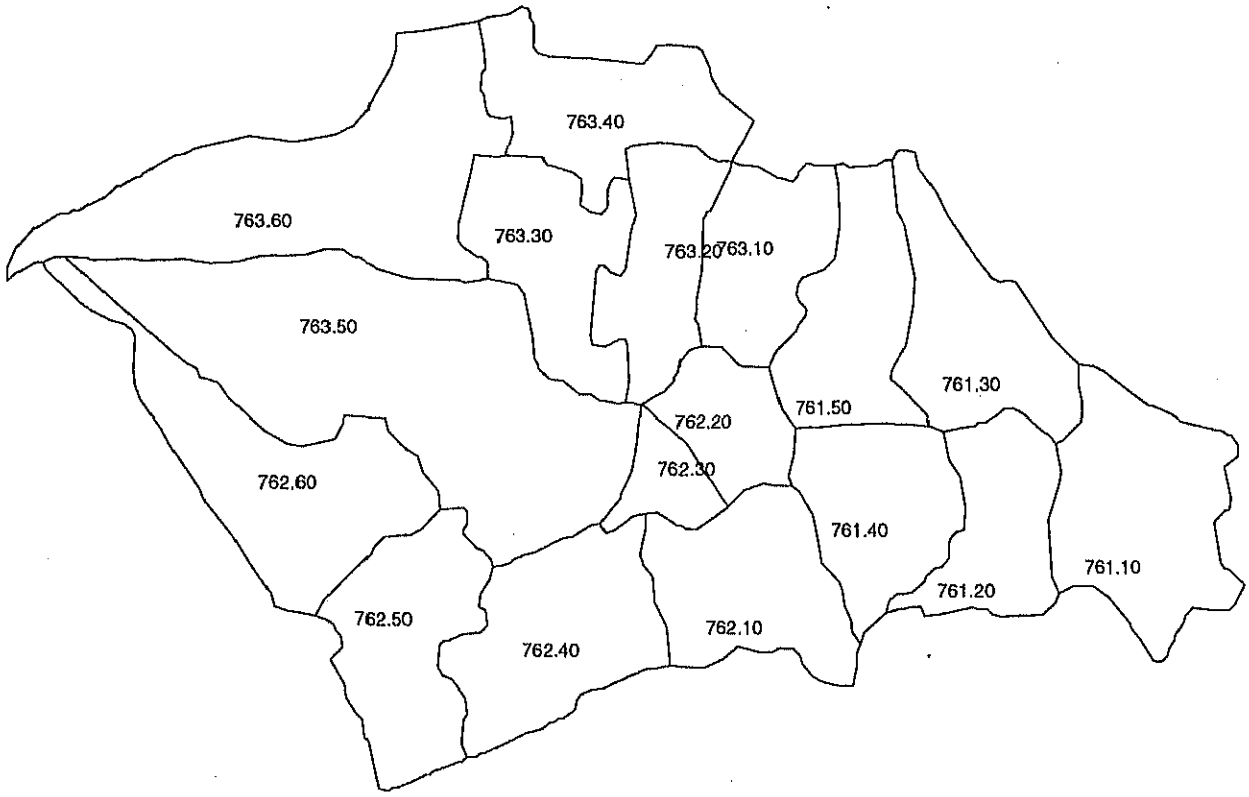
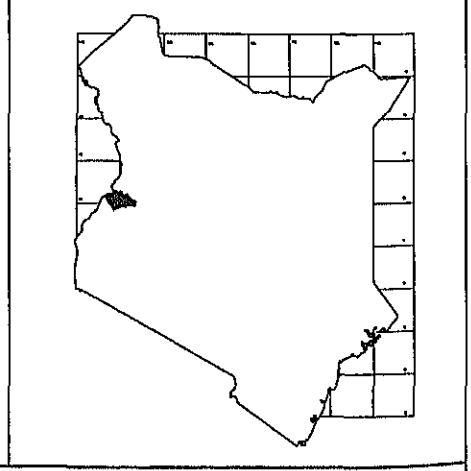


Code	Location	Population
761.1	Chepsiro	11,541
761.2	Cherangany	9,233
761.3	Makutano	14,256
761.4	Kaptamai	13,849
761.5	Sinyerere	17,107
762.1	Waitaluk	18,602
762.2	Kibomet	12,747
762.3	Kitale	15,580
762.4	Kiminini	23,395
762.5	Saboti	22,290
762.6	Kiboroa	16,297
763.1	Kaisagat	14,860
763.2	Kwanza	13,596
763.3	Kapomboi	8,245
763.4	Kolongolo	7,801
763.5	Endebess	22,201
763.6	Chepcholna	17,904



760 Trans Nzoia

THE STUDY
ON
THE NATIONAL WATER MASTER PLAN

JAPAN INTERNATIONAL COOPERATION AGENCY

1. Socio-Economic Profile : 760 Trans Nzoia District

1-1 Population Projection (Unit:1000)

Code	Location	Land Area (sq.km)	Town Name	1990 Total	1990 Urban	1990 Rural	2000 Total	2000 Urban	2000 Rural	2010 Total	2010 Urban	2010 Rural
760	Trans Nzoia District	2,471		424.1	56.4	367.7	615.7	150.0	465.6	842.3	260.0	582.3
761.1	Chepsiro	170		18.4	0.0	18.4	23.2	0.0	23.2	29.1	0.0	29.1
761.2	Cherangany	97		14.7	0.0	14.7	18.6	0.0	18.6	23.3	0.0	23.3
761.3	Makutano	130		22.7	0.0	22.7	28.7	0.0	28.7	35.9	0.0	35.9
761.4	Kaplamai	116	*<---Kitale	22.0	0.0	22.0	27.9	0.0	27.9	34.9	0.0	34.9
761.5	Sinyerere	121	*<---Kitale	27.2	0.0	27.2	34.5	0.0	34.5	43.1	0.0	43.1
762.1	Waitaluk	135	*<---Kitale	29.6	0.0	29.6	37.5	0.0	37.5	46.9	0.0	46.9
762.2	Kibomet	66	*<---Kitale	25.4	25.4	0.0	64.1	64.1	0.0	112.2	112.2	0.0
762.3	Kitale	34	Kitale	31.0	31.0	0.0	78.2	78.2	0.0	136.9	136.9	0.0
762.4	Kiminini	152	Kiminini/Saboti+Kital	37.2	0.0	37.2	50.1	3.0	47.1	63.1	4.2	58.9
762.5	Saboti	138		35.5	0.0	35.5	44.9	0.0	44.9	56.1	0.0	56.1
762.6	Kiboroa	183		25.9	0.0	25.9	32.8	0.0	32.8	41.0	0.0	41.0
763.1	Kaisagat	101	*<---Kitale	23.6	0.0	23.6	29.9	0.0	29.9	37.4	0.0	37.4
763.2	Kwanza	97		21.6	0.0	21.6	27.4	0.0	27.4	34.2	0.0	34.2
763.3	Kapomboi	122		13.1	0.0	13.1	16.6	0.0	16.6	20.8	0.0	20.8
763.4	Kolongolo	130		12.4	0.0	12.4	15.7	0.0	15.7	19.6	0.0	19.6
763.5	Endebess	401	Endebess/Kwanza	35.3	0.0	35.3	49.5	4.8	44.7	62.6	6.7	55.9
763.6	Chepchoina	278		28.5	0.0	28.5	36.1	0.0	36.1	45.1	0.0	45.1

1-2 GRDP Projection

Item	1990	2000	2010
1) GRDP (K.Pound million)	108.8	165.8	231.1
Percentage to GDP	1.4%	1.2%	1.1%
2) GRDP per Capita (K.Pound)	256.5	269.4	274.3
Ratio to GDP per capita	0.75	0.60	0.54
Urban (K.Pound)	644.7	458.4	405.0
Rural (K.Pound)	197.0	208.5	216.0

1-3 Present District Profile (1990)

1) Agricultural Production (1989)

Product	Production	Unit
Maize	276,818	tons
Sorghum/Millet	6,869	tons
Potato	9,925	tons
Rice	-	tons
Wheat/Barley	7,500	tons
Coffee	-	tons
Tea	1,098	tons
Milk	40,740	tons
Meat	1,059	tons

2) Number of Manufacturing Establishments (1986)

Type of Industry	Number
Food	12
Textile	5
Wood	5
Paper	2
Chemical	0
Non-metal	0
Metal	0
Machinery	3
Others	1
Total	28

3) Water Supply Schemes in Service Centre

Piped system	6
Communal water points	0
Other sources	14

4) Educational Facilities

Primary school	169
Secondary school	36
Institute	6

5) Medical Facilities

Hospital	2
Health Centre	10
Dispensary	36
Others	0

6) Out-patient of Infective Diseases in Relation to Water Supplies (1985-89 Average)

Diarrhoeal Diseases	32,544
Leprosy	48
Infectious Hepatitis	388
Bilharzia	1,621
Eye Infections	10,010

2. Land and resources

2.1 Present Land Use

Unit : km2

Total Area	Land Area	Water Area	Forest & Park	Swamp	Town	Barrenland	Agriculture Land	Other Land
2,468	2,468	0	451	110	86	0	1,777	44

2.2 Rain fall

Unit : mm

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
30	48	86	169	179	119	139	153	125	101	92	33	1,281

2.3 River Flow

Unit : m3/sec

Gauge Code	Catchment Area (km2)	Mean Flow	Low Flow Frequency			
			80%	90%	95%	Min.
1BB02	140	1.5	0.5	0.4	0.4	0.4

2.4 Groundwater

Aquifer Characteristics

Elevation (m)	Total Depth (m)	Water Struck (m)	Level Rest (m)	Yield (m3/hr)	Draw Down (m)
1367	66.4	39.23	18.3	2.38	34.69

Safe Abstruction Yield

Unit : m3/year

Borehole	Shallow	Total
601,974	1,720,801	2,322,775

2.5 Agriculture

Suitable Area for Major Crops

Unit: km2

Maize	Wheat	Rice	Sorghum	Potato	Coffee	Tea
1,481	680	0	1,052	600	83	0

Area of Irrigation Potential

Unit : ha

Surfce Water		Groundwater	
Upland	Lowland	Upland	Lowland
6,791	622	30.2	0.3

Livestock Population

Unit: 1,000

Cattle	Sheep/Goats	Camels	Donkeys
189.30	59.01	-	-

3 Water Demand Projection

Unit: cu.m/day

Location	1990				2000				2010			
	Rural	Urban	Livestock	Industry	Rural	Urban	Livestock	Industry	Rural	Urban	Livestock	Industry
Trans Nzoia District	14,499	8,877	20,311	1,119	22,706	24,165	27,262	2,080	35,952	42,704	33,797	3,009
Chepsiro	587	0	227	0	884	0	265	0	1,455	0	340	0
Cherangany	341	0	182	0	481	0	212	0	727	0	272	0
Makutano	784	0	281	57	1,200	0	327	105	2,022	0	420	152
Kaplamai	436	0	273	0	595	0	317	0	848	0	408	0
Sinyerere	814	0	337	0	1,215	0	392	0	1,984	0	504	0
Waitaluk	586	0	366	0	798	0	426	0	1,139	0	548	0
Kibomet	0	3,672	79	0	0	9,441	182	0	0	16,841	328	0
Kitale	0	4,482	96	1,061	0	11,523	223	1,973	0	20,554	401	2,854
Kiminini	816	0	461	0	1,132	439	545	0	1,662	628	702	0
Saboti	1,098	0	439	0	1,637	0	511	0	2,661	0	657	0
Kiboroa	859	0	321	0	1,301	0	374	0	2,162	0	480	0
Kaisagat	643	0	293	0	941	0	341	0	1,495	0	438	0
Kwanza	429	0	268	0	583	0	312	0	832	0	401	0
Kapomboi	260	0	162	0	354	0	189	0	504	0	243	0
Kolongolo	247	0	154	0	337	0	179	0	482	0	230	0
Endebess	962	0	437	1	1,405	702	523	2	2,225	1,004	674	3
Chepchoina	714	0	352	0	1,031	0	410	0	1,609	0	528	0

4 Action Plan

4.1 Urban Water Supply

Urban Name	Population	Present Raw Water Source	Future Raw Water Source	G/P	Pipe line (km)	Pump lift (m)	Cost 1000 US$
Kitale	249,200	Koitobos river	Koitobos river	p	4.4	80	34,757
Kiminini/Saboti+Spr.Kita	4,200	River (Local)	Kabewyan river	p	23.4	140	3,963
Endebess/Kwanza	6,700	River (Local)	Koitobos river	p	2.4	20	2,412

g: gravity p; pump

4.2 Small Scale Irrigation Scheme

Scheme Name	Area (ha)	Farmers No (Nos)	Division	Location	Type of Project	Imp. Agency	Cost million Kshs	Basin
-	-	-	-	-	-	-	-	-

4.3 Large Scale Irrigation Project

Project	Area (ha)	Water Source	Water Demand (MCM)	Cost (million)		Major Crops
				US$	K£	
-	-	-	-	-	-	-

4.4 Hydropower Development

Project	Description	Executing Agency	Cost(million)		Implementation Schedule																
			US$	K£	93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10
-	-	-	-	-																		

★ Design ☆ Study ● Construction

4.5 Flood Mitigation Project

Project	Description	Executing Agency	Cost(million)		Implementation Schedule																
			US$	K£	93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10
-	-	-	-	-																		

★ Design ☆ Study ● Construction

4.6 Urban Drainage and Ad-hoc River Improvement Projects

Project	Population	Area (Km2)	Executing Agency	Cost (million)		Implementation Schedule															
				US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Kitale	56,400	4.2	MOLG	25.2	31.8						☆	☆	☆	●	●	●							

★ Design ☆ Study ● Construction

4.7 Dam Development Plan

Damsites	C.A. (km2)	Purpose	FSL (El. m)	Storage (MCM)	Yield (m3/s)	Height (m)	Cost (1,000US$)
-	-	-	-	-	-	-	-

W:Water Supply I:Irrigation P: Power

4.8 Groundwater Development Projects

Proposed Numbers				Executing Agency	Cost (million)		Implementation Schedule																Remarks
Drinking		Livestock																					
(B/H+D)	(S/W+H)	(B/H+D)	(S/W+H)		US$	K£	93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10	
31	205	0	0	MOCSS	4.3	5.4			☆	●	●														Small communication supply

★ Design ☆ Study ● Construction

4.9 Source Development Plan for Rural Water Supply

District	Source Development Plan									Total	Implementation Program (%)	
	Surface Water	Borehole	Shallow Well	Roof Catch	Small Dam	Subsur-face Dam	Sand Dam	Rock Catch	Existing Pipeline		Up to 2000	2001-2010
- Quantity (m3/d)	19,082	456	1,015	0	781	0	0	35	410	21,779	35.3	64.7
- No. of Facilities	0	31	205	0	15	0	0	3	0	254		
- Cost (mill.US$)	0	1.87	0.93	0	0.5	0	0	0.05	0	3.35		
(mill.K£)	0	2.36	1.17	0	0.63	0	0	0.07	0	4.23		

4.10 Source Development Plan for Livestock Water Supply

District	Source Development Plan							Total	Implementation Program (%)	
	Surface Water	Borehole	Shallow Well	Small Dam	Subsur-face Dam	Sand Dam	Existing Pipeline		Up to 2000	2001-2010
- Quantity (m3/d)	6,529	0	0	268	0	0	0	6,797	35.1	64.9
- No. of Facilities	0	0	0	15	0	0	0	15		
- Cost (mill.US$)	0	0	0	0.17	0	0	0	0.17		
(mill.K£)	0	0	0	0.21	0	0	0	0.21		

4.11 Watering Points in Nomadic Pasturage Area

Asumed Nomadic Pasturage Area (km2)	No. of Watering Points (Nos)	Executing Agency	Cost (million)		Implementaion of Watering Points (No.)	
			US$	K£	up to 2000	2001-2010
-	-	-	-	-	-	-

5 Future Water Resources Developmet Potential and Study Proposal

5.1 Potential Water Source for Future Development

Potential Water Source for Future Development	Purpose	Schemes		
		Water Supply	Irrigation	Hydropower
Moi's Bridge Dam Kapolet River	P+I+W W	Suam & Kerio rivers Kapengulia	-	Moi's Bridge

W:Water Supply I:Irrigation P: Power

5.2 River Basin Developmetn Study

Description	Executing Agency	Cost (million)		Implementation Schedule																	
		US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Nzoia/Yala River Basin Study	LBDA	3.0	3.8		☆	☆	☆														

★ Design ☆ Study ● Construction

5.3 District Water Resource Study

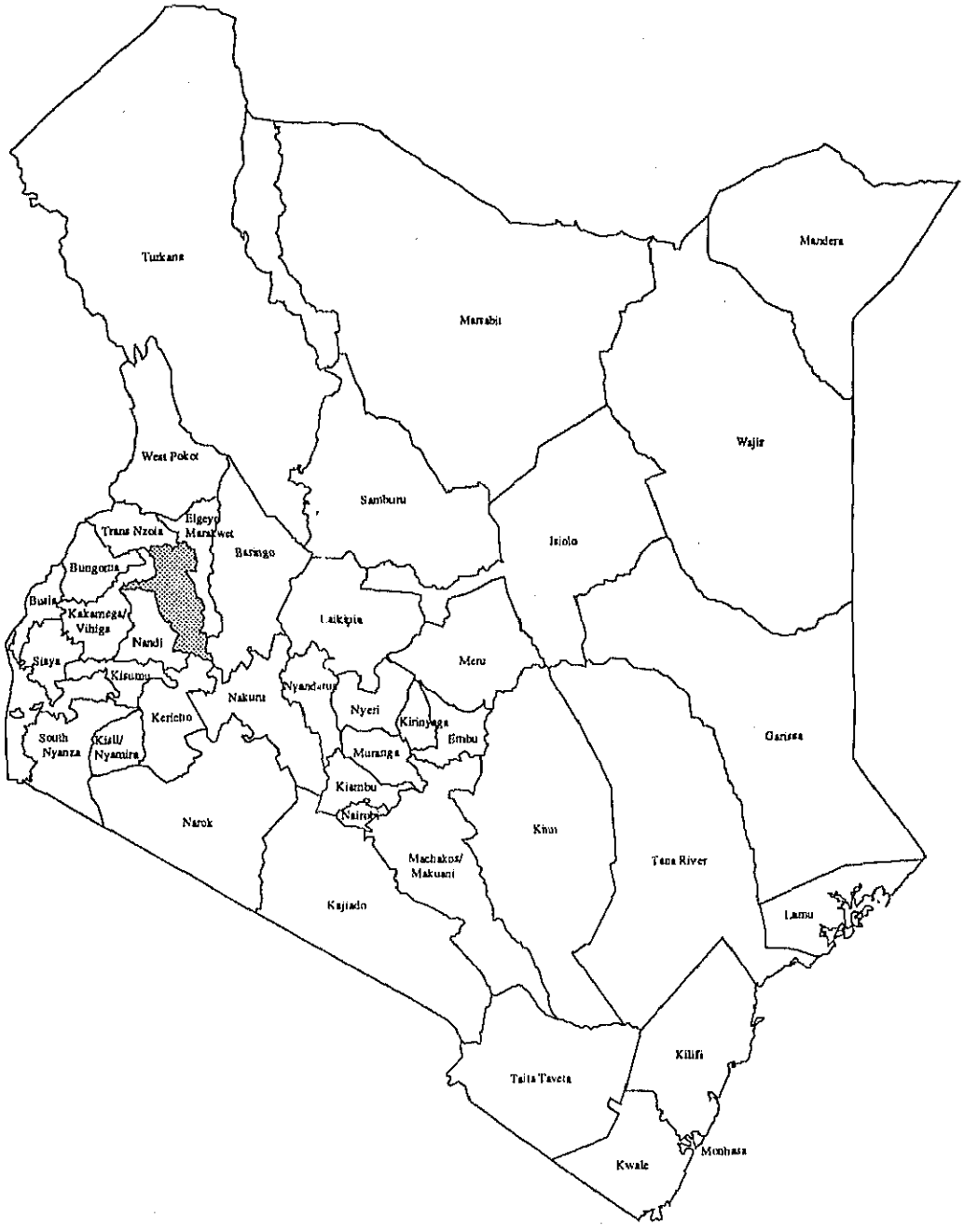
Related Basin Study Proposed	Remarks	Executing Agency	Cost (million)		Implementation Schedule																
			US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Nzoia		MOWD	2.0	2.5		o	o	o	☆	☆												

☆ Study

o River Basin Study (proposed under separate programme)

Uasin Gishu

District



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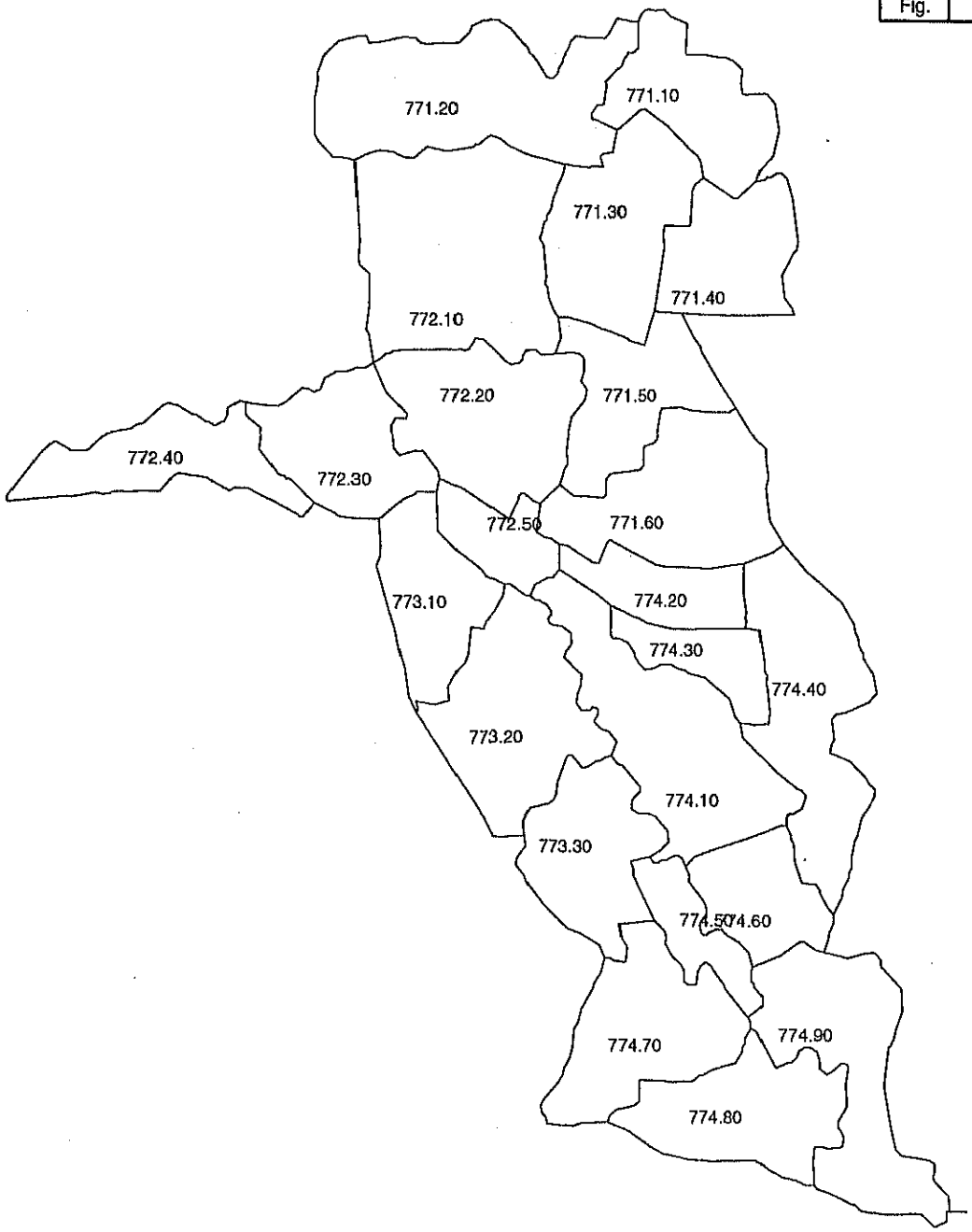
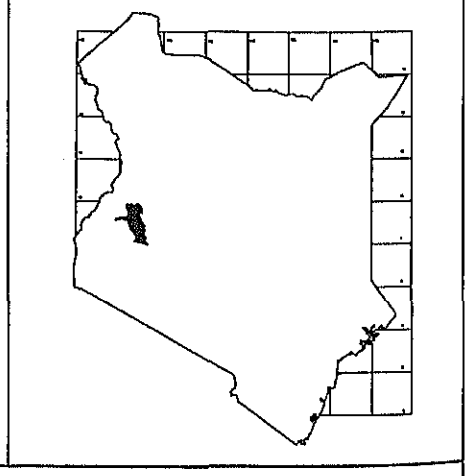


Code	Location	Population
771.1	Molbeki	5,347
771.2	Moi's Bridge	18,036
771.3	Molben	13,414
771.4	Karuna	6,683
771.5	Sergoit	12,872
771.6	Temboleo	9,357
772.1	Soi	16,998
772.2	Kiplombe	14,457
772.3	Turbo East	10,306
772.4	Turbo West	14,665
772.5	Eldoret Municipality	50,503
773.1	Kapsaret	10,183
773.2	Ngeria	12,515
773.3	Tulwet	11,601
774.1	Cheptiret	21,459
774.2	Kaptagat	8,355
774.3	Kapsinende	7,162
774.4	Kipkabus Kaptagat	7,725
774.5	Tarakwa	4,687
774.6	Olare	6,227
774.7	Lainguse	16,406
774.8	Timboroa	8,413
774.9	Ainabkoi	13,393



770 Uasin Gishu

THE STUDY
ON
THE NATIONAL WATER MASTER PLAN

JAPAN INTERNATIONAL COOPERATION AGENCY

1. Socio-Economic Profile : 770 Uasin Gishu District

1-1 Population Projection

(Unit:1000)

Code	Location	Land Area (sq.km)	Town Name	1990			2000			2010		
				Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural
770	Uasin Gishu District	3,781		470.3	123.6	346.7	666.0	297.0	369.0	1,009.7	525.4	484.2
771.1	Moibeki	138		7.4	-	7.4	7.9	-	7.9	10.3	-	10.3
771.2	Moi's Bridge	275	Moi's Bridge	28.1	3.1	25.0	32.9	6.3	26.6	45.0	10.1	34.9
771.3	Moiben	192		18.6	-	18.6	19.8	-	19.8	26.0	-	26.0
771.4	Karuna	127		9.3	-	9.3	9.9	-	9.9	12.9	-	12.9
771.5	Sergoit	146		17.8	-	17.8	19.0	-	19.0	24.9	-	24.9
771.6	Tembeleo	205		13.0	-	13.0	13.8	-	13.8	18.1	-	18.1
772.1	Soi	310	Soy	24.7	1.1	23.6	27.3	2.2	25.1	36.5	3.6	32.9
772.2	Kiplombe	202		20.0	-	20.0	21.3	-	21.3	28.0	-	28.0
772.3	Turbo East	144		14.3	-	14.3	15.2	-	15.2	19.9	-	19.9
772.4	Turbo West	133	Turbo	24.6	4.3	20.3	30.4	8.8	21.6	42.3	14.0	28.4
772.5	Eldoret Municipality	66	Eldoret	112.9	112.9	0.0	272.5	272.5	0.0	486.8	486.8	0.0
773.1	Kapsaret	126		14.1	-	14.1	15.0	-	15.0	19.7	-	19.7
773.2	Ngeria	210	Kesses	17.3	-	17.3	21.2	2.7	18.5	28.1	3.9	24.2
773.3	Tulwet	151		16.1	-	16.1	17.1	-	17.1	22.4	-	22.4
774.1	Cheptiret	251	*Sprawled by Eldoret	29.7	-	29.7	31.6	-	31.6	41.5	-	41.5
774.2	Kaptagat	83		11.6	-	11.6	12.3	-	12.3	16.2	-	16.2
774.3	Kapsinende	69		9.9	-	9.9	10.6	-	10.6	13.9	-	13.9
774.4	Kipkabus Kaptagat	221		10.7	-	10.7	11.4	-	11.4	14.9	-	14.9
774.5	Tarakwa	65		6.5	-	6.5	6.9	-	6.9	9.1	-	9.1
774.6	Olare	100	Burnt Forest	10.8	2.2	8.6	13.7	4.5	9.2	19.2	7.1	12.1
774.7	Lainguse	190		22.7	-	22.7	24.2	-	24.2	31.7	-	31.7
774.8	Timboroa	164		11.7	-	11.7	12.4	-	12.4	16.3	-	16.3
774.9	Ainabkoi	213		18.6	-	18.6	19.7	-	19.7	25.9	-	25.9

1-2 GRDP Projection

Item	1990	2000	2010
1) GRDP (K.Pound million)	145.8	279.2	418.4
Percentage to GDP	1.9%	2.0%	2.0%
2) GRDP per Capita (K.Pound)	310.0	419.3	414.3
Ratio to GDP per capita	0.91	0.93	0.82
Urban (K.Pound)	556.4	437.8	432.7
Rural (K.Pound)	222.2	404.3	399.6

1-3 Present District Profile (1990)

1) Agricultural Production (1989)

Product	Production	Unit
Maize	248,014	tons
Sorghum/Millet	32,842	tons
Potato	11,125	tons
Rice	-	tons
Wheat/Barley	118,197	tons
Coffee	-	tons
Tea	-	tons
Milk	41,651,268	tons
Meat	2,948	tons

2) Number of Manufacturing Establishments (1986)

Type of Industry	Number
Food	20
Textile	9
Wood	19
Paper	5
Chemical	4
Non-metal	2
Metal	0
Machinery	2
Others	0
Total	61

3) Water Supply Schemes in Service Centre

Piped system	12
Communal water points	0
Other sources	26

4) Educational Facilities

Primary school	268
Secondary school	73
Institute	5

5) Medical Facilities

Hospital	3
Health Centre	10
Dispensary	25
Others	1

6) Out-patient of Infective Diseases in Relation to Water Supplies (1985-89 Average)

Diarrhoeal Diseases	22,620
Leprosy	12
Infectious Hepatitis	217
Bilharzia	454
Eye Infections	11,703

2. Land and resources

2.1 Present Land Use

Unit : km2

Total Area	Land Area	Water Area	Forest & Park	Swamp	Town	Barrenland	Agriculture Land	Other Land
3,784	3,784	0	661	42	82.49	0	1,247	1,751.51

2.2 Rain fall

Unit : mm

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
39	52	85	159	155	111	158	171	96	75	86	38	1,231

2.3 River Flow

Unit : m3/sec

Gauge Code	Catchment Area (km2)	Mean Flow	Low Flow Frequency			
			80%	90%	95%	Min.
1BA01	262	1.1	0.4	0.3	0.3	0.2
1BD01	715	3.5	1.9	1.8	1.7	1.5
1CA02	717	3.4	2.7	2.4	2.3	1.8
1CB05	697	4.0	2.9	2.6	2.4	1.8

2.4 Groundwater

Aquifer Characteristics

Elevation (m)	Total Depth (m)	Water Struck (m)	Level Rest (m)	Yield (m3/hr)	Draw Down (m)
1294.27	78.45	54.01	15.97	3.74	48.58

Safe Abstruction Yield

Unit : m3/year

Borehole	Shallow	Total
1,096,409	536,260	1,632,669

2.5 Agriculture

Suitable Area for Major Crops

Unit: km2

Maize	Wheat	Rice	Sorghum	Potato	Coffee	Tea
2,333	2,159	0	384	2,333	3	11

Area of Irrigation Potential

Unit : ha

Surfce Water		Groundwater	
Upland	Lowland	Upland	Lowland
9,384	949	24.5	0.3

Livestock Population

Unit: 1,000

Cattle	Sheep/Goats	Camels	Donkeys
272.46	127.24	-	-

3 Water Demand Projection

Unit: cu.m/day

Location	1990				2000				2010			
	Rural	Urban	Livestock	Industry	Rural	Urban	Livestock	Industry	Rural	Urban	Livestock	Industry
Uasin Gishu District	9,672	17,873	7,770	3,530	11,878	43,763	9,435	6,267	19,743	78,869	15,030	8,541
Moibeki	234	0	152	0	296	0	168	0	515	0	253	0
Moi's Bridge	557	448	530	0	653	930	600	0	1,015	1,511	913	0
Moiben	463	0	382	0	551	0	421	0	877	0	634	0
Karuna	273	0	190	0	338	0	210	0	571	0	316	0
Sergoit	478	0	367	0	576	0	404	0	929	0	608	0
Tembeleo	376	0	267	0	463	0	294	0	771	0	442	0
Soi	613	159	490	0	736	330	545	0	1,181	536	825	0
Kiplombe	466	0	412	0	550	0	454	0	862	0	683	0
Turbo East	305	0	294	0	353	0	323	0	541	0	487	0
Turbo West	403	622	440	0	460	1,289	507	0	690	2,095	778	0
Eldoret Municipality	0	16,325	581	3,468	0	40,150	1,450	6,153	0	73,068	2,971	8,375
Kapsaret	362	0	290	57	434	0	320	105	694	0	481	152
Ngeria	465	0	357	0	559	404	407	0	903	585	615	0
Tulwet	430	0	331	0	518	0	364	0	837	0	548	0
Cheptiret	857	0	612	0	1,054	0	674	0	1,753	0	1,014	0
Kaptagat	354	0	238	1	442	0	262	2	752	0	395	3
Kapsinende	335	0	204	0	430	0	225	0	753	0	338	0
Kipkabus Kaptagat	373	0	220	1	481	0	242	2	853	0	365	3
Tarakwa	189	0	134	0	233	0	147	0	389	0	221	0
Olare	292	319	189	0	372	660	219	0	653	1,073	338	0
Lainguse	750	0	468	0	954	0	515	0	1,659	0	775	0
Timboroa	423	0	240	1	550	0	264	2	982	0	397	3
Ainabkoi	674	0	382	2	875	0	420	3	1,563	0	633	5

4 Action Plan

4.1 Urban Water Supply

Urban Name	Population	Present Raw Water Source	Future Raw Water Source	G/P	Pipe line (km)	Pump lift (m)	Cost 1000 US$
Moi's Bridge	10,100	River	Nzoia river	p	1.5	40	2,934
Turbo	14,000	River	Sosiani river	g	10.5	0	5,480
Eldoret	486,800	Twin Rivers Dam, Ellgirini Dam, Boreholes	Moiben Dam + Nzoia river	p	100	410	135,891
Burnt Forest	7,200	Boreholes	Kipkaren river	p	0.4	50	2,091

g: gravity p: pump

4.2 Small Scale Irrigation Scheme

Scheme Name	Area (ha)	Farmers No (Nos)	Division	Location	Type of Project	Imp. Agency	Cost million Kshs	Basin
Sumbut (Mile 13)	250	?	?	?	Irrigaiton	?	10.25	1CA
Kaprongo	85	?	?	?	Irrigaiton	?	3.485	1CC

4.3 Large Scale Irrigation Project

Project	Area (ha)	Water Source	Water Demand (MCM)	Cost (million)		Major Crops
				US$	K£	
-	-	-	-	-	-	-

4.4 Hydropower Development

Project	Description	Executing Agency	Cost(million)		Implementation Schedule																
			US$	K£	93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10
-	-	-	-	-																		

★ Design ☆ Study ● Construction

4.5 Flood Mitigation Project

Project	Description	Executing Agency	Cost(million)		Implementation Schedule																
			US$	K£	93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10
-	-	-	-	-																		

★ Design ☆ Study ● Construction

4.6 Urban Drainage and Ad-hoc River Improvement Projects

Project	Population	Area (Km2)	Executing Agency	Cost (million)		Implementation Schedule																
				US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Eldoret	112,900	8.6	MOLG	34.3	43.2						☆	☆	☆	●	●	●							

★ Design ☆ Study ● Construction

4.7 Dam Development Plan

Damsites	C.A. (km2)	Purpose	FSL (El. m)	Storage (MCM)	Yield (m3/s)	Height (m)	Cost (1,000US$)

W:Water Supply I:Irrigation P: Power

4.8 Groundwater Development Projects

Proposed Numbers				Executing Agency	Cost (million)		Implementation Schedule																Remarks
Drinking		Livestock																					
(B/H+D)	(S/W+H)	(B/H+D)	(S/W+H)		US$	K£	93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10	
-	-	-	-	-																					-

★ Design ☆ Study ● Construction

4.9 Source Development Plan for Rural Water Supply

District	Source Development Plan									Total	Implementation Program (%)	
	Surface Water	Borehole	Shallow Well	Roof Catch	Small Dam	Subsur-face Dam	Sand Dam	Rock Catch	Existing Pipeline		Up to 2000	2001-2010
- Quantity (m3/d)	16,940	129	101	0	693	0	0	18	1,838	19,719	21.9	78.1
- No. of Facilities	0	4	21	0	20	0	0	2	0	47		
- Cost (mill.US$)	0	0.4	0.1	0	0.42	0	0	0.04	0	0.95		
(mill.K£)	0	0.5	0.12	0	0.53	0	0	0.04	0	1.2		

4.10 Source Development Plan for Livestock Water Supply

District	Source Development Plan							Total	Implementation Program (%)	
	Surface Water	Borehole	Shallow Well	Small Dam	Subsur-face Dam	Sand Dam	Existing Pipeline		Up to 2000	2001-2010
- Quantity (m3/d)	11,335	0	0	466	0	0	0	11,801	22.9	77.1
- No. of Facilities	0	0	0	22	0	0	0	22		
- Cost (mill.US$)	0	0	0	0.28	0	0	0	0.28		
(mill.K£)	0	0	0	0.35	0	0	0	0.35		

4.11 Watering Points in Nomadic Pasturage Area

Asumed Nomadic Pasturage Area (km2)	No. of Watering Points (Nos)	Executing Agency	Cost (million)		Implementaion of Watering Points (No.)	
			US$	K£	up to 2000	2001-2010
-	-	-	-	-	-	-

5 Future Water Resources Developmet Potential and Study Proposal

5.1 Potential Water Source for Future Development

Potential Water Source for Future Development	Purpose	Schemes		
		Water Supply	Irrigation	Hydropower
Kibolo Dam	W	Eldoret	-	-

W:Water Supply I:Irrigation P: Power

5.2 River Basin Developmetn Study

Description	Executing Agency	Cost (million)		Implementation Schedule																	
		US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Nzoia/Yala River Basin Study	LBDA	3.0	3.8		☆	☆	☆														

★ Design ☆ Study ● Construction

5.3 District Water Resource Study

Related Basin Study Proposed	Remarks	Executing Agency	Cost (million)		Implementation Schedule																
			US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Nzoia		MOWD	2.0	2.5		o	o	o	☆	☆												

☆ Study

o River Basin Study (proposed under separate programme)

Baringo

District

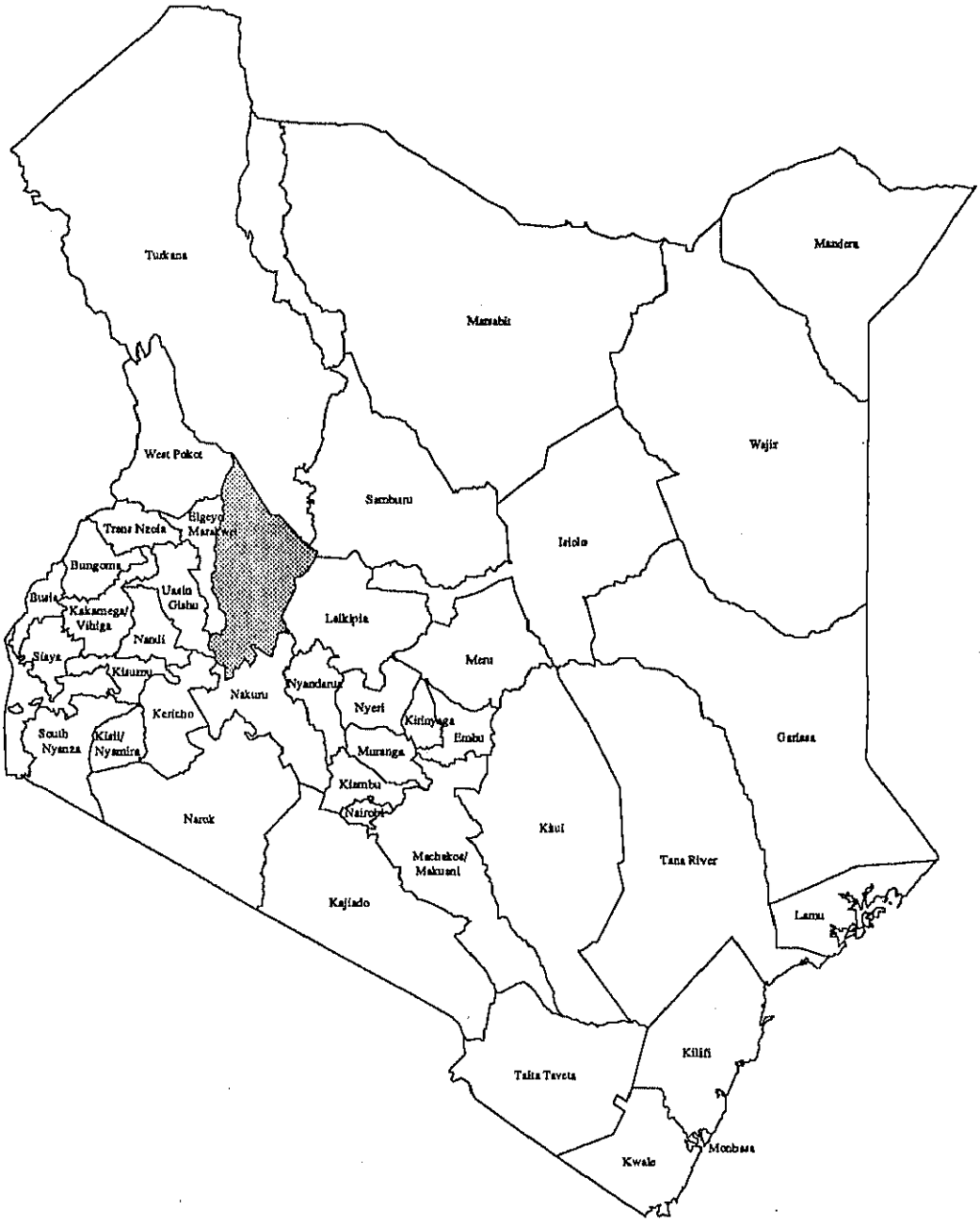
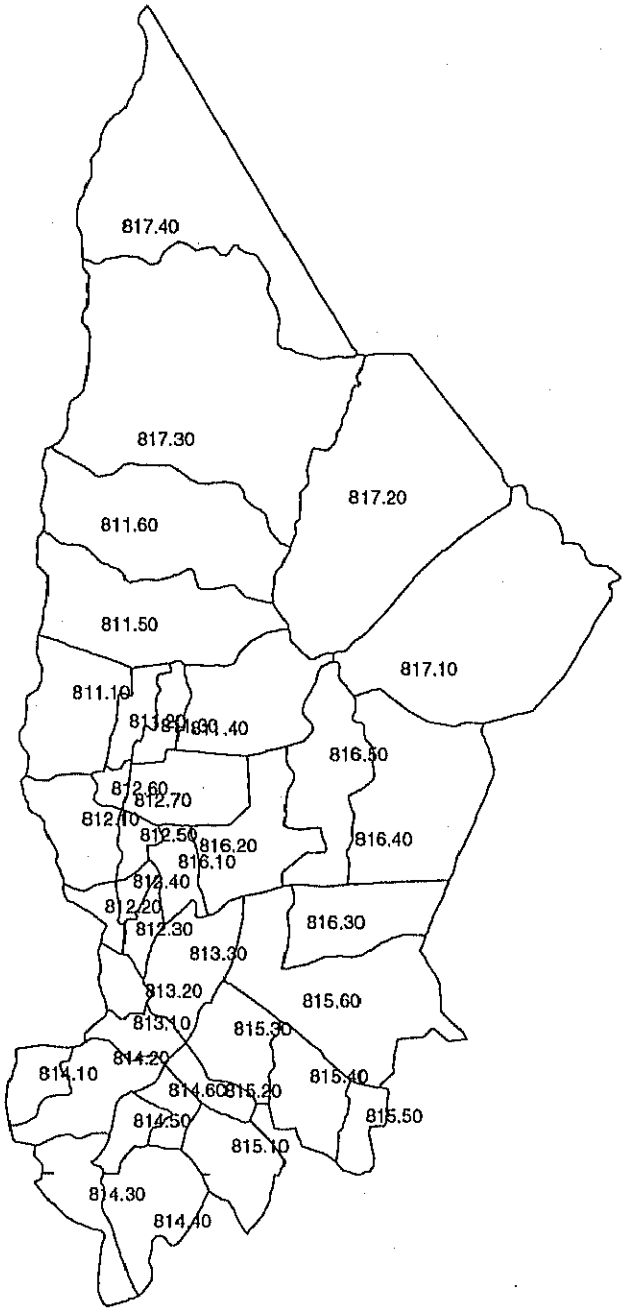
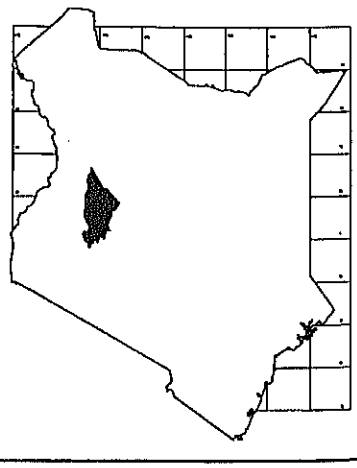


Fig.



Code	Location	Population
811.1	Kamnarok Soi	10,157
811.2	Kamnarok Mosop	6,562
811.3	Saimo Mosop	9,312
811.4	Saimo Soi	7,276
811.5	Kaboskei	9,494
811.6	Ngorora	5,467
812.1	Kabarnet Soi	7,001
812.2	Sacho-Soi	5,056
812.3	Sacho Mosop	2,086
812.4	Kabasis	1,393
812.5	Kabarnet Mosop	814
812.6	Orokwo	2,612
812.7	Ewalel	7,226
813.1	Sirwa	1,751
813.2	Enom	2,494
813.3	Pokor Keben	4,478
814.1	Lembus Mosop	4,615
814.2	Lembus Central	8,230
814.3	Maji Mazuri	12,323
814.4	Koibatek	7,802
814.5	Eldama Ravine	8,128
814.6	Kabi Moi	3,395
815.1	Lembus Soi	9,572
815.2	Kakamor	1,925
815.3	Pokor Keben	4,803
815.4	Pokor Keben Soi	3,194
815.5	Kisanana	1,741
815.6	Endorois	6,010
816.1	Chapchap	3,417
816.2	Marigat	7,189
816.3	Loboi	2,922
816.4	Mukutani	2,759
816.5	Njemps	6,023
817.1	Korosi	7,246
817.2	Loiyamarok	5,281
817.3	Ribkwo	12,995
817.4	Tiriko	1,042



N

810 Baringo

THE STUDY
ON
THE NATIONAL WATER MASTER PLAN

JAPAN INTERNATIONAL COOPERATION AGENCY

1. Socio-Economic Profile : 810 Baringo District

1-1 Population Projection

(Unit:1000)

Code	Location	Land Area (sq.km)	Town Name	1990			2000			2010		
				Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural
810	Baringo District	10,627		306.0	26.1	279.9	405.1	56.9	348.2	516.0	94.8	421.2
811.1	Kamnarok Soi	282		14.9	-	14.9	18.6	-	18.6	22.5	-	22.5
811.2	Kamnarok Mosop	83	Kabartonjo	9.7	-	9.7	12.5	0.5	12.0	15.2	0.7	14.5
811.3	Saimo Mosop	78		13.7	-	13.7	17.1	-	17.1	20.6	-	20.6
811.4	Saimo Soi	324		10.7	-	10.7	13.3	-	13.3	16.1	-	16.1
811.5	Kaboskei	495		14.0	-	14.0	17.4	-	17.4	21.0	-	21.0
811.6	Ngorora	590		8.0	-	8.0	10.0	-	10.0	12.1	-	12.1
812.1	Kabarnet Soi	193	*<---Kabarnet	11.6	3.0	8.6	17.3	6.5	10.7	24.0	11.0	13.0
812.2	Sacho-Soi	53		7.4	-	7.4	9.3	-	9.3	11.2	-	11.2
812.3	Sacho Mosop	55		3.1	-	3.1	3.8	-	3.8	4.6	-	4.6
812.4	Kabasis	36		2.1	-	2.1	2.6	-	2.6	3.1	-	3.1
812.5	Kabarnet Mosop	51	Kabarnet	2.1	2.1	0.0	4.6	4.6	0.0	7.7	7.7	0.0
812.6	Orokwo	32	*<---Kabarnet	4.0	0.5	3.5	5.5	1.1	4.4	7.2	1.8	5.3
812.7	Ewalel	204	*<---Kabarnet	12.0	3.1	8.9	17.8	6.8	11.1	24.8	11.4	13.4
813.1	Sirwa	84		2.6	-	2.6	3.2	-	3.2	3.9	-	3.9
813.2	Enom	66		3.7	-	3.7	4.6	-	4.6	5.5	-	5.5
813.3	Pokor Keben	218	Tenges	6.6	-	6.6	8.3	0.1	8.2	10.0	-	9.9
814.1	Lembus Mosop	93		6.8	-	6.8	8.5	-	8.5	10.2	-	10.2
814.2	Lembus Central	198		12.1	-	12.1	15.1	-	15.1	18.2	-	18.2
814.3	Maji Mazuri	178	Maji Mazuri	17.6	5.2	12.4	26.8	11.3	15.5	37.9	19.1	18.7
814.4	Koibatek	241		11.5	-	11.5	14.3	-	14.3	17.3	-	17.3
814.5	Eldama Ravine	74	Eldama Ravine	11.8	5.6	6.2	19.9	12.2	7.7	29.9	20.6	9.3
814.6	Kabi Moi	70		0.0	-	0.0	0.0	-	0.0	0.0	-	0.0
815.1	Lembus Soi	188	Mogotio	13.7	2.9	10.8	19.8	6.3	13.5	27.0	10.7	16.3
815.2	Kakamor	72		7.8	-	7.8	9.7	-	9.7	11.8	-	11.8
815.3	Pokor Keben	180		7.1	-	7.1	8.8	-	8.8	10.6	-	10.6
815.4	Pokor Keben Soi	184		4.7	-	4.7	5.8	-	5.8	7.1	-	7.1
815.5	Kisanana	80		2.6	-	2.6	3.2	-	3.2	3.9	-	3.9
815.6	Endorois	564		8.8	-	8.8	11.0	-	11.0	13.3	-	13.3
816.1	Chapchap	93	*<---Kabarnet	5.3	0.7	4.6	7.3	1.5	5.7	9.5	2.6	6.9
816.2	Marigat	271	Marigat	13.6	3.0	10.6	18.8	5.6	13.2	24.5	8.6	15.9
816.3	Loboi	251		4.3	-	4.3	5.4	-	5.4	6.5	-	6.5
816.4	Mukutani	520		4.1	-	4.1	5.1	-	5.1	6.1	-	6.1
816.5	Njemps	313		8.9	-	8.9	11.0	-	11.0	13.3	-	13.3
817.1	Korosi	978	Chemolgut	10.7	-	10.7	13.6	0.3	13.3	16.5	0.5	16.1
817.2	Loiyamarok	1,022		7.8	-	7.8	9.7	-	9.7	11.7	-	11.7
817.3	Ribkwo	1,370		19.1	-	19.1	23.8	-	23.8	28.8	-	28.8
817.4	Tiriko	843		1.5	-	1.5	1.9	-	1.9	2.3	-	2.3

1-2 GRDP Projection

Item	1990	2000	2010
1) GRDP (K.Pound million)	31.5	61.0	91.6
Percentage to GDP	0.4%	0.4%	0.4%
2) GRDP per Capita (K.Pound)	103.1	150.7	177.5
Ratio to GDP per capita	0.30	0.33	0.35
Urban (K.Pound)	522.6	453.2	416.4
Rural (K.Pound)	64.0	101.2	123.7

1-3 Present District Profile (1990)

1) Agricultural Production (1989)

Product	Production	Unit
Maize	44,050	tons
Sorghum/Millet	3,275	tons
Potato	10,132	tons
Rice	-	tons
Wheat/Barley	3,695	tons
Coffee	126	tons
Tea	-	tons
Milk	6,500	tons
Meat	2,112,120	tons

2) Number of Manufacturing Establishments (1986)

Type of Industry	Number
Food	20
Textile	9
Wood	19
Paper	5
Chemical	4
Non-metal	2
Metal	0
Machinery	2
Others	0
Total	61

3) Water Supply Schemes in Service Centre

Piped system	27
Communal water points	2
Other sources	12

4) Educational Facilities

Primary school	328
Secondary school	-
Institute	-

5) Medical Facilities

Hospital	3
Health Centre	7
Dispensary	16
Others	0

6) Out-patient of Infective Diseases in Relation to Water Supplies (1985-89 Average)

Diarrhoeal Diseases	7,686
Leprosy	9
Infectious Hepatitis	122
Bilharzia	471
Eye Infections	5,789

2. Land and resources

2.1 Present Land Use

Unit : km2

Total Area	Land Area	Water Area	Forest & Park	Swamp	Town	Barrenland	Agriculture Land	Other Land
10,790	10,627	163	835	128	212.54	636	1,078	7,737.46

2.2 Rain fall

Unit : mm

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
27	33	62	131	103	64	101	100	51	57	79	35	851

2.3 River Flow

Unit : m3/sec

Gauge Code	Catchment Area (km2)	Mean Flow	Low Flow Frequency			
			80%	90%	95%	Min.
2EE07	1181	4.2	2.3	1.9	1.8	1.8
2EE08	500	1.9	0.5	0.4	0.4	0.3

2.4 Groundwater

Aquifer Characteristics

Elevation (m)	Total Depth (m)	Water Struck (m)	Level Rest (m)	Yield (m3/hr)	Draw Down (m)
1531.52	139.02	108.11	69.31	8.05	26.18

Safe Abstruction Yield

Unit : m3/year

Borehole	Shallow	Total
3,967,205	3,475,551	7,442,756

2.5 Agriculture

Suitable Area for Major Crops

Unit: km2

Maize	Wheat	Rice	Sorghum	Potato	Coffee	Tea
910	246	1	1,156	265	153	1

Area of Irrigation Potential

Unit : ha

Surfce Water		Groundwater	
Upland	Lowland	Upland	Lowland
18,018	10,119	17.1	13.9

Livestock Population

Unit: 1,000

Cattle	Sheep/Goats	Camels	Donkeys
179.92	661.63	3.01	3.72

3 Water Demand Projection

Unit: cu.m/day

Location	1990				2000				2010			
	Rural	Urban	Livestock	Industry	Rural	Urban	Livestock	Industry	Rural	Urban	Livestock	Industry
Baringo District	6,416	3,774	6,664	125	8,901	8,387	7,858	232	12,982	14,236	9,476	336
Kamnarok Soi	299	0	348	0	400	0	403	0	554	0	479	0
Kamnarok Mosop	263	0	225	0	377	75	263	0	574	104	313	0
Saimo Mosop	378	0	319	0	543	0	370	0	832	0	439	0
Saimo Soi	212	0	249	0	284	0	289	0	392	0	343	0
Kaboskei	277	0	325	0	370	0	377	0	511	0	448	0
Ngorora	160	0	187	0	213	0	217	0	295	0	258	0
Kabarnet Soi	183	434	218	0	247	965	268	0	347	1,658	335	0
Sacho-Soi	150	0	173	0	201	0	201	0	279	0	239	0
Sacho Mosop	77	0	71	0	109	0	83	0	162	0	98	0
Kabasis	66	0	48	0	98	0	55	0	158	0	66	0
Kabarnet Mosop	0	304	12	62	0	675	25	116	0	1,160	41	168
Orokwo	110	72	85	0	162	161	101	0	256	276	123	0
Ewalel	191	448	225	0	260	996	277	0	370	1,712	346	0
Sirwa	59	0	60	0	82	0	69	0	117	0	83	0
Enom	81	0	85	0	112	0	99	0	160	0	118	0
Pokor Keben	132	0	153	0	177	8	178	0	244	12	212	0
Lembus Mosop	246	0	158	0	374	0	183	0	616	0	218	0
Lembus Central	381	0	282	0	561	0	327	0	890	0	388	0
Maji Mazuri	439	752	320	3	664	1,671	397	5	1,083	2,874	501	8
Koibatek	311	0	267	0	445	0	310	0	676	0	368	0
Eldama Ravine	143	810	176	59	198	1,799	232	109	285	3,094	307	157
Kabi Moi	0	0	0	0	0	0	0	0	0	0	0	0
Lembus Soi	215	419	269	0	287	932	326	0	396	1,602	404	0
Kakamor	155	0	182	0	208	0	211	0	287	0	251	0
Pokor Keben	140	0	165	0	187	0	191	0	258	0	227	0
Pokor Keben Soi	93	0	109	0	125	0	127	0	172	0	151	0
Kisanana	50	0	60	0	67	0	69	0	94	0	82	0
Endorois	185	0	206	0	251	0	239	0	354	0	284	0
Chapchap	91	102	112	0	123	225	133	0	169	386	162	0
Marigat	210	434	264	1	280	829	316	2	387	1,287	385	3
Loboi	86	0	100	0	114	0	116	0	158	0	138	0
Mukutani	81	0	95	0	110	0	110	0	152	0	130	0
Njemps	176	0	206	0	235	0	239	0	324	0	284	0
Korosi(Ribkwo)	212	0	248	0	283	51	290	0	390	71	344	0
Loiyamarok	154	0	181	0	206	0	210	0	284	0	249	0
Ribkwo	379	0	445	0	507	0	516	0	700	0	613	0
Tiriko	31	0	36	0	41	0	41	0	56	0	49	0

4 Action Plan

4.1 Urban Water Supply

Urban Name	Population	Present Raw Water Source	Future Raw Water Source	G/P	Pipe line (km)	Pump lift (m)	Cost 1000 US$
Kabarnet	34,700	Boreholes (C4722,3506)	Kirandich Dam	p	5.8	250	27,324
Maji Mazuri	19,200	Maji Mazuri River	Maji Mazuri river	g	4.5	0	5,180
Eldama Ravine	20,700	Chemususu River	Chemususu Dam	g	12.7	0	26,552
Mogotio	10,700	Molo River	Molo river /Chemususu Dam	g	3.3	0	6,011
Marigat	8,600	Parkerra River/ Chemeron dam	Perkerra river	g	1.7	0	2,549

g: gravity p; pump

4.2 Small Scale Irrigation Scheme

Scheme Name	Area (ha)	Farmers No (Nos)	Division	Location	Type of Project	Imp. Agency	Cost million Kshs	Basin
Salabani	31	40	?	?	Irrigation	FARMERS	10	2EH
Kaplenikoi	0	0	?	?	Irrigation	?	?	?
Kerio	0	0	?	?	Irrigation	?	?	?
Kerio Downst	0	0	?	?	Irrigation	?	?	?
Lake Baringo	0	0	?	?	Irrigation	?	?	?

4.3 Large Scale Irrigation Project

Project	Area (ha)	Water Source	Water Demand (MCM)	Cost (million) US$	Cost (million) K£	Major Crops
-	-	-	-	-	-	-

4.4 Hydropower Development

Project	Description	Executing Agency	Cost(million) US$	Cost(million) K£	Implementation Schedule 93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10
-	-	-	-	-																		

★ Design ☆ Study ● Construction

4.5 Flood Mitigation Project

Project	Description	Executing Agency	Cost(million) US$	Cost(million) K£	Implementation Schedule 93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10
-	-	-	-	-																		

★ Design ☆ Study ● Construction

4.6 Urban Drainage and Ad-hoc River Improvement Projects

Project	Population	Area (Km2)	Executing Agency	Cost (million) US$	Cost (million) K£	Implementation Schedule 93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Kabarnet	9,400	0.2	MOLG	1.3	1.6													☆	☆	☆	●	●	●

★ Design ☆ Study ● Construction

4.7 Dam Development Plan

Damsites	C.A. (km2)	Purpose	FSL (El. m)	Storage (MCM)	Yield (m3/s)	Height (m)	Cost (1,000US$)
Chemususu	63	W	2338	11.0	0.41	45	20,197
Kirandich	28	W	1776	4.5	0.13	50	20,000

W:Water Supply I:Irrigation P: Power

4.8 Groundwater Development Projects

Proposed Numbers Drinking (B/H+D)	Proposed Numbers Drinking (S/W+H)	Proposed Numbers Livestock (B/H+D)	Proposed Numbers Livestock (S/W+H)	Executing Agency	Cost (million) US$	Cost (million) K£	Implementation Schedule 93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10	Remarks
90	114	97	172	MORDASA	35.4	44.6	☆	●	●	●	●														Rural water supply

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4.9 Source Development Plan for Rural Water Supply

District	Source Development Plan: Surface Water	Borehole	Shallow Well	Roof Catch	Small Dam	Subsur-face Dam	Sand Dam	Rock Catch	Existing Pipeline	Total	Implementation Program (%): Up to 2000	2001-2010
- Quantity (m3/d)	4,246	3,907	1,588	1,081	209	50	37	7	1,759	12,884	37.8	62.2
- No. of Facilities	0	119	173	27,659	29	26	17	1	0	28,024		
- Cost (mill.US$)	0	14.21	0.85	16.64	0.18	0.13	0.07	0.02	0	32.09		
(mill.K£)	0	17.91	1.07	20.99	0.23	0.17	0.09	0.02	0	40.47		

4.10 Source Development Plan for Livestock Water Supply

District	Source Development Plan							Total	Implementation Program (%)	
	Surface Water	Borehole	Shallow Well	Small Dam	Subsur-face Dam	Sand Dam	Existing Pipeline		Up to 2000	2001-2010
- Quantity (m3/d)	3,932	3,067	1,574	210	30	26	51	8,890	42.5	57.5
- No. of Facilities	0	97	172	31	16	12	0	328		
- Cost (mill.US$)	0	11.11	0.84	0.18	0.08	0.05	0	12.25		
(mill.K£)	0	14.01	1.05	0.23	0.1	0.07	0	15.45		

4.11 Watering Points in Nomadic Pasturage Area

Asumed Nomadic Pasturage Area (km2)	No. of Watering Points (Nos)	Executing Agency	Cost (million)		Implementaion of Watering Points (No.)	
			US$	K£	up to 2000	2001-2010
7,087	11	MOWD	1.9	2.4	3	8

5 Future Water Resources Developmet Potential and Study Proposal

5.1 Potential Water Source for Future Development

Potential Water Source for Future Development	Purpose	Schemes		
		Water Supply	Irrigation	Hydropower
Waseges Dam	W	Rural	-	-
Aram Dam	W	Marigat	-	-
Ratat Dam	W	Marigat	-	-

W:Water Supply I:Irrigation P: Power

5.2 River Basin Developmetn Study

Description	Executing Agency	Cost (million)		Implementation Schedule																
		US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Kerio River Basin Study (Update)	KUDA	2.0	2.5					☆	☆	☆											

★ Design ☆ Study ● Construction

5.3 District Water Resource Study

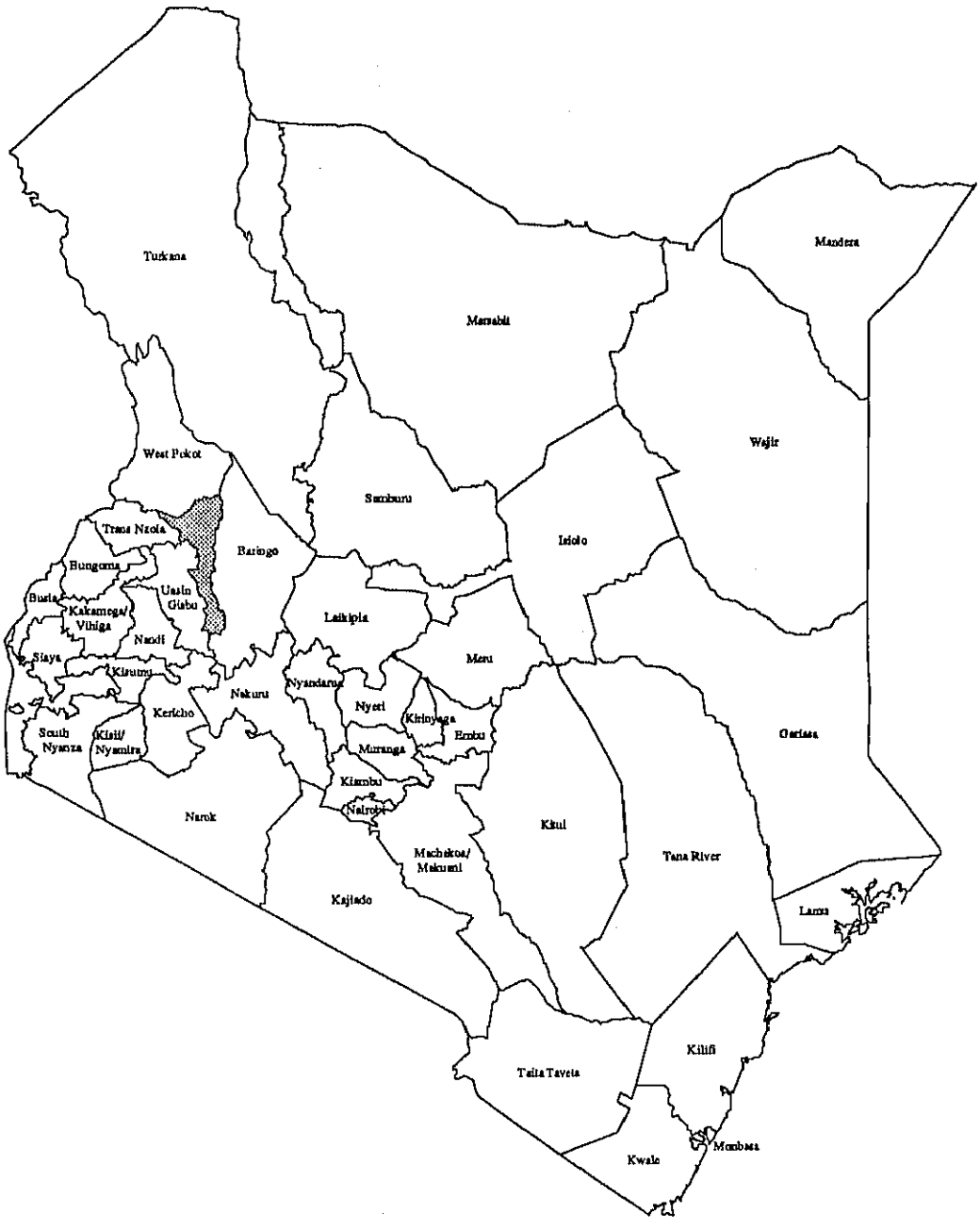
Related Basin Study Proposed	Remarks	Executing Agency	Cost (million)		Implementation Schedule																
			US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
	(WRAP completed)	MOWD	-	-																		

☆ Study

○ River Basin Study (proposed under separate programme)

Elgeyo Marakwet

District



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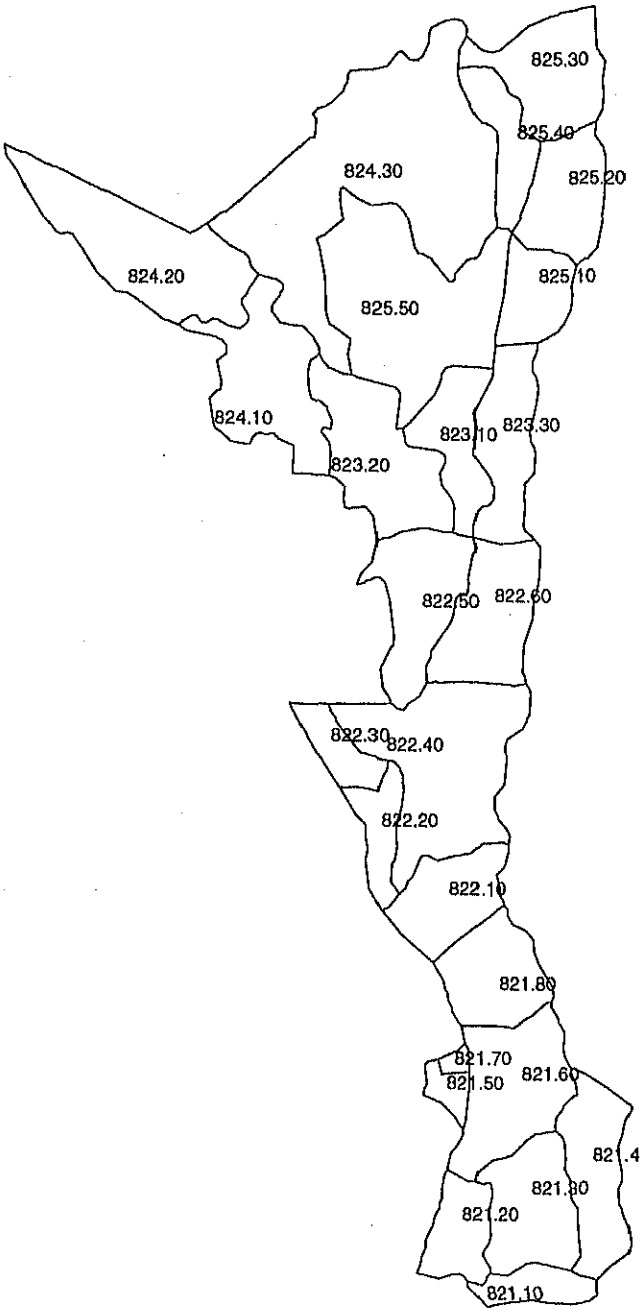
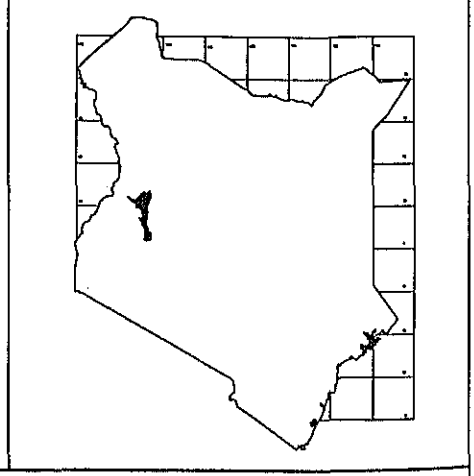


Code	Location	Population
821.1	Metkei	3,118
821.2	Kamwosor	5,848
821.3	Kocholwa	3,280
821.4	Chemoiben	1,788
821.5	Marichor	7,176
821.6	Soy	5,243
821.7	Mosop	5,897
821.8	Kibargoi	1,845
822.1	Kitany	5,896
822.2	Mutei	4,822
822.3	Irong	4,252
822.4	Kiptuilong	10,075
822.5	Kapchemutwa	8,112
822.6	Keu	2,189
823.1	Koibarak	6,918
823.2	Moiben	8,388
823.3	Arror	5,233
824.1	Cherangani	7,359
824.2	Sengwer	8,590
824.3	Lelan	5,348
825.1	Mon	5,279
825.2	Mokoro	6,315
825.3	Endo	9,449
825.4	Embobut	4,354
825.5	Sambirir	12,094



820 Elgeyo Marakwet

THE STUDY
ON
THE NATIONAL WATER MASTER PLAN

JAPAN INTERNATIONAL COOPERATION AGENCY

1. Socio-Economic Profile : 820 Elgeyo Marakwet District

1-1 Population Projection

(Unit:1000)

Code	Location	Land Area (sq.km)	Town Name	1990			2000			2010		
				Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural
820	Elgeyo Marakwet	2,725		227.3	6.1	221.2	300.6	13.6	287.0	363.2	20.5	342.7
821.1	Metkei	36		4.6	-	4.6	6.0	-	6.0	7.2	-	7.2
821.2	Kamwosor	57		8.7	-	8.7	11.3	-	11.3	13.5	-	13.5
821.3	Kocholwa	104		4.9	-	4.9	6.3	-	6.3	7.6	-	7.6
821.4	Chemoiben	99		2.7	-	2.7	3.4	-	3.4	4.1	-	4.1
821.5	Marichor	17	Chepkorio	10.7	-	10.7	14.1	0.3	13.8	16.9	0.4	16.5
821.6	Soy	131		7.8	-	7.8	10.1	-	10.1	12.1	-	12.1
821.7	Mosop	7		8.8	-	8.8	11.4	-	11.4	13.6	-	13.6
821.8	Kibargoi	92		2.7	-	2.7	3.6	-	3.6	4.2	-	4.2
822.1	Kitany	85		8.8	-	8.8	11.4	-	11.4	13.6	-	13.6
822.2	Mutei	41		7.2	-	7.2	9.3	-	9.3	11.1	-	11.1
822.3	Irong	35		6.3	-	6.3	8.2	-	8.2	9.8	-	9.8
822.4	Kiptuilong	214	Iten+Tambach	21.1	6.1	15.0	32.4	12.9	19.4	42.8	19.6	23.2
822.5	Kapchemutwa	111		12.1	-	12.1	15.6	-	15.6	18.7	-	18.7
822.6	Keu	111		3.3	-	3.3	4.2	-	4.2	5.0	-	5.0
823.1	Koibarak	75	Kapsowar	10.3	-	10.3	13.5	0.1	13.3	16.1	0.2	15.9
823.2	Moiben	136	Chebiemit	12.5	-	12.5	16.4	0.3	16.2	19.6	0.3	19.3
823.3	Arror	95		7.8	-	7.8	10.1	-	10.1	12.0	-	12.0
824.1	Cherangani	139		10.9	-	10.9	14.2	-	14.2	16.9	-	16.9
824.2	Sengwer	177		12.8	-	12.8	16.6	-	16.6	19.8	-	19.8
824.3	Lelan	401		7.9	-	7.9	10.3	-	10.3	12.3	-	12.3
825.1	Mon	61		7.8	-	7.8	10.2	-	10.2	12.2	-	12.2
825.2	Mokoro	86		9.4	-	9.4	12.2	-	12.2	14.5	-	14.5
825.3	Endo	110		14.0	-	14.0	18.2	-	18.2	21.8	-	21.8
825.4	Embobut	60		6.5	-	6.5	8.4	-	8.4	10.0	-	10.0
825.5	Sambirir	245		18.0	-	18.0	23.3	-	23.3	27.8	-	27.8

1-2 GRDP Projection

Item	1990	2000	2010
1) GRDP (K.Pound million)	38.3	78.4	117.2
Percentage to GDP	0.5%	0.6%	0.6%
2) GRDP per Capita (K.Pound)	168.4	260.7	322.7
Ratio to GDP per capita	0.49	0.58	0.64
Urban (K.Pound)	223.8	271.6	336.1
Rural (K.Pound)	166.8	260.4	322.3

1-3 Present District Profile (1990)

1) Agricultural Production (1989)

Product	Production	Unit
Maize	84,105	tons
Sorghum/Millet	8,510	tons
Potato	43,700	tons
Rice	-	tons
Wheat/Barley	8,100	tons
Coffee	-	tons
Tea	-	tons
Milk	N.A	tons
Meat	402	tons

2) Number of Manufacturing Establishments (1986)

Type of Industry	Number
Food	1
Textile	0
Wood	5
Paper	0
Chemical	0
Non-metal	0
Metal	0
Machinery	0
Others	0
Total	6

3) Water Supply Schemes in Service Centre

Piped system	16
Communal water points	7
Other sources	15

4) Educational Facilities

Primary school	249
Secondary school	43
Institute	6

5) Medical Facilities

Hospital	2
Health Centre	5
Dispensary	8
Others	0

6) Out-patient of Infective Diseases in Relation to Water Supplies (1985-89 Average)

Diarrhoeal Diseases	11,011
Leprosy	11
Infectious Hepatitis	48
Bilharzia	285
Eye Infections	4,665

2. Land and resources

2.1 Present Land Use

Unit : km2

Total Area	Land Area	Water Area	Forest & Park	Swamp	Town	Barrenland	Agriculture Land	Other Land
2,722	2,722	0	900	40	85	0	1,328	369

2.2 Rain fall

Unit : mm

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
28	39	74	154	139	80	126	120	70	72	95	39	1,039

2.3 River Flow

Unit : m3/sec

Gauge Code	Catchment Area (km2)	Mean Flow	Low Flow Frequency			
			80%	90%	95%	Min.
2C 05	185	2.1	0.4	0.4	0.3	0.3
2C 07	893	15.9	4.3	3.5	3.2	2.5
2C 12	133	5.0	2.0	1.6	1.5	1.3

2.4 Groundwater

Aquifer Characteristics

Elevation (m)	Total Depth (m)	Water Struck (m)	Level Rest (m)	Yield (m3/hr)	Draw Down (m)
1320.3	111.86	67.07	38.36	4.87	32.03

Safe Abstruction Yield

Unit : m3/year

Borehole	Shallow	Total
460,032	2,465,072	2,925,104

2.5 Agriculture

Suitable Area for Major Crops

Unit: km2

Maize	Wheat	Rice	Sorghum	Potato	Coffee	Tea
329	180	0	378	452	0	38

Area of Irrigation Potential

Unit : ha

Surfce Water		Groundwater	
Upland	Lowland	Upland	Lowland
8,688	6,002	15.8	5.7

Livestock Population

Unit: 1,000

Cattle	Sheep/Goats	Camels	Donkeys
152.44	314.21	3.70	5.90

3 Water Demand Projection

Unit: cu.m/day

Location	1990				2000				2010			
	Rural	Urban	Livestock	Industry	Rural	Urban	Livestock	Industry	Rural	Urban	Livestock	Industry
Elgeyo Marakwet District	6,081	882	6,382	62	9,177	2,005	10,558	114	14,036	3,074	16,625	166
Metkei	160	0	133	0	251	0	219	0	405	0	343	0
Kamwosor	295	0	249	0	462	0	410	0	741	0	643	0
Kocholwa	98	0	140	0	139	0	230	0	193	0	361	0
Chemoiben	54	0	76	0	75	0	125	0	102	0	197	0
Marichor	352	0	305	0	549	44	506	0	877	58	794	0
Soy	156	0	223	1	218	0	367	2	299	0	577	3
Mosop	250	0	251	0	380	0	413	0	590	0	649	0
Kibargoi	55	0	79	0	76	0	129	0	103	0	203	0
Kitany	174	0	251	0	243	0	413	0	331	0	649	0
Mutei	195	0	205	0	296	0	338	0	452	0	530	0
Irong	181	0	181	0	271	0	298	0	409	0	468	0
Kiptuilong	324	882	473	2	463	1,906	824	3	656	2,942	1,343	5
Kapchemutwa	369	0	345	0	570	0	569	0	896	0	892	0
Keu	64	0	93	0	90	0	153	0	123	0	241	0
Koibarak	261	0	295	57	386	17	486	105	573	23	763	152
Moiben	448	0	357	1	708	38	590	2	1,148	51	927	3
Arror	154	0	223	1	215	0	367	2	293	0	576	3
Cherangani	386	0	313	0	608	0	516	0	980	0	810	0
Sengwer	449	0	366	0	706	0	602	0	1,138	0	945	0
Lelan	277	0	228	0	437	0	375	0	703	0	588	0
Mon	155	0	225	0	216	0	370	0	295	0	581	0
Mokoro	186	0	269	0	259	0	443	0	354	0	695	0
Endo	287	0	402	0	403	0	662	0	558	0	1,040	0
Embobut	138	0	185	0	195	0	305	0	273	0	479	0
Sambirir	613	0	515	0	961	0	848	0	1,544	0	1,331	0

4 Action Plan

4.1 Urban Water Supply

Urban Name	Population	Present Raw Water Source	Future Raw Water Source	G/P	Pipe line (km)	Pump lift (m)	Cost 1000 US$
Iten+Tambach	19,700	Kamariny Spring	Moiben Dam	p	35.2	40	12,727

g: gravity p: pump

4.2 Small Scale Irrigation Scheme

Scheme Name	Area (ha)	Farmers No. (Nos)	Division	Location	Type of Project	Imp. Agency	Cost million Kshs	Basin
-	-	-	-	-	-	-	-	-

4.3 Large Scale Irrigation Project

Project	Area (ha)	Water Source	Water Demand (MCM)	Cost (million)		Major Crops
				US$	K£	
Arror	1,340	Arror River	21.6	6.3	7.9	Banana, Cassava, finger millet

4.4 Hydropower Development

Project	Description	Executing Agency	Cost(million)		Implementation Schedule																
			US$	K£	93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10
-	-	-	-	-																		

★ Design ☆ Study ● Construction

4.5 Flood Mitigation Project

Project	Description	Executing Agency	Cost(million)		Implementation Schedule																
			US$	K£	93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10
-	-	-	-	-																		

★ Design ☆ Study ● Construction

4.6 Urban Drainage and Ad-hoc River Improvement Projects

Project	Population	Area (Km2)	Executing Agency	Cost (million)		Implementation Schedule															
				US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Iten	6,300	0.3	MOLG	2.6	3.3													☆	☆	☆	●	●	●

★ Design ☆ Study ● Construction

4.7 Dam Development Plan

Damsites	C.A. (km2)	Purpose	FSL (El. m)	Storage (MCM)	Yield (m3/s)	Height (m)	Cost (1,000US$)
Moiben	188	W	2362	19.6	0.68	42	14,724

W:Water Supply I:Irrigation P: Power

4.8 Groundwater Development Projects

Proposed Numbers				Executing Agency	Cost (million)		Implementation Schedule															Remarks
Drinking		Livestock																				
(B/H+D)	(S/W+H)	(B/H+D)	(S/W+H)		US$	K£	93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10	
65	490	63	675	MORDASA	34.4	43.3	☆	●	●	●	●	●													Rural water supply

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4.9 Source Development Plan for Rural Water Supply

District	Source Development Plan									Total	Implementation Program (%)	
	Surface Water	Borehole	Shallow Well	Roof Catch	Small Dam	Subsur-face Dam	Sand Dam	Rock Catch	Existing Pipeline		Up to 2000	2001-2010
- Quantity (m3/d)	6,769	1,751	3,475	503	272	15	0	9	1,193	13,987	38.9	61.1
- No. of Facilities	0	68	628	12,995	23	3	0	1	0	13,718		
- Cost (mill.US$)	0	6.74	3.11	7.78	0.22	0.04	0	0.02	0	17.91		
(mill.K£)	0	8.5	3.92	9.81	0.27	0.05	0	0.02	0	22.58		

4.10 Source Development Plan for Livestock Water Supply

District	Source Development Plan							Total	Implementation Program (%)	
	Surface Water	Borehole	Shallow Well	Small Dam	Subsur-face Dam	Sand Dam	Existing Pipeline		Up to 2000	2001-2010
- Quantity (m3/d)	9,895	1,730	4,028	455	24	0	207	16,339	40.8	59.2
- No. of Facilities	0	63	675	25	3	0	0	766		
- Cost (mill.US$)	0	6.61	3.46	0.39	0.07	0	0	10.52		
(mill.K£)	0	8.33	4.36	0.49	0.09	0	0	13.27		

4.11 Watering Points in Nomadic Pasturage Area

Asumed Nomadic Pasturage Area (km2)	No. of Watering Points (Nos)	Executing Agency	Cost (million)		Implementaion of Watering Points (No.)	
			US$	K£	up to 2000	2001-2010
-	-	-	-	-	-	-

5 Future Water Resources Developmet Potential and Study Proposal

5.1 Potential Water Source for Future Development

Potential Water Source for Future Development	Purpose	Schemes		
		Water Supply	Irrigation	Hydropower
Kipsang Dam	W	Rural	-	-
Kimwarer Dam	W+P+I	-	Kimwarer	Kimwarer
Sererwa Dam	P+I+W	Rural	Arror	Arror
Arror Dam	W	Rural	-	-

W:Water Supply I:Irrigation P: Power

5.2 River Basin Developmetn Study

Description	Executing Agency	Cost (million)		Implementation Schedule																
		US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Kerio River Basin Study (Update)	KUDA	2.0	2.5					☆	☆	☆											

★ Design ☆ Study ● Construction

5.3 District Water Resource Study

Related Basin Study Proposed	Remarks	Executing Agency	Cost (million)		Implementation Schedule																
			US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Kerio	(WRAP completed)	MOWD	-	-																		

☆ Study

o River Basin Study (proposed under separate programme)

Nandi

District

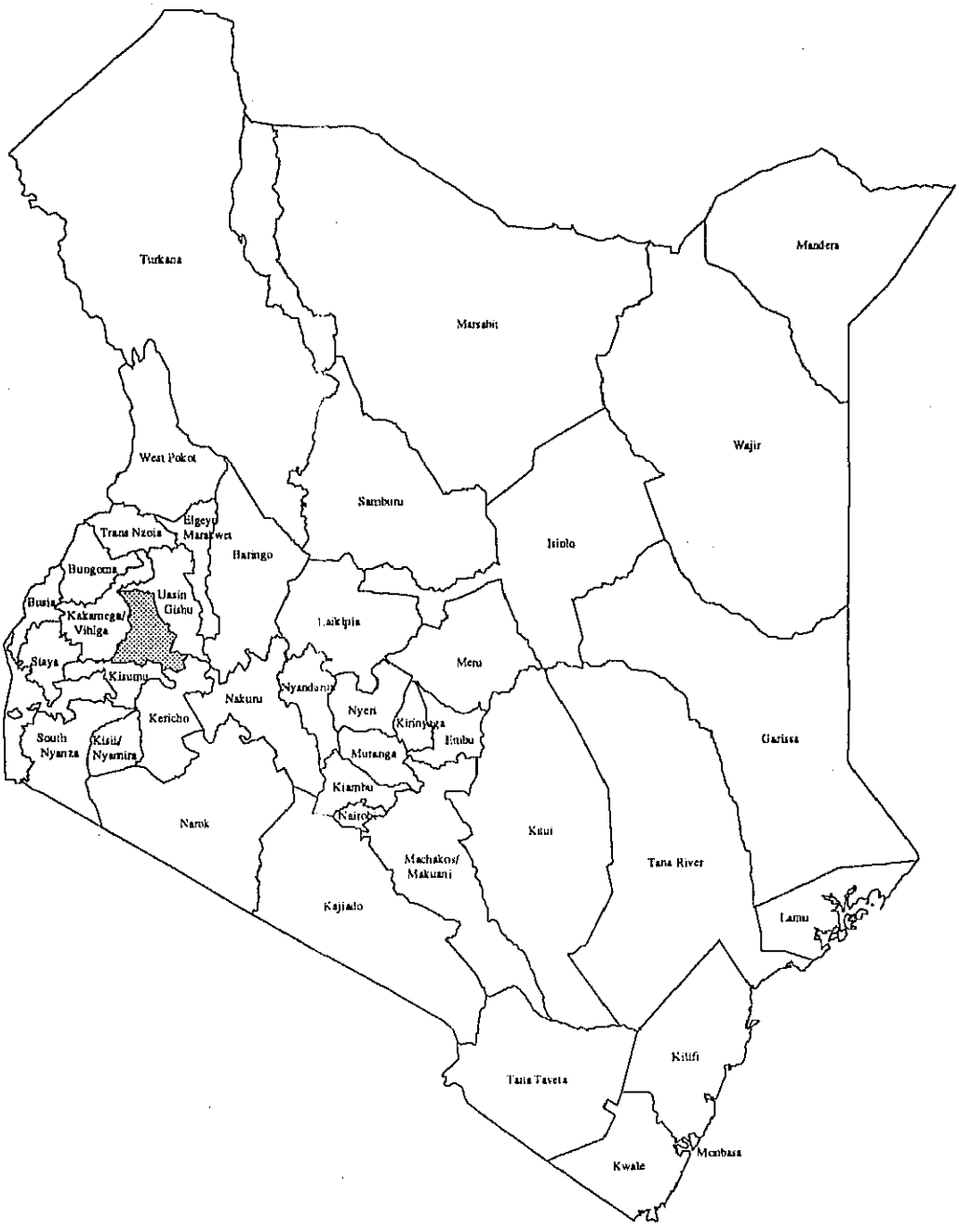
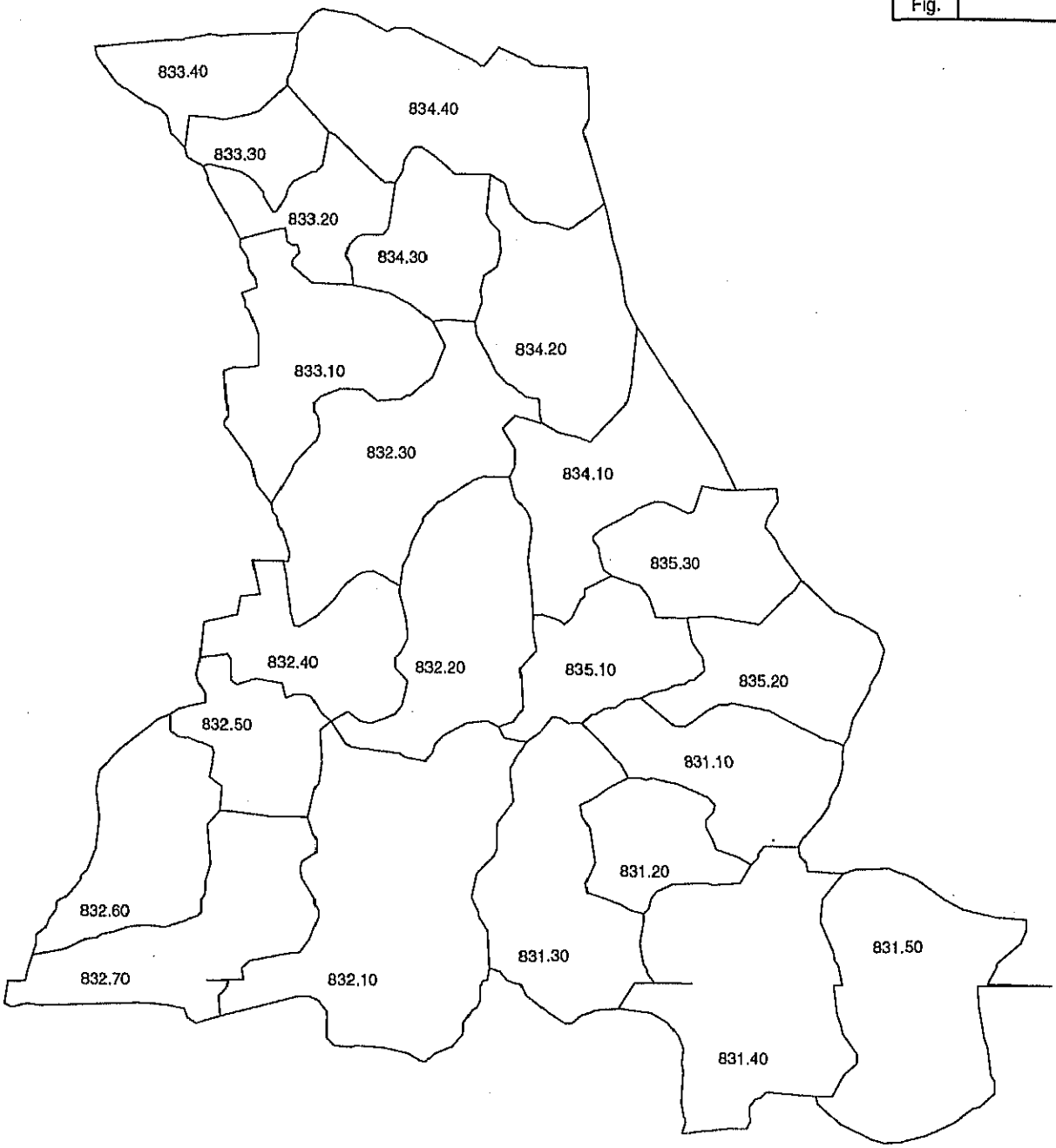
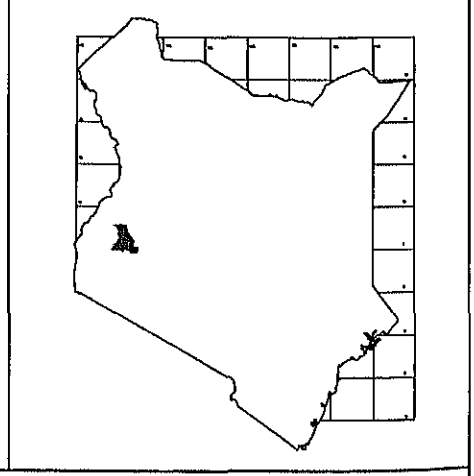


Fig.



Code	Location	Population
831.1	Mogobich	28,460
831.2	Chebarus	9,956
831.3	Chemelil	7,701
831.4	Songhor	13,847
831.5	Miteitei	10,611
832.1	Kaputumo	22,945
832.2	Chemundu	22,186
832.3	Kaptel	13,310
832.4	Kapkangani	14,180
832.5	Chepkumia	14,560
832.6	Kemeloi	26,576
832.7	Maraba	15,862
833.1	Sangalo	4,900
833.2	Kurgung	8,369
833.3	Kipngoror	4,244
833.4	Chepterwai	6,003
834.1	Kostrai	13,311
834.2	Lelmokwo	10,822
834.3	Kabiyet	9,906
834.4	Kabemit	12,228
835.1	Kaplamai	9,362
835.2	Olessos	12,363
835.3	Kilibwoni	7,618



830 Nandi

THE STUDY
ON
THE NATIONAL WATER MASTER PLAN

JAPAN INTERNATIONAL COOPERATION AGENCY

1. Socio-Economic Profile : 830 Nandi District

1-1 Population Projection

(Unit:1000)

Code	Location	Land Area (sq.km)	Town Name	1990 Total	1990 Urban	1990 Rural	2000 Total	2000 Urban	2000 Rural	2010 Total	2010 Urban	2010 Rural
830	Nandi District	2,745		473.3	14.5	458.8	637.9	38.5	599.4	783.8	64.2	719.7
831.1	Mogobich	108		44.1	0.0	44.1	57.6	0.0	57.6	69.1	0.0	69.1
831.2	Chebarus	66		15.4	0.0	15.4	20.1	0.0	20.1	24.2	0.0	24.2
831.3	Chemelil	147	Nandi Hills	13.2	1.3	11.9	18.3	2.7	15.6	22.9	4.2	18.7
831.4	Songhor	196		21.4	0.0	21.4	28.0	0.0	28.0	33.6	0.0	33.6
831.5	Miteitei	177		16.4	0.0	16.4	21.5	0.0	21.5	25.8	0.0	25.8
832.1	Kaptumo	265	Kaptumo	35.5	0.0	35.5	46.8	0.4	46.4	56.2	0.5	55.7
832.2	Chemundu	143	Kapsabet+Baraton	43.0	13.2	29.8	72.0	33.0	38.9	103.0	56.2	46.7
832.3	Kaptel	172		20.6	0.0	20.6	26.9	0.0	26.9	32.3	0.0	32.3
832.4	Kapkangani	93		22.0	0.0	22.0	28.7	0.0	28.7	34.4	0.0	34.4
832.5	Chepkumia	72		22.5	0.0	22.5	29.4	0.0	29.4	35.4	0.0	35.4
832.6	Kemeloi	111		41.1	0.0	41.1	53.8	0.0	53.8	64.5	0.0	64.5
832.7	Maraba	135	Kabunjoi	24.6	0.0	24.6	32.7	0.6	32.1	39.3	0.8	38.5
833.1	Sangalo	128		7.6	0.0	7.6	9.9	0.0	9.9	11.9	0.0	11.9
833.2	Kurgung	61		13.0	0.0	13.0	16.9	0.0	16.9	20.3	0.0	20.3
833.3	Kipngoror	43		6.6	0.0	6.6	8.6	0.0	8.6	10.3	0.0	10.3
833.4	Chepterwai	60		9.3	0.0	9.3	12.1	0.0	12.1	14.6	0.0	14.6
834.1	Kosirai	126	Cheptarit	20.6	0.0	20.6	27.4	0.5	26.9	33.0	0.7	32.3
834.2	Lelmokwo	123		16.8	0.0	16.8	21.9	0.0	21.9	26.3	0.0	26.3
834.3	Kabiyet	76	Kabiyet	15.3	0.0	15.3	20.5	0.5	20.0	24.8	0.7	24.1
834.4	Kabiemit	179		18.9	0.0	18.9	24.7	0.0	24.7	29.7	0.0	29.7
835.1	Kaplamai	82		14.5	0.0	14.5	18.9	0.0	18.9	22.7	0.0	22.7
835.2	Olessos	93	Olessos	19.1	0.0	19.1	25.7	0.7	25.0	31.0	1.0	30.0
835.3	Kilibwoni	89		11.8	0.0	11.8	15.4	0.0	15.4	18.5	0.0	18.5

1-2 GRDP Projection

Item	1990	2000	2010
1) GRDP (K.Pound million)	74.1	134.0	192.5
Percentage to GDP	1.0%	1.0%	0.9%
2) GRDP per Capita (K.Pound)	156.6	210.1	245.5
Ratio to GDP per capita	0.46	0.47	0.48
Urban (K.Pound)	854.7	609.0	559.4
Rural (K.Pound)	134.5	184.5	217.5

1-3 Present District Profile (1990)

1) Agricultural Production (1989)

Product	Production	Unit
Maize	28,689	tons
Sorghum/Millet	5,655	tons
Potato	11,008	tons
Rice	-	tons
Wheat/Barley	400	tons
Coffee	82	tons
Tea	5,242	tons
Milk	26,603	tons
Meat	-	tons

2) Number of Manufacturing Establishments (1986)

Type of Industry	Number
Food	15
Textile	0
Wood	1
Paper	0
Chemical	0
Non-metal	0
Metal	0
Machinery	0
Others	0
Total	16

3) Water Supply Schemes in Service Centre

Piped system	13
Communal water points	0
Other sources	18

4) Educational Facilities

Primary school	399
Secondary school	59
Institute	19

5) Medical Facilities

Hospital	2
Health Centre	11
Dispensary	41
Others	0

6) Out-patient of Infective Diseases in Relation to Water Supplies (1985-89 Average)

Diarrhoeal Diseases	24,444
Leprosy	16
Infectious Hepatitis	114
Bilharzia	683
Eye Infections	12,347

2. Land and resources

2.1 Present Land Use

Unit : km2

Total Area	Land Area	Water Area	Forest & Park	Swamp	Town	Barrenland	Agriculture Land	Other Land
2,745	2,745	0	415	0	4	0	171	2,155

2.2 Rain fall

Unit : mm

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
63	77	130	207	179	135	148	174	127	104	116	60	1,524

2.3 River Flow

Unit : m3/sec

Gauge Code	Catchment Area (km2)	Mean Flow	Low Flow Frequency			
			80%	90%	95%	Min.
1FE02	1577	16.4	10.3	8.2	7.1	4.1

2.4 Groundwater

Aquifer Characteristics

Elevation (m)	Total Depth (m)	Water Struck (m)	Level Rest (m)	Yield (m3/hr)	Draw Down (m)
1523.5	95.1	45.75	15.67	6.04	39.8

Safe Abstruction Yield

Unit : m3/year

Borehole	Shallow	Total
468,245	1,663,833	2,132,078

2.5 Agriculture

Suitable Area for Major Crops

Unit: km2

Maize	Wheat	Rice	Sorghum	Potato	Coffee	Tea
2,002	653	10	871	1,055	414	735

Area of Irrigation Potential

Unit : ha

Surfce Water		Groundwater	
Upland	Lowland	Upland	Lowland
12,709	5,226	32.9	4.4

Livestock Population

Unit: 1,000

Cattle	Sheep/Goats	Camels	Donkeys
363.75	63.99	-	-

3 Water Demand Projection

Unit: cu.m/day

Location	1990				2000				2010			
	Rural	Urban	Livestock	Industry	Rural	Urban	Livestock	Industry	Rural	Urban	Livestock	Industry
Nandi District	14,282	2,097	9,044	855	22,091	5,671	11,058	1,581	34,794	9,631	12,929	2,278
Mogobich	1,546	0	862	0	2,446	0	1,045	0	3,962	0	1,215	0
Chebarus	553	0	301	0	880	0	366	0	1,434	0	425	0
Chemelil	411	188	240	683	648	399	295	1,264	1,046	624	347	1,820
Songhor	660	0	419	0	1,023	0	508	0	1,618	0	591	0
Miteitei	584	0	321	0	927	0	390	0	1,507	0	453	0
Kaputumo	1,238	0	695	0	1,956	57	844	0	3,163	80	981	0
Chemundu	940	1,909	647	115	1,452	4,870	857	212	2,282	8,440	1,068	306
Kaptel	603	0	403	0	915	0	489	0	1,407	0	568	0
Kapkangani	786	0	429	0	1,249	0	521	0	2,035	0	605	0
Chepkumia	807	0	441	0	1,283	0	535	0	2,090	0	621	0
Kemeloi	1,493	0	805	0	2,381	0	976	0	3,892	0	1,134	0
Maraba	892	0	480	0	1,421	87	585	0	2,323	123	681	0
Sangalo	238	0	148	0	366	0	180	0	574	0	209	0
Kurgung	284	0	253	0	405	0	307	0	575	0	357	0
Kipngoror	142	0	129	0	202	0	156	0	286	0	181	0
Chepterwai	208	0	182	0	301	0	220	0	429	0	256	0
Kosirai	552	0	403	0	815	76	491	0	1,205	107	571	0
Lelmokwo	395	0	328	0	572	0	397	0	821	0	462	0
Kabiyet	320	0	300	0	453	75	366	0	632	106	426	0
Kabemit	386	0	370	0	547	0	449	0	755	0	522	0
Kaplamai	408	0	283	0	611	0	344	0	922	0	399	0
Olessos	520	0	374	57	771	106	457	105	1,146	150	532	152
Kilibwoni	316	0	231	0	467	0	280	0	690	0	325	0

4 Action Plan

4.1 Urban Water Supply

Urban Name	Population	Present Raw Water Source	Future Raw Water Source	G/P	Pipe line (km)	Pump lift (m)	Cost 1000 US$
Nandi Hills	4,200	Taito River	Mokong River	p	7	170	4,008
Kapsabet+Baraton	56,300	Kabutie River	Mokong river	p	8.8	170	11,817

g: gravity p: pump

4.2 Small Scale Irrigation Scheme

Scheme Name	Area (ha)	Farmers No (Nos)	Division	Location	Type of Project	Imp. Agency	Cost million Kshs	Basin
-	-	-	-	-	-	-	-	-

4.3 Large Scale Irrigation Project

Project	Area (ha)	Water Source	Water Demand (MCM)	Cost (million)		Major Crops
				US$	K£	
-	-	-	-	-	-	-

4.4 Hydropower Development

Project	Description	Executing Agency	Cost(million)		Implementation Schedule																	
			US$	K£	93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10
-	-	-	-	-																		

★ Design ☆ Study ● Construction

4.5 Flood Mitigation Project

Project	Description	Executing Agency	Cost(million)		Implementation Schedule																	
			US$	K£	93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10
-	-	-	-	-																		

★ Design ☆ Study ● Construction

4.6 Urban Drainage and Ad-hoc River Improvement Projects

Project	Population	Area (Km2)	Executing Agency	Cost (million)		Implementation Schedule																
				US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Kapsabet/Baraton	13,400	1.6	MOLG	13.1	16.5													☆	☆	☆	●	●	●

★ Design ☆ Study ● Construction

4.7 Dam Development Plan

Damsites	C.A. (km2)	Purpose	FSL (El. m)	Storage (MCM)	Yield (m3/s)	Height (m)	Cost (1,000US$)
Kibos	179	W	1482	7.1	0.95	39	23,836

W:Water Supply I:Irrigation P: Power

4.8 Groundwater Development Projects

Proposed Numbers				Executing Agency	Cost (million)		Implementation Schedule																Remarks
Drinking		Livestock																					
(B/H+D)	(S/W+H)	(B/H+D)	(S/W+H)		US$	K£	93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10	
25	340	0	0	MOCSS	6.0	7.6			☆	●	●														Small communication supply

★ Design ☆ Study ● Construction

4.9 Source Development Plan for Rural Water Supply

District	Source Development Plan									Total	Implementation Program (%)	
	Surface Water	Borehole	Shallow Well	Roof Catch	Small Dam	Subsur-face Dam	Sand Dam	Rock Catch	Existing Pipeline		Up to 2000	2001-2010
- Quantity (m3/d)	31,085	481	1,679	0	1,130	0	0	0	375	34,750	38.1	61.9
- No. of Facilities	0	25	340	0	23	0	0	0	0	388		
- Cost (mill.US$)	0	1.85	1.62	0	0.63	0	0	0	0	4.1		
(mill.K£)	0	2.33	2.04	0	0.79	0	0	0	0	5.17		

4.10 Source Development Plan for Livestock Water Supply

District	Source Development Plan							Total	Implementation Program (%)	
	Surface Water	Borehole	Shallow Well	Small Dam	Subsur-face Dam	Sand Dam	Existing Pipeline		Up to 2000	2001-2010
- Quantity (m3/d)	12,211	0	0	414	0	0	0	12,625	51.8	48.2
- No. of Facilities	0	0	0	23	0	0	0	23		
- Cost (mill.US$)	0	0	0	0.22	0	0	0	0.22		
(mill.K£)	0	0	0	0.28	0	0	0	0.28		

4.11 Watering Points in Nomadic Pasturage Area

Asumed Nomadic Pasturage Area (km2)	No. of Watering Points (Nos)	Executing Agency	Cost (million)		Implementaion of Watering Points (No.)	
			US$	K£	up to 2000	2001-2010
1,690	3	MOWD	0.5	0.6	1	2

5 Future Water Resources Developmet Potential and Study Proposal

5.1 Potential Water Source for Future Development

Potential Water Source for Future Development	Purpose	Schemes		
		Water Supply	Irrigation	Hydropower
Kimondi Dam	W+I	Kerio Valley	-	-
Nandi Forest Dam	I+P+W	-	Yala Swamp	Nandi Forest

W:Water Supply I:Irrigation P: Power

5.2 River Basin Developmetn Study

Description	Executing Agency	Cost (million)		Implementation Schedule																
		US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Nzoia/Yala River Basin Study	LBDA	3.0	3.8		☆	☆	☆														

★ Design ☆ Study ● Construction

5.3 District Water Resource Study

Related Basin Study Proposed	Remarks	Executing Agency	Cost (million)		Implementation Schedule																
			US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Yala		MOWD	2.0	2.5		o	o	o	☆	☆												

☆ Study

o River Basin Study (proposed under separate programme)

Samburu

District

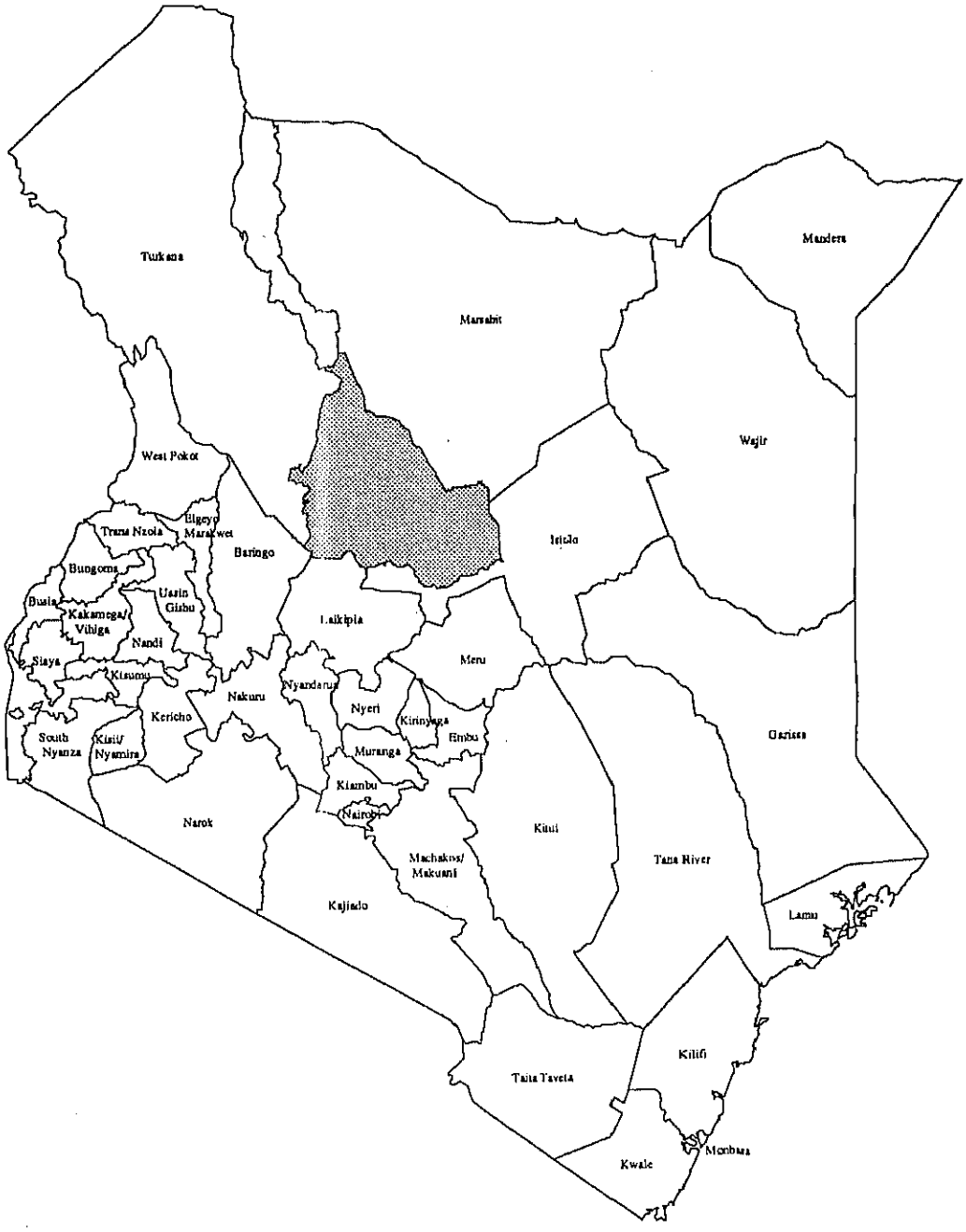
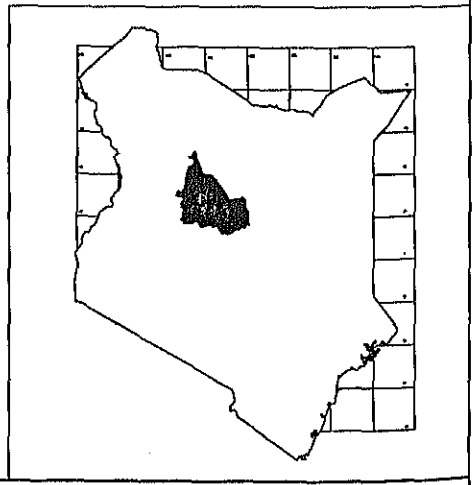


Fig.

Code	Location	Population
841.1	Suguta Marmar	5,395
841.2	Loosuk	2,308
841.3	Poro	2,493
841.4	Maralal Urban	10,230
841.5	Angata Nanyukie	3,264
841.6	Opiroi	2,003
841.7	Kisima	4,210
841.8	Lodokejek	4,850
842.1	Sercleyi	1,374
842.2	Ngilai	5,449
842.3	Lodungokwe	3,753
842.4	Wamba	4,567
842.5	Wasa	3,621
843.1	Marti	2,563
843.2	Nachola	3,428
843.3	Kowop	2,723
843.4	Nyiro	3,877
843.5	Ndooto	3,505
843.6	Elbarta	5,613
843.7	Arsim	1,682



840 Samburu

THE STUDY
ON
THE NATIONAL WATER MASTER PLAN

JAPAN INTERNATIONAL COOPERATION AGENCY

1. Socio-Economic Profile : 840 Samburu District

1-1 Population Projection

(Unit:1000)

Code	Location	Land Area (sq.km)	Town Name	1990			2000			2010		
				Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural
840	Samburu District	20,812		122.3	24.7	97.6	180.2	58.7	121.5	260.3	103.7	156.6
841.1	Suguta Marmar	579		8.5	-	8.5	10.6	-	10.6	13.7	-	13.7
841.2	Loosuk	474		3.6	-	3.6	4.5	-	4.5	5.8	-	5.8
841.3	Poro	538		3.9	-	3.9	4.9	-	4.9	6.3	-	6.3
841.4	Maralal Urban	173	Maralal	17.8	17.8	0.0	42.3	42.3	0.0	74.7	74.7	0.0
841.5	Angata Nanyukie	682		5.2	-	5.2	6.4	-	6.4	8.3	-	8.3
841.6	Opiroi	472		3.2	-	3.2	3.9	-	3.9	5.1	-	5.1
841.7	Kisima	446		6.6	-	6.6	8.3	-	8.3	10.7	-	10.7
841.8	Lodokejek	570		7.7	-	7.7	9.5	-	9.5	12.3	-	12.3
842.1	Serolevi	2,060		2.2	-	2.2	2.7	-	2.7	3.5	-	3.5
842.2	Ngilai	3,234		8.6	-	8.6	10.7	-	10.7	13.8	-	13.8
842.3	Lodungokwe	1,020		5.9	-	5.9	7.4	-	7.4	9.5	-	9.5
842.4	Wamba	803	Wamba	7.3	3.7	3.6	13.3	8.8	4.5	21.4	15.5	5.9
842.5	Wasa	2,827		5.7	-	5.7	7.1	-	7.1	9.2	-	9.2
843.1	Marti	1,192		4.0	-	4.0	5.0	-	5.0	6.5	-	6.5
843.2	Nachola	571		5.4	-	5.4	6.7	-	6.7	8.7	-	8.7
843.3	Kowop	838		4.3	-	4.3	5.4	-	5.4	6.9	-	6.9
843.4	Nyiro	1,262		6.1	-	6.1	7.6	-	7.6	9.8	-	9.8
843.5	Ndooto	1,325		5.5	-	5.5	6.9	-	6.9	8.9	-	8.9
843.6	Elbarta	1,192	Baragoi	8.0	3.2	4.8	13.5	7.6	5.9	21.1	13.4	7.7
843.7	Arsim	554		2.7	-	2.7	3.3	-	3.3	4.3	-	4.3

1-2 GRDP Projection

Item	1990	2000	2010
1) GRDP (K.Pound million)	35.5	67.2	99.4
Percentage to GDP	0.5%	0.5%	0.5%
2) GRDP per Capita (K.Pound)	290.6	372.9	382.0
Ratio to GDP per capita	0.85	0.83	0.75
Urban (K.Pound)	356.0	457.0	468.1
Rural (K.Pound)	274.0	351.7	360.2

1-3 Present District Profile (1990)

1) Agricultural Production (1989)

Product	Production	Unit
Maize	1,808	tons
Sorghum/Millet	-	tons
Potato	480	tons
Rice	-	tons
Wheat/Barley	9,599	tons
Coffee	-	tons
Tea	-	tons
Milk	12,000	tons
Meat	1,073	tons

2) Number of Manufacturing Establishments (1986)

Type of Industry	Number
Food	3
Textile	0
Wood	1
Paper	0
Chemical	0
Non-metal	1
Metal	0
Machinery	0
Others	0
Total	5

3) Water Supply Schemes in Service Centre

Piped system	8
Communal water points	0
Other sources	9

4) Educational Facilities

Primary school	76
Secondary school	4
Institute	5

5) Medical Facilities

Hospital	2
Health Centre	3
Dispensary	16
Others	0

6) Out-patient of Infective Diseases in Relation to Water Supplies (1985-89 Average)

Diarrhoeal Diseases	8,028
Leprosy	1
Infectious Hepatitis	382
Bilharzia	276
Eye Infections	6,233

2. Land and resources

2.1 Present Land Use

Unit : km2

Total Area	Land Area	Water Area	Forest & Park	Swamp	Town	Barrenland	Agriculture Land	Other Land
20,809	20,809	0	3,288	0	13	3,568	50	13,890

2.2 Rain fall

Unit : mm

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
20	21	48	107	54	26	38	40	19	49	80	32	540

2.3 River Flow

Unit : m3/sec

Gauge Code	Catchment Area (km2)	Mean Flow	Low Flow Frequency			
			80%	90%	95%	Min.
-	-	-	-	-	-	-

2.4 Groundwater

Aquifer Characteristics

Elevation (m)	Total Depth (m)	Water Struck (m)	Level Rest (m)	Yield (m3/hr)	Draw Down (m)
1261.37	96.83	64.1	30.88	4.21	57.18

Safe Abstruction Yield

Unit : m3/year

Borehole	Shallow	Total
5,282,985	14,997,422	20,280,407

2.5 Agriculture

Suitable Area for Major Crops

Unit: km2

Maize	Wheat	Rice	Sorghum	Potato	Coffee	Tea
0	253	0	333	0	0	0

Area of Irrigation Potential

Unit : ha

Surfce Water		Groundwater	
Upland	Lowland	Upland	Lowland
1,528	7,830	5.2	9.5

Livestock Population

Unit: 1,000

Cattle	Sheep/Goats	Camels	Donkeys
155.49	451.07	14.03	8.12

3 Water Demand Projection

Unit: cu.m/day

Location	1990				2000				2010			
	Rural	Urban	Livestock	Industry	Rural	Urban	Livestock	Industry	Rural	Urban	Livestock	Industry
Samburu District	2,001	3,572	6,485	241	2,701	8,645	9,472	434	4,025	15,566	14,626	606
Suguta Marmar	169	0	532	57	226	0	737	105	332	0	1,095	152
Loosuk	76	0	228	0	103	0	316	0	155	0	468	0
Poro	83	0	246	0	113	0	341	0	167	0	506	0
Maralal Urban	0	2,574	278	184	0	6,230	735	329	0	11,218	1,497	454
Angata Nanyukie	118	0	322	0	163	0	446	0	252	0	662	0
Opiroi	65	0	198	0	88	0	274	0	132	0	406	0
Kisima	153	0	415	0	212	0	575	0	329	0	854	0
Lodokejek	162	0	478	0	221	0	663	0	334	0	985	0
Serolevi	43	0	136	0	57	0	188	0	85	0	279	0
Ngilai	174	0	537	0	236	0	745	0	351	0	1,106	0
Lodungokwe	117	0	370	0	157	0	513	0	231	0	762	0
Wamba	76	535	286	0	103	1,295	469	0	154	2,332	780	0
Wasa	113	0	357	0	152	0	495	0	223	0	735	0
Marti	81	0	253	0	107	0	350	0	158	0	520	0
Nachola	107	0	338	0	144	0	469	0	211	0	696	0
Kowop	85	0	269	0	114	0	372	0	167	0	553	0
Nyiro	121	0	382	0	162	0	530	0	239	0	787	0
Ndooto	110	0	346	0	147	0	479	0	216	0	711	0
Elbarta	95	462	348	0	126	1,120	545	0	186	2,016	882	0
Arsim	53	0	166	0	70	0	230	0	103	0	342	0

4 Action Plan

4.1 Urban Water Supply

Urban Name	Population	Present Raw Water Source	Future Raw Water Source	G/P	Pipe line (km)	Pump lift (m)	Cost 1000 US$
Maralal	74,800	Nundoto Dam	Loikas/Yamo river	g	9.8	0	16,040
Wamba	15,600	Borehole (C4513)	Boreholes	g	1033	0	81,960
Baragoi	13,500	Boreholes (C4530)	Boreholes + Sub-surface dam	g	1640	0	123,684

g: gravity p: pump

4.2 Small Scale Irrigation Scheme

Scheme Name	Area (ha)	Farmers No (Nos)	Division	Location	Type of Project	Imp. Agency	Cost million Kshs	Basin
South Horr	20	40	Baragoi	South Horr	Irrigation	FARMERS	10	2D

4.3 Large Scale Irrigation Project

Project	Area (ha)	Water Source	Water Demand (MCM)	Cost (million)		Major Crops
				US$	K£	
-	-	-	-	-	-	-

4.4 Hydropower Development

Project	Description	Executing Agency	Cost(million)		Implementation Schedule																
			US$	K£	93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10
-	-	-	-	-																		

★ Design ☆ Study ● Construction

4.5 Flood Mitigation Project

Project	Description	Executing Agency	Cost(million)		Implementation Schedule																
			US$	K£	93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10
-	-	-	-	-																		

★ Design ☆ Study ● Construction

4.6 Urban Drainage and Ad-hoc River Improvement Projects

Project	Population	Area (Km2)	Executing Agency	Cost (million)		Implementation Schedule																
				US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Maralal	17,800	0.7	MOLG	5.6	7.1												☆	☆	☆	●	●	●	

★ Design ☆ Study ● Construction

4.7 Dam Development Plan

Damsites	C.A. (km2)	Purpose	FSL (El. m)	Storage (MCM)	Yield (m3/s)	Height (m)	Cost (1,000US$)
-	-	-	-	-	-	-	-

W:Water Supply I:Irrigation P: Power

4.8 Groundwater Development Projects

Proposed Numbers				Executing Agency	Cost (million)		Implementation Schedule																Remarks
Drinking		Livestock					93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10	
(B/H+D)	(S/W+H)	(B/H+D)	(S/W+H)		US$	K£																			
38	139	242	1287	MORDASA	54.2	68.3	☆	●	●	●	●	●	●												Rural water supply

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4.9 Source Development Plan for Rural Water Supply

District	Source Development Plan									Total	Implementation Program (%)	
	Surface Water	Borehole	Shallow Well	Roof Catch	Small Dam	Subsur-face Dam	Sand Dam	Rock Catch	Existing Pipeline		Up to 2000	2001-2010
- Quantity (m3/d)	240	1,174	1,607	529	15	17	18	375	6	3,981	34.6	65.4
- No. of Facilities	0	67	319	16,898	4	8	8	57	0	17,361		
- Cost (mill.US$)	0	5.18	1.47	10.19	0.02	0.05	0.04	0.99	0	17.93		
(mill.K£)	0	6.53	1.85	12.85	0.02	0.06	0.05	1.25	0	22.61		

4.10 Source Development Plan for Livestock Water Supply

District	Source Development Plan							Total	Implementation Program (%)	
	Surface Water	Borehole	Shallow Well	Small Dam	Subsur-face Dam	Sand Dam	Existing Pipeline		Up to 2000	2001-2010
- Quantity (m3/d)	909	4,702	6,544	86	112	155	2	12,510	36.7	63.3
- No. of Facilities	0	242	1,287	6	21	24	0	1,580		
- Cost (mill.US$)	0	20.68	5.98	0.12	0.32	0.32	0	27.42		
(mill.K£)	0	26.07	7.54	0.15	0.4	0.41	0	34.57		

4.11 Watering Points in Nomadic Pasturage Area

Asumed Nomadic Pasturage Area (km2)	No. of Watering Points (Nos)	Executing Agency	Cost (million)		Implementaion of Watering Points (No.)	
			US$	K£	up to 2000	2001-2010
13,563	22	MOWD	2.4	3.1	7	15

5 Future Water Resources Developmet Potential and Study Proposal

5.1 Potential Water Source for Future Development

Potential Water Source for Future Development	Purpose	Schemes		
		Water Supply	Irrigation	Hydropower
Archers Post Dam	W+I+P	Flow augmentation	Small	Archer's post
Nundoto Dam	W	Maralal	-	-

W:Water Supply I:Irrigation P: Power

5.2 River Basin Developmetn Study

Description	Executing Agency	Cost (million)		Implementation Schedule																	
		US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Ewaso Ngiro North River Basin Study	ENNRDA	2.5	3.2		☆	☆	☆														

★ Design ☆ Study ● Construction

5.3 District Water Resource Study

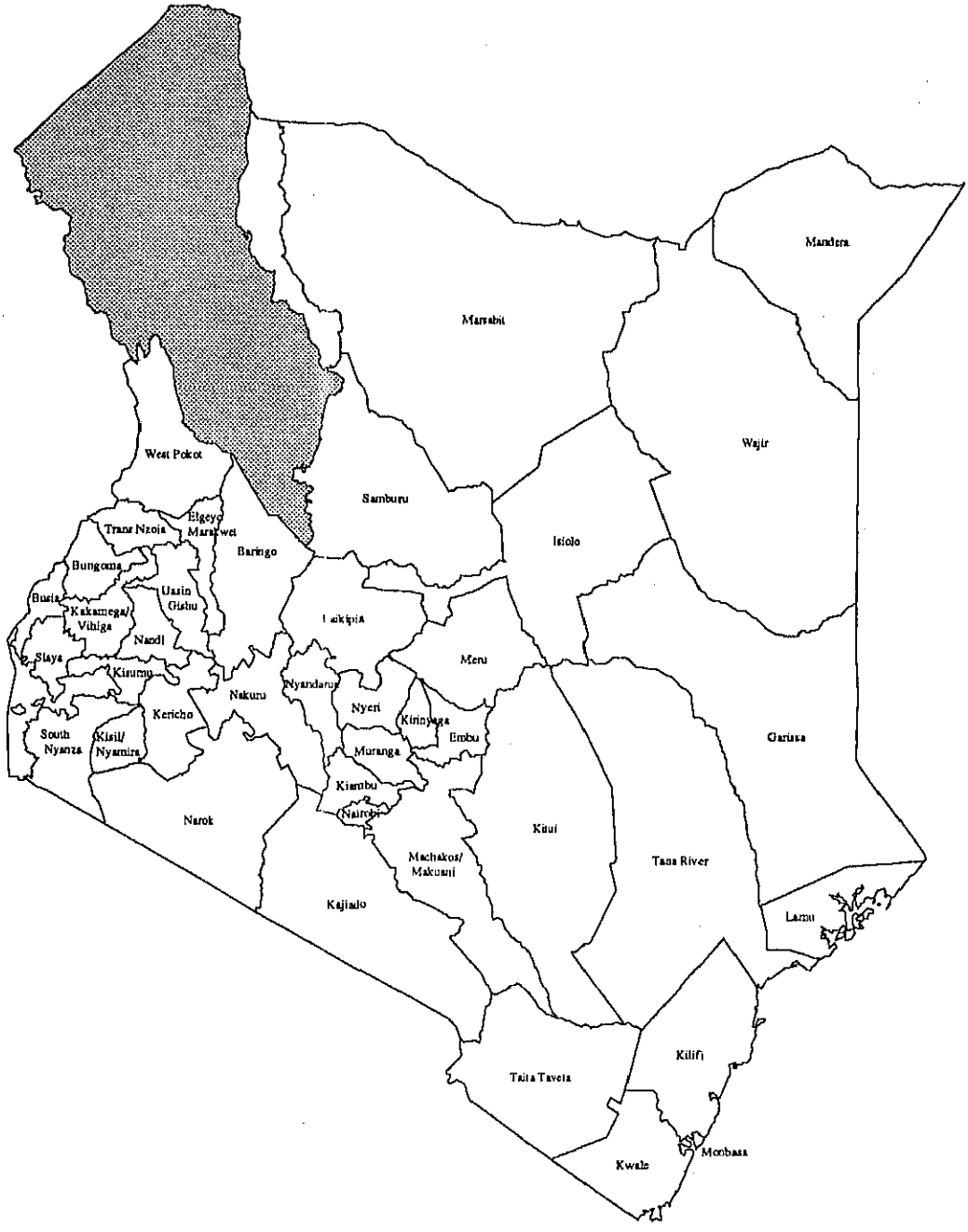
Related Basin Study Proposed	Remarks	Executing Agency	Cost (million)		Implementation Schedule																
			US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Ewaso Ngiro N.	(WRAP completed)	MOWD	-	-																		

☆ Study

o River Basin Study (proposed under separate programme)

Turkana

District



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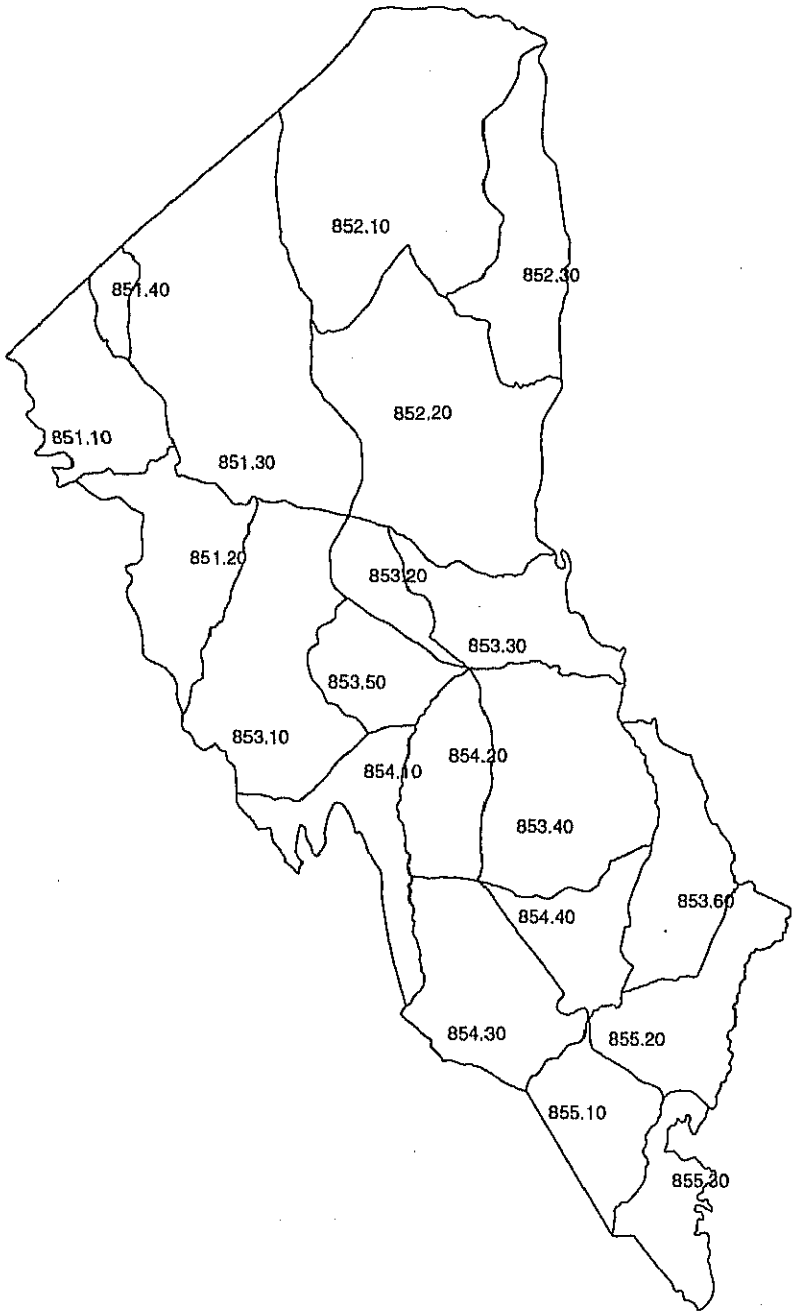
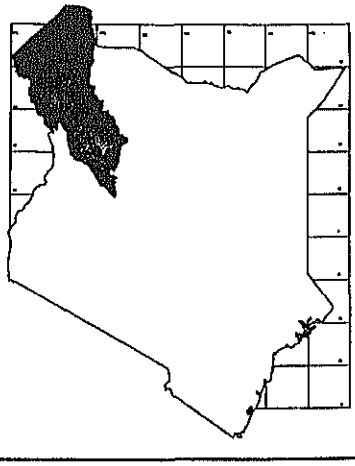


Code	Location	Population
851.1	Lokichoggio	7,064
851.2	Kalobeyei	4,538
851.3	Pelekech	6,072
851.4	Mogila	1,753
852.1	Ngikwatela	6,148
852.2	Kaaling	11,665
852.3	Ngisiger	13,233
853.1	Ngikajik	4,001
853.2	Ngisir	6,767
853.3	Kalokol	13,341
853.4	Kangatotha	5,447
853.5	Lodwar	10,338
853.6	Kerio	13,207
854.1	Lorengippi	6,501
854.2	Kafapata	15,563
854.3	Kautir/Ngingboto	1,465
854.4	Lobokat	3,134
855.1	Lomelo	2,402
855.2	Loriu	6,719
855.3	Ngibila	3,344



850 Turkana

THE STUDY
ON
THE NATIONAL WATER MASTER PLAN

JAPAN INTERNATIONAL COOPERATION AGENCY

1. Socio-Economic Profile : 850 Turkana District

1-1 Population Projection

(Unit: 1000)

Code	Location	Land Area (sq.km)	Town Name	1990			2000			2010		
				Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural
850	Turkana District	67,403		189.4	9.3	180.1	238.8	25.3	213.5	290.1	38.7	251.5
851.1	Lokichoggio	2,662		9.3	-	9.3	11.1	-	11.1	13.0	-	13.0
851.2	Kalobeyei	3,005		6.0	-	6.0	7.1	-	7.1	8.4	-	8.4
851.3	Pelekech	8,188		8.0	-	8.0	9.5	-	9.5	11.2	-	11.2
851.4	Mogila	506		2.3	-	2.3	2.7	-	2.7	3.2	-	3.2
852.1	Ngikwatela	8,304		8.1	-	8.1	9.6	-	9.6	11.3	-	11.3
852.2	Kaaling	7,098		15.4	-	15.4	18.3	-	18.3	21.5	-	21.5
852.3	Ngisiger	3,230	Lokitaung	17.5	-	17.5	22.1	1.4	20.7	26.2	1.8	24.4
853.1	Ngikajik	4,871		5.3	-	5.3	6.3	-	6.3	7.4	-	7.4
853.2	Ngisir	1,147		8.9	-	8.9	10.6	-	10.6	12.5	-	12.5
853.3	Kalokol	2,526	Kalokol	17.6	-	17.6	22.3	1.4	20.9	26.4	1.8	24.6
853.4	Kangatotha	4,937		7.2	-	7.2	8.5	-	8.5	10.1	-	10.1
853.5	Lodwar	1,741	Lodwar	14.4	9.3	5.1	27.4	21.3	6.1	40.5	33.4	7.2
853.6	Kerio	2,757		17.5	-	17.5	20.7	-	20.7	24.4	-	24.4
854.1	Lorengippi	2,256		8.6	-	8.6	10.2	-	10.2	12.0	-	12.0
854.2	Kalapata	2,168		20.6	-	20.6	24.4	-	24.4	28.7	-	28.7
854.3	Kautir/Ngingboto	3,504		1.9	-	1.9	2.3	-	2.3	2.7	-	2.7
854.4	Lobokat	1,910	Lokori	4.1	-	4.1	6.2	1.3	4.9	7.5	1.7	5.8
855.1	Lomelo	2,140		3.2	-	3.2	3.8	-	3.8	4.4	-	4.4
855.2	Loriu	2,757		8.9	-	8.9	10.5	-	10.5	12.4	-	12.4
855.3	Ngibila	1,696		4.4	-	4.4	5.2	-	5.2	6.2	-	6.2

1-2 GRDP Projection

Item	1990	2000	2010
1) GRDP (K.Pound million)	11.6	20.9	31.2
Percentage to GDP	0.1%	0.2%	0.2%
2) GRDP per Capita (K.Pound)	61.0	87.4	107.7
Ratio to GDP per capita	0.18	0.19	0.21
Urban (K.Pound)	781.9	542.9	544.4
Rural (K.Pound)	23.8	33.4	40.6

1-3 Present District Profile (1990)

1) Agricultural Production (1989)

Product	Production	Unit
Maize	576	tons
Sorghum/Millet	-	tons
Potato	-	tons
Rice	-	tons
Wheat/Barley	-	tons
Coffee	-	tons
Tea	-	tons
Milk	-	tons
Meat	-	tons

2) Number of Manufacturing Establishments (1986)

Type of Industry	Number
Food	6
Textile	0
Wood	0
Paper	0
Chemical	0
Non-metal	0
Metal	0
Machinery	0
Others	0
Total	6

3) Water Supply Schemes in Service Centre

Piped system	11
Communal water points	1
Other sources	10

4) Educational Facilities

Primary school	102
Secondary school	6
Institute	2

5) Medical Facilities

Hospital	2
Health Centre	1
Dispensary	5
Others	0

6) Out-patient of Infective Diseases in Relation to Water Supplies (1985-89 Average)

Diarrhoeal Diseases	12,128
Leprosy	7
Infectious Hepatitis	109
Bilharzia	163
Eye Infections	10,631

2. Land and resources

2.1 Present Land Use

Unit : km2

Total Area	Land Area	Water Area	Forest & Park	Swamp	Town	Barrenland	Agriculture Land	Other Land
69,684	67,405	2,279	826	2,551	66	17,984	69	45,909

2.2 Rain fall

Unit : mm

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
11	20	47	84	52	23	41	28	20	26	47	20	424

2.3 River Flow

Unit : m3/sec

Gauge Code	Catchment Area (km2)	Mean Flow	Low Flow Frequency			
			80%	90%	95%	Min.
-	-	-	-	-	-	-

2.4 Groundwater

Aquifer Characteristics

Elevation (m)	Total Depth (m)	Water Struck (m)	Level Rest (m)	Yield (m3/hr)	Draw Down (m)
671.76	63.64	37.06	18.29	5.1	15.86

Safe Abstruction Yield

Unit : m3/year

Borehole	Shallow	Total
23,332,104	51,652,401	74,984,505

2.5 Agriculture

Suitable Area for Major Crops

Unit: km2

Maize	Wheat	Rice	Sorghum	Potato	Coffee	Tea
0	0	0	30	0	0	0

Area of Irrigation Potential

Unit : ha

Surfce Water		Groundwater	
Upland	Lowland	Upland	Lowland
9,449	10,053	345.1	546.9

Livestock Population

Unit: 1,000

Cattle	Sheep/Goats	Camels	Donkeys
235.27	1,805.36	102.08	54.08

3 Water Demand Projection

Unit: cu.m/day

Location	1990				2000				2010			
	Rural	Urban	Livestock	Industry	Rural	Urban	Livestock	Industry	Rural	Urban	Livestock	Industry
Turkana District	3,567	1,344	20,452	342	4,550	3,730	36,286	632	6,112	5,802	66,113	910
Lokichoggio	185	0	1,047	0	236	0	1,827	0	317	0	3,301	0
Kalobeyei	119	0	672	0	151	0	1,174	0	204	0	2,121	0
Pelekech	159	0	900	0	203	0	1,570	0	272	0	2,837	0
Mogila	46	0	260	0	59	0	454	0	79	0	819	0
Ngikwatela	160	0	911	0	205	0	1,590	0	276	0	2,873	0
Kaaling	305	0	1,729	0	390	0	3,017	0	523	0	5,450	0
Ngisiger	346	0	1,961	0	442	202	3,479	0	594	270	6,297	0
Ngikajik	105	0	593	0	133	0	1,035	0	179	0	1,869	0
Ngisir	177	0	1,003	0	226	0	1,750	0	304	0	3,162	0
Kalokol	349	0	1,977	57	446	204	3,507	105	598	273	6,348	152
Kangatotha	143	0	807	0	182	0	1,409	0	244	0	2,545	0
Lodwar	102	1,344	837	285	130	3,135	1,885	527	175	5,006	3,930	758
Kerio	346	0	1,957	0	441	0	3,416	0	592	0	6,171	0
Lorengippi	170	0	963	0	217	0	1,681	0	292	0	3,037	0
Kalapata	408	0	2,306	0	519	0	4,025	0	698	0	7,272	0
Kautir/Ngingboto	38	0	217	0	49	0	379	0	65	0	685	0
Lobokat	82	0	464	0	105	190	864	0	141	254	1,572	0
Lomelo	63	0	356	0	80	0	621	0	108	0	1,122	0
Loriu	176	0	996	0	224	0	1,738	0	301	0	3,139	0
Ngibila	88	0	496	0	112	0	865	0	150	0	1,563	0

4 Action Plan

4.1 Urban Water Supply

Urban Name	Population	Present Raw Water Source	Future Raw Water Source	G/P	Pipe line (km)	Pump lift (m)	Cost 1000 US$
Lodwar	33,400	Boreholes	Boreholes & sub-surface dam	g	1343	0	132,580

g: gravity p; pump

4.2 Small Scale Irrigation Scheme

Scheme Name	Area (ha)	Farmers No (Nos)	Division	Location	Type of Project	Imp. Agency	Cost million Kshs	Basin
Lokorkor	0	100	Lokori	Katilia	Irrigation	OWN	200	?

4.3 Large Scale Irrigation Project

Project	Area (ha)	Water Source	Water Demand (MCM)	Cost (million)		Major Crops
				US$	K£	
Turkwel	600	Turkwell	12.1	1.8	2.3	Cotton, Maize, Beans

4.4 Hydropower Development

Project	Description	Executing Agency	Cost(million)		Implementation Schedule																
			US$	K£	93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10
-	-	-	-	-																		

★ Design ☆ Study ● Construction

4.5 Flood Mitigation Project

Project	Description	Executing Agency	Cost(million)		Implementation Schedule																
			US$	K£	93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10
-	-	-	-	-																		

★ Design ☆ Study ● Construction

4.6 Urban Drainage and Ad-hoc River Improvement Projects

Project	Population	Area (Km2)	Executing Agency	Cost (million)		Implementation Schedule																
				US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Lodwar	9,300	0.2	MOLG	1.8	2.2												☆	☆	☆	●	●	●	

★ Design ☆ Study ● Construction

4.7 Dam Development Plan

Damsites	C.A. (km2)	Purpose	FSL (El. m)	Storage (MCM)	Yield (m3/s)	Height (m)	Cost (1,000US$)
-	-	-	-	-	-	-	-

W:Water Supply I:Irrigation P: Power

4.8 Groundwater Development Projects

Proposed Numbers				Executing Agency	Cost (million)		Implementation Schedule																Remarks
Drinking		Livestock																					
(B/H+D)	(S/W+H)	(B/H+D)	(S/W+H)		US$	K£	93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10	
33	178	796	5765	MORDASA	213.2	268.6	☆	●	●	●	●	●	●	●	●	●	●	●	●						Rural water supply

★ Design ☆ Study ● Construction

4.9 Source Development Plan for Rural Water Supply

District	Source Development Plan									Total	Implementation Program (%)	
	Surface Water	Borehole	Shallow Well	Roof Catch	Small Dam	Subsur-face Dam	Sand Dam	Rock Catch	Existing Pipeline		Up to 2000	2001-2010
- Quantity (m3/d)	289	1,871	2,956	690	3	102	127	16	6	6,060	38.6	61.4
- No. of Facilities	0	77	500	31,371	1	20	22	2	0	31,993		
- Cost (mill.US$)	0	6.78	2.49	18.88	0	0.29	0.26	0.03	0	28.74		
(mill.K£)	0	8.55	3.14	23.81	0.01	0.36	0.33	0.04	0	36.24		

4.10 Source Development Plan for Livestock Water Supply

District	Source Development Plan							Total	Implementation Program (%)	
	Surface Water	Borehole	Shallow Well	Small Dam	Subsur-face Dam	Sand Dam	Existing Pipeline		Up to 2000	2001-2010
- Quantity (m3/d)	3,781	22,265	34,948	64	1,157	1,417	0	63,632	34.7	65.3
- No. of Facilities	0	796	5,765	2	124	150	0	6,837		
- Cost (mill.US$)	0	80.87	29.46	0.09	3.35	3.02	0	116.78		
(mill.K£)	0	101.97	37.15	0.11	4.22	3.8	0	147.26		

4.11 Watering Points in Nomadic Pasturage Area

Asumed Nomadic Pasturage Area (km2)	No. of Watering Points (Nos)	Executing Agency	Cost (million)		Implementaion of Watering Points (No.)	
			US$	K£	up to 2000	2001-2010
44,837	72	MOWD	9.1	11.5	22	50

5 Future Water Resources Developmet Potential and Study Proposal

5.1 Potential Water Source for Future Development

Potential Water Source for Future Development	Purpose	Schemes		
		Water Supply	Irrigation	Hydropower
Kamukuny Dam	W+I	Flow Augmentation	-	-

W:Water Supply I:Irrigation P: Power

5.2 River Basin Developmetn Study

Description	Executing Agency	Cost (million)		Implementation Schedule																
		US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Kerio River Basin Study (Update)	KUDA	2.0	2.5					☆	☆	☆											

★ Design ☆ Study ● Construction

5.3 District Water Resource Study

Related Basin Study Proposed	Remarks	Executing Agency	Cost (million)		Implementation Schedule																
			US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
		MOWD	3.0	3.8		☆	☆	☆														

☆ Study

o River Basin Study (proposed under separate programme)

West Pokot District

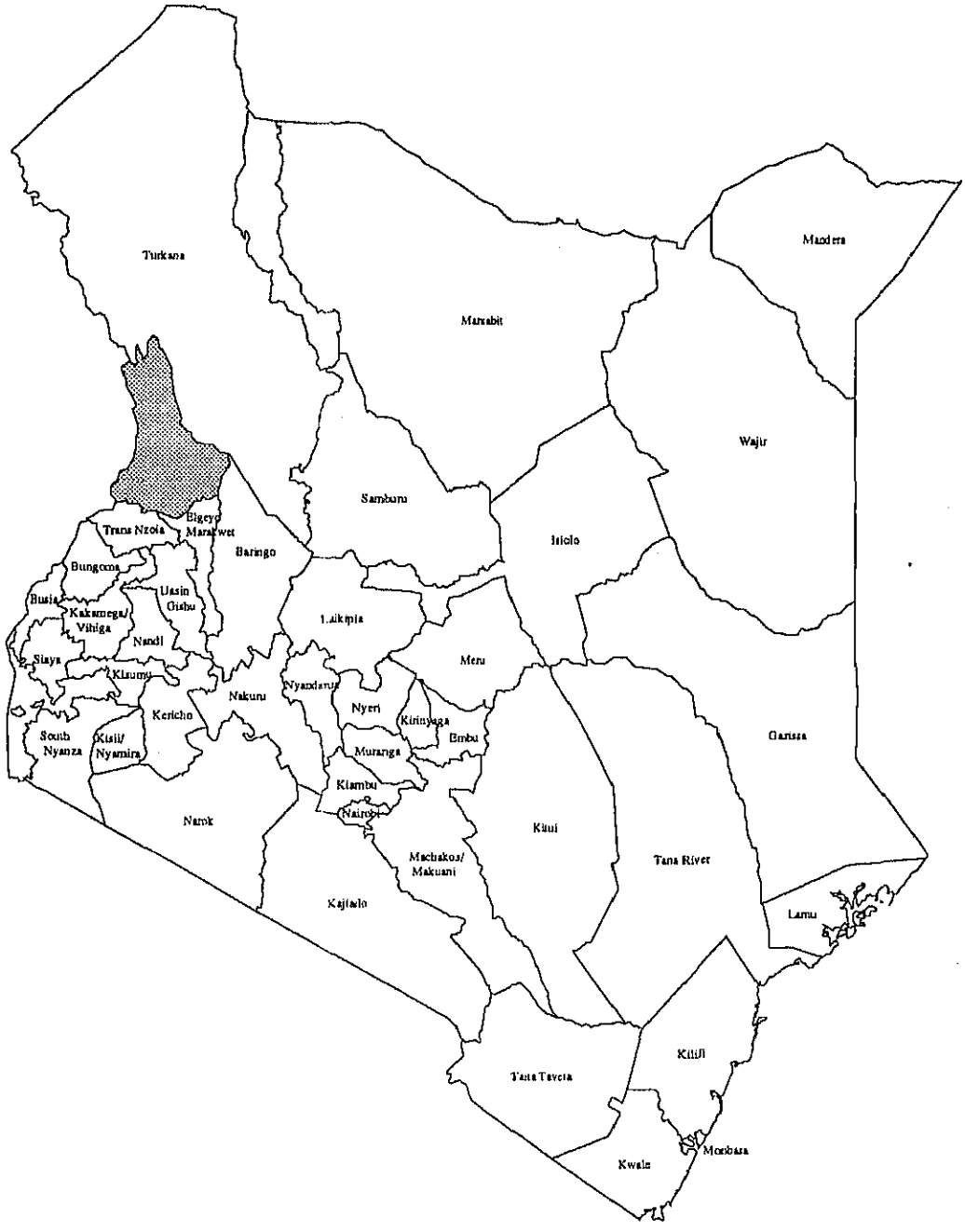
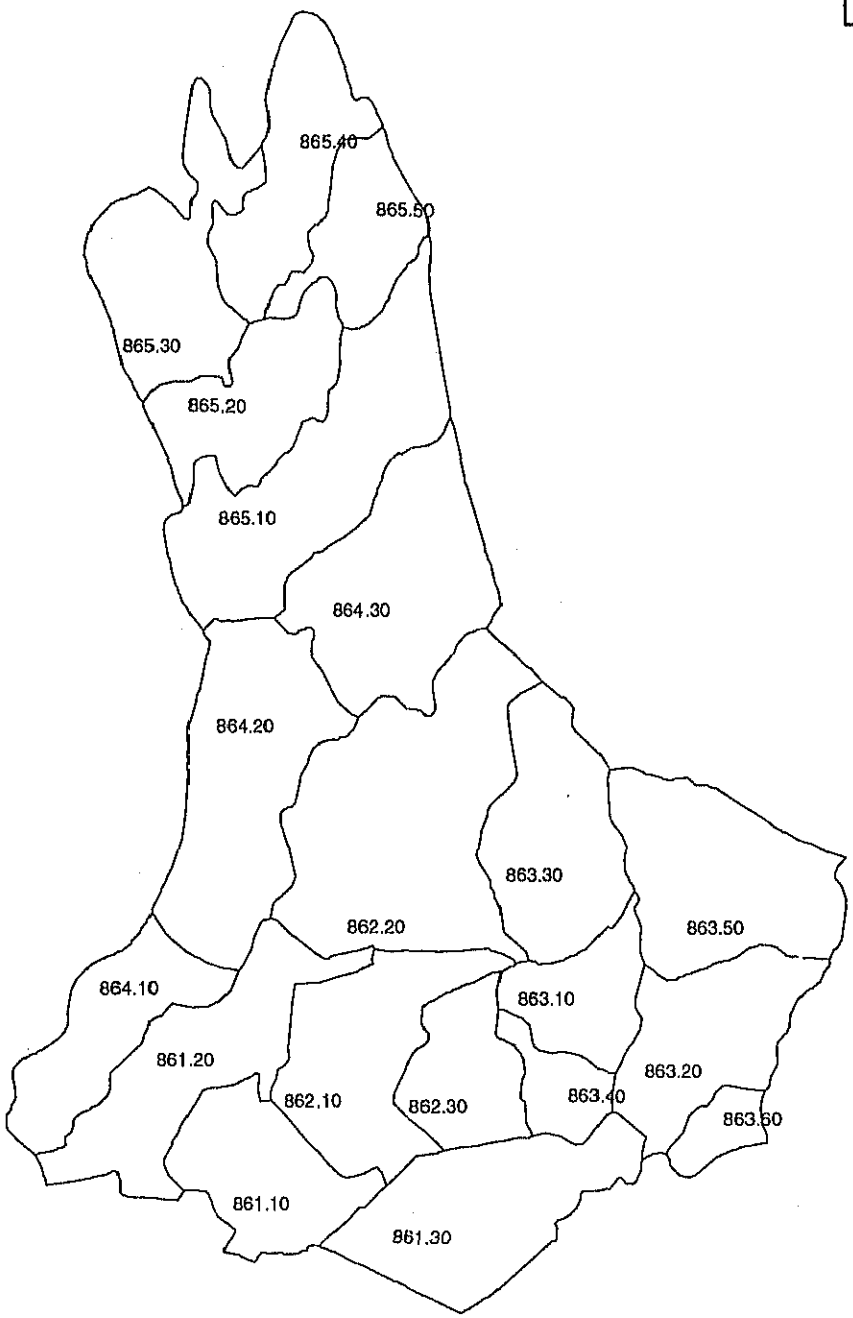
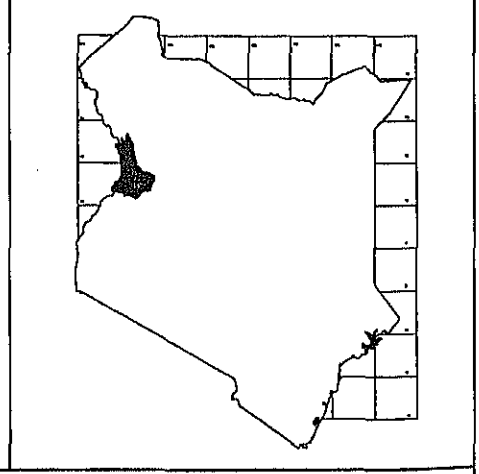


Fig.



Code	Location	Population
861.1	Kapenguria	35,186
861.2	Riwa	9,619
861.3	Lelan	11,149
862.1	Kipkomo	14,628
862.2	Sook	9,325
862.3	Batei	11,136
863.1	Weiwei	5,515
863.2	Lomut	6,687
863.3	Sekerr	7,154
863.4	Mwino	7,157
863.5	Masol	3,474
863.6	Cheptulel	4,238
864.1	Suam	7,513
864.2	Kapchok	7,452
864.3	Kasei	1,350
865.1	Kiwawa	3,527
865.2	Kases	5,815
865.3	Alale	4,346
865.4	Akoret	1,449
865.5	Chemorongit	1,932



860 West Pokot

THE STUDY
ON
THE NATIONAL WATER MASTER PLAN

JAPAN INTERNATIONAL COOPERATION AGENCY

1. Socio-Economic Profile : 860 West Pokot District

1-1 Population Projection

(Unit:1000)

Code	Location	Land Area (sq.km)	Town Name	1990			2000			2010		
				Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural
860	West Pokot District	9,057		248.1	13.2	234.9	330.1	31.2	298.9	412.4	53.0	359.4
861.1	Kapenguria	380	Kapenguria/Makutano	58.3	12.0	46.3	86.8	27.9	58.9	119.0	48.1	70.9
861.2	Riwa	516		14.7	-	14.7	18.7	-	18.7	22.5	-	22.5
861.3	Lelan	553		17.0	-	17.0	21.7	-	21.7	26.1	-	26.1
862.1	Kipkomo	494	Chepareria	23.5	1.2	22.3	30.8	2.4	28.4	37.9	3.7	34.2
862.2	Sook	936		14.2	-	14.2	18.1	-	18.1	21.8	-	21.8
862.3	Batei	270		17.0	-	17.0	21.6	-	21.6	26.0	-	26.0
863.1	Weiwei	247	Sigor	8.4	-	8.4	11.1	0.3	10.7	13.4	0.5	12.9
863.2	Lomut	425		10.2	-	10.2	13.0	-	13.0	15.6	-	15.6
863.3	Sekerr	490		10.9	-	10.9	13.9	-	13.9	16.7	-	16.7
863.4	Mwino	138		10.9	-	10.9	13.9	-	13.9	16.7	-	16.7
863.5	Masol	581		5.3	-	5.3	6.8	-	6.8	8.1	-	8.1
863.6	Cheptulel	93		6.5	-	6.5	8.2	-	8.2	9.9	-	9.9
864.1	Suam	353		11.5	-	11.5	14.6	-	14.6	17.6	-	17.6
864.2	Kapchok	681		11.4	-	11.4	14.5	-	14.5	17.4	-	17.4
864.3	Kasei	631		2.1	-	2.1	2.6	-	2.6	3.2	-	3.2
865.1	Kiwawa	728	Alale	5.4	-	5.4	7.4	0.5	6.9	9.0	0.8	8.2
865.2	Kases	384		8.9	-	8.9	11.3	-	11.3	13.6	-	13.6
865.3	Alale	470		6.6	-	6.6	8.4	-	8.4	10.2	-	10.2
865.4	Akoret	410		2.2	-	2.2	2.8	-	2.8	3.4	-	3.4
865.5	Chemorongit	277		3.0	-	3.0	3.8	-	3.8	4.5	-	4.5

1-2 GRDP Projection

Item	1990	2000	2010
1) GRDP (K.Pound million)	31.2	61.1	91.0
Percentage to GDP	0.4%	0.4%	0.4%
2) GRDP per Capita (K.Pound)	125.8	185.1	220.7
Ratio to GDP per capita	0.37	0.41	0.44
Urban (K.Pound)	498.0	398.9	359.0
Rural (K.Pound)	104.9	162.8	200.3

1-3 Present District Profile (1990)

1) Agricultural Production (1989)

Product	Production	Unit
Maize	67,302	tons
Sorghum/Millet	-	tons
Potato	6,940	tons
Rice	-	tons
Wheat/Barley	-	tons
Coffee	48	tons
Tea	-	tons
Milk	1,154	tons
Meat	3,091	tons

2) Number of Manufacturing Establishments (1986)

Type of Industry	Number
Food	1
Textile	0
Wood	0
Paper	0
Chemical	0
Non-metal	0
Metal	0
Machinery	0
Others	0
Total	1

3) Water Supply Schemes in Service Centre

Piped system	18
Communal water points	0
Other sources	15

4) Educational Facilities

Primary school	233
Secondary school	13
Institute	7

5) Medical Facilities

Hospital	2
Health Centre	3
Dispensary	27
Others	3

6) Out-patient of Infective Diseases in Relation to Water Supplies (1985-89 Average)

Diarrhoeal Diseases	19,547
Leprosy	11
Infectious Hepatitis	107
Bilharzia	330
Eye Infections	14,777

2. Land and resources

2.1 Present Land Use

Unit : km2

Total Area	Land Area	Water Area	Forest & Park	Swamp	Town	Barrenland	Agriculture Land	Other Land
9,056	9,056	0	548	3	228	1,454	1,470	5,353

2.2 Rain fall

Unit : mm

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
13	24	52	121	112	63	97	79	66	51	64	23	772

2.3 River Flow

Unit : m3/sec

Gauge Code	Catchment Area (km2)	Mean Flow	Low Flow Frequency			
			80%	90%	95%	Min.
-	-	-	-	-	-	-

2.4 Groundwater

Aquifer Characteristics

Elevation (m)	Total Depth (m)	Water Struck (m)	Level Rest (m)	Yield (m3/hr)	Draw Down (m)
1510.8	77.79	45.57	22.38	2.56	21.46

Safe Abstruction Yield

Unit : m3/year

Borehole	Shallow	Total
1,985,861	8,463,944	10,449,805

2.5 Agriculture

Suitable Area for Major Crops

Unit: km2

Maize	Wheat	Rice	Sorghum	Potato	Coffee	Tea
95	132	0	803	179	4	0

Area of Irrigation Potential

Unit : ha

Surfce Water		Groundwater	
Upland	Lowland	Upland	Lowland
17,769	15,949	63.1	33.5

Livestock Population

Unit: 1,000

Cattle	Sheep/Goats	Camels	Donkeys
169.74	266.65	0.54	1.19

3 Water Demand Projection

Unit: cu.m/day

Location	1990				2000				2010			
	Rural	Urban	Livestock	Industry	Rural	Urban	Livestock	Industry	Rural	Urban	Livestock	Industry
West Pokot District	5,124	1,909	4,219	57	7,194	4,592	4,466	105	10,275	7,961	4,694	152
Kapenguria	1,091	1,736	873	57	1,558	4,114	959	105	2,285	7,225	1,044	152
Riwa	291	0	260	0	398	0	272	0	547	0	283	0
Lelan	547	0	302	0	832	0	316	0	1,326	0	328	0
Kipkomo	442	174	401	0	606	349	423	0	831	551	442	0
Sook	282	0	252	0	386	0	264	0	530	0	274	0
Batei	381	0	301	0	539	0	315	0	777	0	328	0
Weiwei	167	0	149	0	229	49	157	0	314	70	164	0
Lomut	205	0	181	0	281	0	189	0	388	0	197	0
Sekerr	217	0	194	0	296	0	202	0	407	0	211	0
Mwino	257	0	194	0	365	0	203	0	533	0	211	0
Masol	105	0	94	0	144	0	98	0	197	0	102	0
Cheptulel	131	0	115	0	178	0	120	0	245	0	125	0
Suam	227	0	203	0	311	0	213	0	427	0	221	0
Kapchok	225	0	202	0	308	0	211	0	424	0	219	0
Kasei	41	0	37	0	56	0	38	0	76	0	40	0
Kiwawa	107	0	95	0	146	80	102	0	200	114	106	0
Kases	176	0	157	0	241	0	165	0	330	0	171	0
Alale	131	0	118	0	180	0	123	0	247	0	128	0
Akoret	43	0	39	0	60	0	41	0	82	0	43	0
Chemorongit	58	0	52	0	80	0	55	0	109	0	57	0

4 Action Plan

4.1 Urban Water Supply

Urban Name	Population	Present Raw Water Source	Future Raw Water Source	G/P	Pipe line (km)	Pump lift (m)	Cost 1000 US$
Kapenguria/Makutano	48,200	Kapenguria Stream	Kapenguria River	p	1.7	170	8,920

g: gravity p; pump

4.2 Small Scale Irrigation Scheme

Scheme Name	Area (ha)	Farmers No. (nos)	Division	Location	Type of Project	Imp. Agency	Cost million Kshs	Basin
Amolem Is	45	112	Sigor	Masol	Irrigation	FAO	200	2BB
Wakorr	4	-	"	Wei Wei	"	FARMERS	0.164	2BB
Enoch	44	-	"	"	"	"	1.804	2BB
Sigor Agri	100	540	"	"	"	KVDA	-	2BB

4.3 Large Scale Irrigation Project

Project	Area (ha)	Water Source	Water Demand (MCM)	Cost (million)		Major Crops
				US$	K£	
-	-	-	-	-	-	-

4.4 Hydropower Development

Project	Description	Executing Agency	Cost(million) US$	Cost(million) K£	Implementation Schedule 93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10
-	-	-	-	-																		

★ Design ☆ Study ● Construction

4.5 Flood Mitigation Project

Project	Description	Executing Agency	Cost(million) US$	Cost(million) K£	Implementation Schedule 93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10
-	-	-	-	-																		

★ Design ☆ Study ● Construction

4.6 Urban Drainage and Ad-hoc River Improvement Projects

Project	Population	Area (Km2)	Executing Agency	Cost (million) US$	Cost (million) K£	Implementation Schedule 93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Kapenguria/ Makutano	12,000	0.4	MOLG	2.8	3.5												☆	☆	☆	●	●	●	
			MOLG																				

★ Design ☆ Study ● Construction

4.7 Dam Development Plan

Damsites	C.A. (km2)	Purpose	FSL (El. m)	Storage (MCM)	Yield (m3/s)	Height (m)	Cost (1,000US$)
-	-	-	-	-	-	-	-

W:Water Supply I:Irrigation P: Power

4.8 Groundwater Development Projects

Proposed Numbers Drinking (B/H+D)	Proposed Numbers Drinking (S/W+H)	Proposed Numbers Livestock (B/H+D)	Proposed Numbers Livestock (S/W+H)	Executing Agency	Cost (million) US$	Cost (million) K£	Implementation Schedule 93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10	Remarks
60	584	38	417	MORDASA	23.0	29.0	☆	●	●	●	●														Rural water supply

★ Design ☆ Study ● Construction

4.9 Source Development Plan for Rural Water Supply

District	Source Development Plan: Surface Water	Borehole	Shallow Well	Roof Catch	Small Dam	Subsur-face Dam	Sand Dam	Rock Catch	Existing Pipeline	Total	Implementation Program (%): Up to 2000	2001-2010
- Quantity (m3/d)	3,077	1,522	4,456	961	129	49	25	0	0	10,219	40.2	59.8
- No. of Facilities	0	79	882	28,553	14	11	9	0	0	29,548		
- Cost (mill.US$)	0	6.46	4	17.18	0.12	0.14	0.05	0	0	27.95		
(mill.K£)	0	8.15	5.05	21.66	0.15	0.17	0.06	0	0	35.24		

4.10 Source Development Plan for Livestock Water Supply

District	Source Development Plan: Surface Water	Borehole	Shallow Well	Small Dam	Subsur-face Dam	Sand Dam	Existing Pipeline	Total	Implementation Program (%): Up to 2000	2001-2010
- Quantity (m3/d)	1,588	692	2,095	75	20	10	0	4,480	52.0	48.0
- No. of Facilities	0	38	417	14	10	7	0	486		
- Cost (mill.US$)	0	2.85	1.88	0.07	0.05	0.02	0	4.87		
(mill.K£)	0	3.6	2.37	0.09	0.07	0.03	0	6.14		

4.11 Watering Points in Nomadic Pasturage Area

Asumed Nomadic Pasturage Area (km2)	No. of Watering Points (Nos)	Executing Agency	Cost (million)		Implementaion of Watering Points (No.)	
			US$	K£	up to 2000	2001-2010
4,855	8	MOWD	1.1	1.3	2	6

5 Future Water Resources Developmet Potential and Study Proposal

5.1 Potential Water Source for Future Development

Potential Water Source for Future Development	Purpose	Schemes		
		Water Supply	Irrigation	Hydropower
-	-	-	-	-

W:Water Supply I:Irrigation P: Power

5.2 River Basin Developmetn Study

Description	Executing Agency	Cost (million)		Implementation Schedule																	
		US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Kerio River Basin Study (Update)	KUDA	2.0	2.5					☆	☆	☆											

★ Design ☆ Study ● Construction

5.3 District Water Resource Study

Related Basin Study Proposed	Remarks	Executing Agency	Cost (million)		Implementation Schedule																
			US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
	(WRAP completed)	MOWD	-	-																		

☆ Study

o River Basin Study (proposed under separate programme)

Western Province

Western Province

Socio Economic Profiles

Western Province has a total area of 8.4 thousand km^2 or 1.4% of the national total. Most of the land is of high and medium potential with the exception of a small area in low a potential zone covering the upper slopes of Mt.Elgon. Of the total provincial area, 137 km^2 or 1.6% of the provincial area is occupied by water areas such as lake Victoria, marshes and rivers. Of the total provincial land area of 8.2 thousand km^2, 1.2 thousand km^2 or 14% is reserved area for uses such as national parks and reserved areas. The rest, 7.0 thousand km^2 or 85%, is habitable area where the people carry out their daily activities. The district population distribution was as follows:

Code District	Area (km^2)	Population in 1990 (1000)	Density (persons/km^2)
910 Bungoma	3,074	789	257
920 Busia	1,766	454	257
930 Kakamega/Vihiga	3,520	1,479	420

In 1990, 2,722 thousand people or 12% of the national population were living in Western Province. Its district distribution is shown in the above table.

The urban population numbered 171 thousand or 6.3% of the total provincial population. It was distributed among 14 towns in four Districts as follows: seven towns with 70 thousand of urban population in Bungoma District; two towns, 15 thousand, in Busia; and five towns, 85 thousand, in Kakamega/Vihiga. Among these towns, the top 10 towns in terms of urban population were Kakamega, Bungoma, Webuye, Mumias, Busia, Kimilili, Vihiga, Luanda, Chaptais and Malakisi in that order.

Kakamega is the largest town in the province, which functions as the provincial capital as well as the district headquarters of Kakamega/Vihiga. The district headquarters of the other Districts are Bungoma in Bungoma District; and Busia in Busia. In addition, Vihiga town is functioning as District headquarters of independent Vihiga District at present.

Maize dominates the crop acreage in the province. Succeedingly, beans and sorghum are significant features of the cultivated area. Sugar-cane and cassava are also important crops in the province. Coffee, tea and cotton are developed in the three districts, as the important cash crops

Kakamega ranks as the most industrialized town in the province. Besides, Bungoma, Busia and Luanda are also listed up as industrialized towns in the province. In some rural areas, large-scale manufacturing industries are functioning or are being planned taking into account regional resources and labour conditions in the province.

Western Province recorded K£493 million at 1989 constant prices or 6.4% of GDP, according to the Study Team's estimation explained in Chapter 5 of Sectoral Report "A".

Kakamega/Vihiga District recorded the largest GRDP in the province. It was estimated at K£208 million or 2.7% of GDP. On the other hand, Busia recorded the largest GRDP per capita in the province. It was estimated at K£405 in 1990, which was 1.19 times of the national average. GRDP per capita of the other Districts recorded was as follows: K£141 or 0.41 times in Kakamega/Vihiga; and K£128 or 0.38 in Bungoma.

Surface Water

Western Province is situated at the southern foot of Mt.Elgon. Mean annual rainfall varies ranging from 1,558 mm in Busia District to 1,755 mm in Kakamega District. There is no distinctive dry month throughout the year, while a single maximum monthly rainfall was recorded in April.

Since the Province is fully covered with perennial stream resources, surface water has been utilized extensively. Major perennial rivers are organized into (i) the tributaries of the Malaba River, (ii) Sio River and (iii) Nzoia River and its tributaries. However, existing water supply systems will not meet the demand in 2010.

Boreholes and the protection of springs are the major water sources for rural water supply.

Bungoma District with an area of 3,074 km^2 of which 592 km^2 (19.3%) is covered by piped water supply and 1,048 km^2 (34.1%) will be covered by the on-going projects being implemented by KEFINCO.

Busia District has 27 water supply systems, 3 selp-help water supplies and 1,389 communal water points which have been done by KEFINCO.

Kakamega District is served by 13 piped water supplies as well as boreholes. Among the urban centers, the population growth in Kakamega town has risen faster than the projected supply capacity of water, though the supplement of borehole development is incorporated. The Mukulusi Dam will be required for Kakamega town water supply.

Geology

The main rock type of the province is granite, which is intrusive into Kavirondian and Nyanzian system rocks. Other main rocks consist of Nyanzian volcanics, Tertiary volcanics, the basement metamorphic rocks, and Quaternary sediments.

Physiography

The area is on a gently sloping peneplained surface, south of Mt. Elgon and west of the Nandi Escarpment with a general elevation of 1200 and 1700 m.

Groundwater

Shallow aquifers are found in the overburden or in highly weathered bedrock and

sometimes it is perched water with no connection to deep aquifers. The shallow groundwater levels in most parts of the province lie between 2.5 and 5 m from the ground surface. Groundwater is found very near the ground surface in south and east Bunyala locations near the Nzoia River and in the swampy areas. In the northern part of Bungoma District and the most parts of West Kabras, Central Kabras, East Isukha, Chevaywa, and Bunyala locations, the shallow groundwater levels lie deeper. The shallow groundwater rest-level fluctuated seasonaly a margin of between 2 to 3 m. The shallow groundwater usually has a very low level of dissolved solids with a conductivity of 110 μS/cm and very soft.

Deep groundwater potential in most parts of Western Province is good or moderate and the yields are enough for handpumps and small submersible pumps.

The struck water levels range 2 to 102 m below the ground surface and the averages in Bungoma, Busia, and Kakamega Districts are 39, 37, and 32 m, respectively. The rest water levels are generally between 10 and 13 m in most parts of the province. The yield is about 3 m^3/hr on average. The specific capacity is generally very low at about 0.2 m^3/hr/m on average. The specific capacity in Bungoma District is even smaller. The transmissivity ranges between 1000 and 4000 m^2/d and the storage coefficient is from 10^{-1} to 10^{-4}.

(1) Bungoma District

The average boreholes yield in the District is 3.2 m^3/hr, but the yields may actually vary from nil to over 15 m^3/hr. The average borehole depth is 60 meters. The average rest level of the water in boreholes is 12 meters.

The District is mainly drained by the Noia, Kibisi, Kuywa, Kimilili, and Lwakhakha Rivers. All the rivers, except the Nzoia, originate from Mt. Elgon.

According to the 1987 Infrastructure Inventory, the District has some 31 gazetted water supplies supplemented by 77 boreholes, 86 dug wells and 99 springs, Reports which have been received indicate that a number of schools, health facilities and dips are not getting steady supply of water leading to underutilization of these facilities. There is a need, therefore, to improved on the water supply and to extend it to as many of these facilities as possible. In some cases the answer may lie in providing more boreholes and dug wells and constructing tanks in homesteads to facilitate harvesting and storage of roof water.

(2) Busia District

The average boreholes yield in the District is 3.3 m^3/hr, but the yields may actually vary from nil to over 18 m^3/hr. The average borehole depth is 54 meters. The average rest level of the water in boreholes is 113 meters.

The District is mainly drained by the Noia, Kibisi, Kuywa, Kimilili, and Lwakhakha Rivers. All the rivers, except the Nzoia, originate from Mt. Elgon.

The topography of the District calls for high pumping-heads and long pipe lines. These factors diminish the economic attractiveness of surface water where ground water is available. The Ministry of Water where ground water is available. The Ministry of Water Development, and Lake Basin Development Authority have dug numerous shallow wells to satisfy the District's immediate water requirements.

Busia District has 27 water supplies, Eleven of these are operated and maintained by the Ministry of water Development, 6 are institutional, 8 county council facilities, and 2 are self-help facilities. In addition the District has communal water points.

Communal water points are the most popular source of water in the District Some 1,396 communal water points have been establishes, most of them through Kenya-Finlad Rural Water Project (KEFINCO). Most of the communal water points (boreholes and shallow wells have been established in areas not yet served by pipe schemes).

In 1987, the District had 3;0 piped schemes with a total coverage of 926 sq.km. There are about 1,000 boreholes in the District.

(3) Kakamega District

The average boreholes yield in the District is 4.1 m^3/hr, but the yields may actually vary from nil to over 17 m^3/hr. The average borehole depth is 48 meters. The average rest level of the water in boreholes is 11 meters.

The District is mainly drained by the Noia, Kibisi, Kuywa, Kimilili, and Lwakhakha Rivers. All the rivers, except the Nzoia, originate from Mt. Elgon.

The surface water resources of the southern and central part of the District can be regarded as being abundant. However, thorough treatment of this water is necessary for safe use by people and livestock.

Most of the central and southern parts of the District have abundant groundwater resources. The deep groundwater resources are quite evenly distributed throughout the area.

The central and southern parts also have good shallow groundwater resources. Since the quality is generally good, it seems to be a promising source of clean water. Detailed information on this is not yet available for the northern part of the District.

The District is served with piped water as well as boreholes. Except for the northern Division of Lugari and Kabras, the rest of the Districts is well served with these schemes. The only question that would be raised in their operational aspects

in order to serve other facilities such as schools and hospitals.

Improvements in water supply need to consider the north and make the established schemes successful in fulfilling their objectives of facilitating the needed resource.

Aquifer characteristics by district

District code	name	Elevation (m)	Total depth(m)	Water struck(m)	level rest(m)	Yield (m3/hr)	Draw down(m)
910	Bungoma	1399.53	60.19	38.71	11.93	3.23	27.41
920	Busia	1231.97	53.97	36.70	12.84	3.31	13.66
930	Kakamega	1424.01	48.37	32.08	10.71	4.05	17.23

Groundwater development plan and cost by district

District code	name	Proposed Drinking (B/H+D)	number (S/W+H)	Proposed Livestock (B/H+D)	number (S/W+W)	Proposed (million) US$	cost (million) K£
910	Bungoma	75	1150	9	84	23.8	30
920	Busia	142	1729	28	308	42.2	53
930	Kakamega /Vihiga	122	1514	0	0	27.2	34

Irrigation Development Possibility

Irrigation development possibility as of 1990 was roughly checked through comparing estimated irrigation potential area and present irrigation area (existing area + future development plan) as shown in following table.

Code	910	920	930
District	Bungoma	Busia	Kakamega
Availability	○	○	●

note : × There is no area for irrigation development
❑ There is some area for irrigation development (less than 500 ha)
○ There is more area for irrigation development (less than 5000 ha)
● There is more than enough area for irrigation development (more than 5000 ha)

Bungoma

District

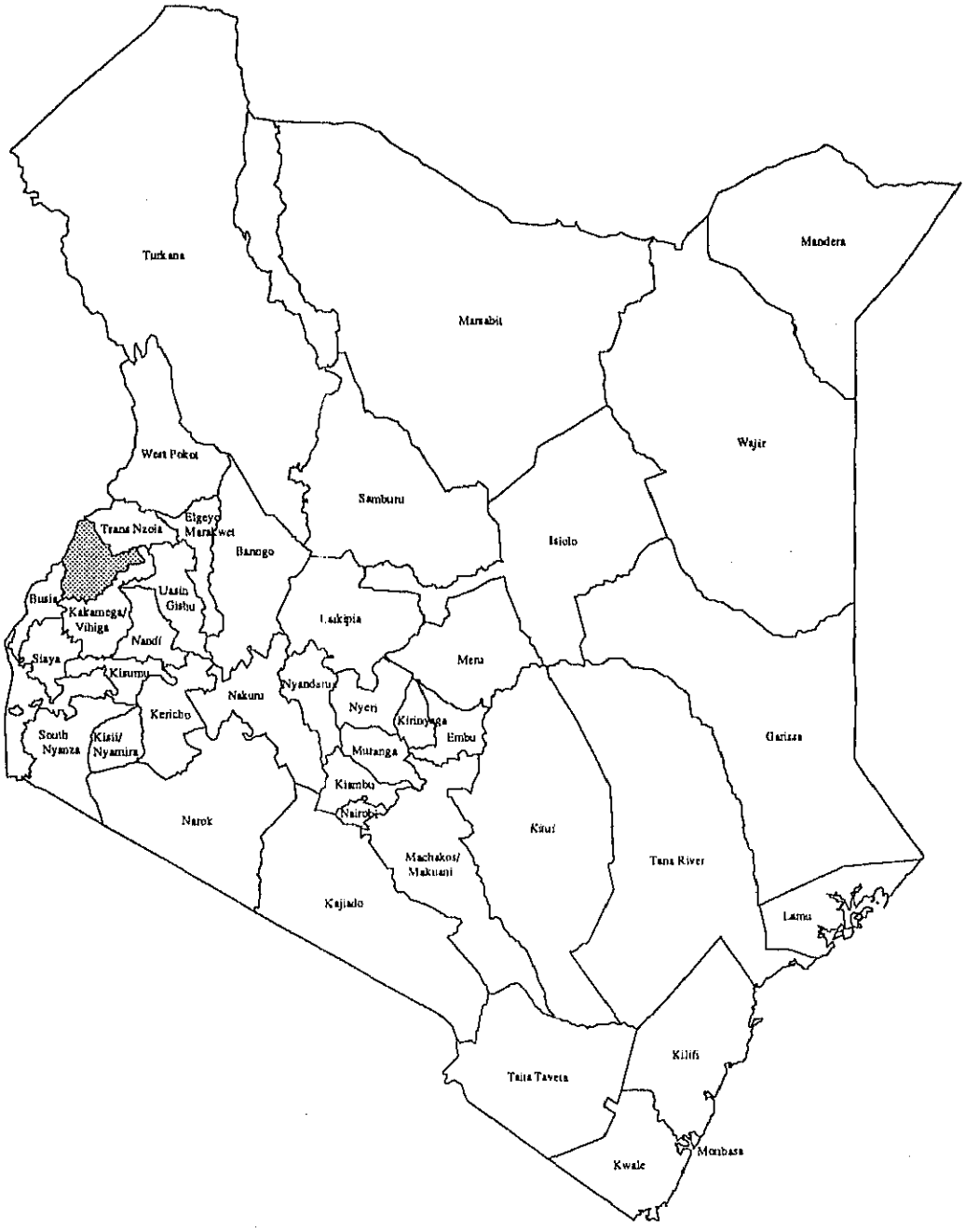
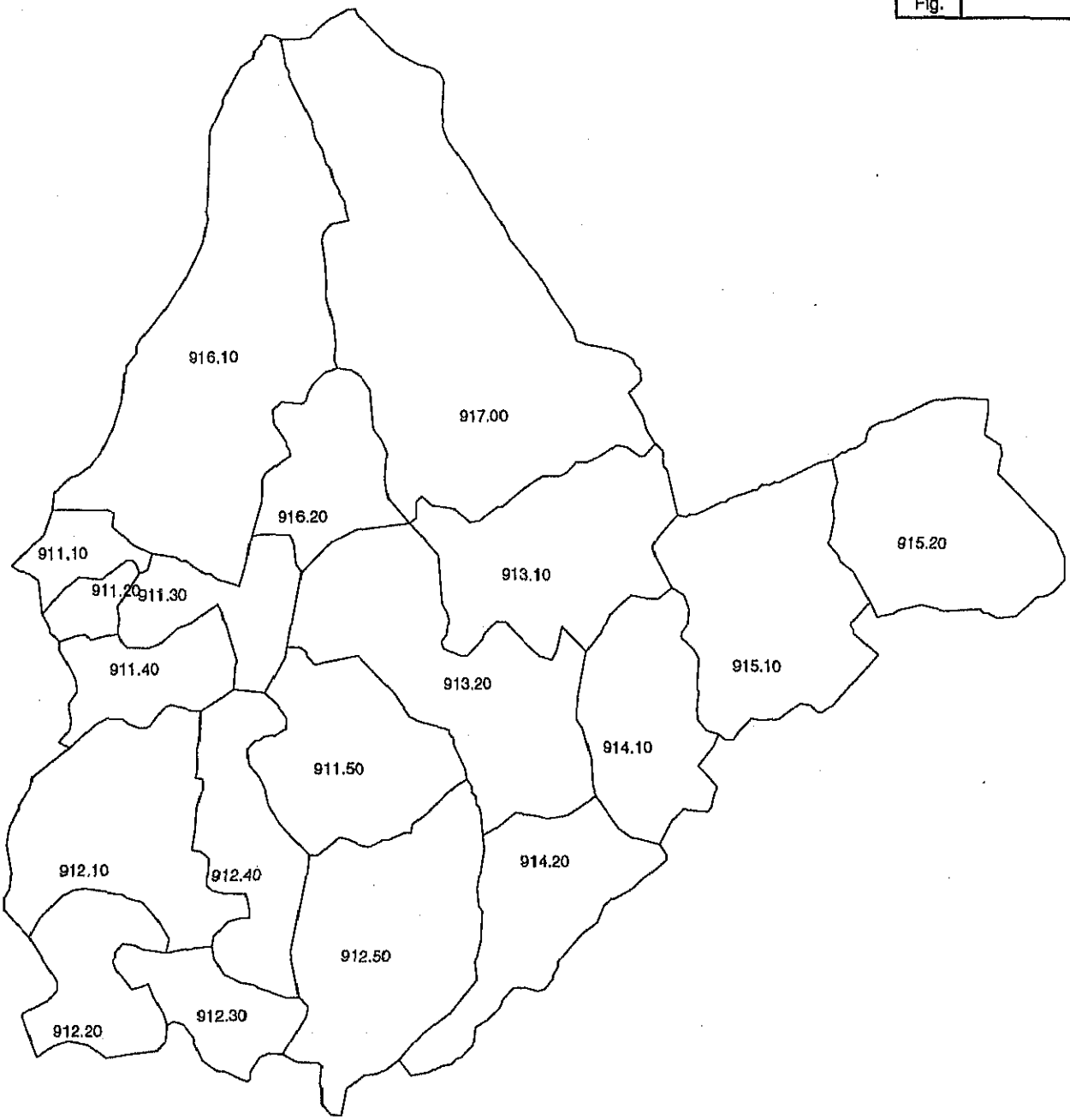
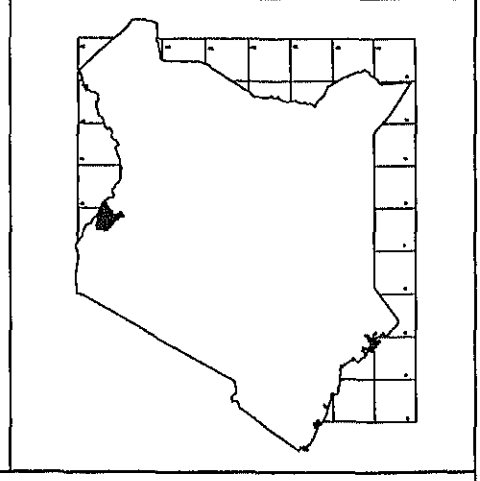


Fig.



Code	Location	Population
911.1	Lwandanyi	9,156
911.2	Lwakhakha	7,544
911.3	Sirisia	17,482
911.4	Malakisi	13,658
911.5	North Bukusu	38,337
912.1	West Bukusu	30,023
912.2	Bumala	15,788
912.3	South Bukusu	16,062
912.4	Kanduyi	35,349
912.5	East bukusu	32,628
913.1	Kimilili	48,433
913.2	Bokoli	51,313
914.1	Ndivisi	31,874
914.2	Webuye	27,830
915.1	Naitiri	27,652
915.2	Ndalu	21,806
916.1	Cheptais	26,924
916.2	Elgon and Kaptama	20,514
917	Elgon	31,663



910 Bungoma

THE STUDY
ON
THE NATIONAL WATER MASTER PLAN

JAPAN INTERNATIONAL COOPERATION AGENCY

1. Socio-Economic Profile : 910 Bungoma District

1-1 Population Projection

(Unit:1000)

Code	Location	Land Area (sq.km)	Town Name	1990			2000			2010		
				Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural
910	Bungoma District	3,072		789.1	69.8	719.3	1,130.3	197.0	933.3	1,476.3	334.2	1,142.2
911.1	Lwandanyi	36		14.4	-	14.4	18.6	-	18.6	22.8	-	22.8
911.2	Lwakhakha	23		11.8	-	11.8	15.4	-	15.4	18.8	-	18.8
911.3	Sirisia	78	Sirisia	28.5	1.1	27.4	38.1	2.5	35.6	47.5	3.9	43.5
911.4	Malakisi	72	Mwalie + Malakisi	24.0	2.6	21.4	34.8	7.0	27.8	44.7	10.7	34.0
911.5	North Bukusu	148		60.1	-	60.1	78.0	-	78.0	95.5	-	95.5
912.1	West Bukusu	185		47.1	-	47.1	61.1	-	61.1	74.8	-	74.8
912.2	Bumala	89		24.8	-	24.8	32.1	-	32.1	39.3	-	39.3
912.3	South Bukusu	70		25.2	-	25.2	32.7	-	32.7	40.0	-	40.0
912.4	Kanduyi	115	Bungoma	45.5	29.5	16.0	103.8	83.0	20.7	168.1	142.7	25.4
912.5	East Bukusu	216		51.0	-	51.0	66.2	-	66.2	81.0	-	81.0
913.1	Kimilili	184	Kimilili	79.1	6.5	72.6	112.5	18.3	94.2	146.7	31.4	115.3
913.2	Bokoli	231	Chwele	80.5	-	80.5	105.8	1.4	104.4	129.7	2.0	127.8
914.1	Ndivisi	130		50.0	-	50.0	64.9	-	64.9	79.4	-	79.4
914.2	Webuye	138	Webuye	42.1	26.6	15.5	95.0	74.9	20.1	153.2	128.7	24.6
915.1	Naitiri	206		43.4	-	43.4	56.3	-	56.3	68.9	-	68.9
915.2	Ndalu	194	Tongaren	34.2	-	34.2	46.1	1.7	44.4	56.6	2.3	54.3
916.1	Cheptais	385	Chaptais	45.0	2.8	42.2	61.2	6.5	54.8	77.0	10.0	67.0
916.2	Elgon and Kaptama	92		32.2	-	32.2	41.7	-	41.7	51.1	-	51.1
917.0	Elgon	480	Kapsakwony	50.4	0.7	49.7	66.0	1.6	64.4	81.3	2.5	78.8

1-2 GRDP Projection

Item	1990	2000	2010
1) GRDP (K.Pound million)	100.7	187.9	279.9
Percentage to GDP	1.3%	1.4%	1.4%
2) GRDP per Capita (K.Pound)	127.6	166.2	189.6
Ratio to GDP per capita	0.37	0.37	0.37
Urban (K.Pound)	662.1	443.7	400.4
Rural (K.Pound)	75.8	107.7	127.9

1-3 Present District Profile (1990)

1) Agricultural Production (1989)

Product	Production	Unit
Maize	2,300	tons
Sorghum/Millet	-	tons
Potato	13,120	tons
Rice	100	tons
Wheat/Barley	1,260	tons
Coffee	10,801	tons
Tea	-	tons
Milk	3,917	tons
Meat	2,854	tons

2) Number of Manufacturing Establishments (1986)

Type of Industry	Number
Food	15
Textile	1
Wood	1
Paper	2
Chemical	1
Non-metal	0
Metal	0
Machinery	0
Others	0
Total	20

3) Water Supply Schemes in Service Centre

Piped system	39
Communal water points	0
Other sources	23

4) Educational Facilities

Primary school	465
Secondary school	116
Institute	8

5) Medical Facilities

Hospital	5
Health Centre	13
Dispensary	23
Others	6

6) Out-patient of Infective Diseases in Relation to Water Supplies (1985-89 Average)

Diarrhoeal Diseases	25,624
Leprosy	32
Infectious Hepatitis	189
Bilharzia	460
Eye Infections	9,684

2. Land and resources

2.1 Present Land Use

Unit : km2

Total Area	Land Area	Water Area	Forest & Park	Swamp	Town	Barrenland	Agriculture Land	Other Land
3,074	3,074	0	552	0	334	0	2,188	0

2.2 Rain fall

Unit : mm

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
50	80	143	239	239	133	118	139	139	136	139	61	1,623

2.3 River Flow

Unit : m3/sec

Gauge Code	Catchment Area (km2)	Mean Flow	Low Flow Frequency			
			80%	90%	95%	Min.
1BG06	530	2.5	1.1	1.0	1.0	0.8
1DB01	446	3.9	1.2	0.6	0.6	0.5

2.4 Groundwater

Aquifer Characteristics

Elevation (m)	Total Depth (m)	Water Struck (m)	Level Rest (m)	Yield (m3/hr)	Draw Down (m)
1399.53	60.19	38.71	11.93	3.23	27.41

Safe Abstruction Yield

Unit : m3/year

Borehole	Shallow	Total
1,152,710	1,855,671	3,008,381

2.5 Agriculture

Suitable Area for Major Crops

Unit: km2

Maize	Wheat	Rice	Sorghum	Potato	Coffee	Tea
2,164	81	730	1,913	239	672	353

Area of Irrigation Potential

Unit : ha

Surfce Water		Groundwater	
Upland	Lowland	Upland	Lowland
8,612	7,968	26.1	9.7

Livestock Population

Unit: 1,000

Cattle	Sheep/Goats	Camels	Donkeys
294.48	102.93	-	-

3 Water Demand Projection

Unit: cu.m/day

Location	1990				2000				2010			
	Rural	Urban	Livestock	Industry	Rural	Urban	Livestock	Industry	Rural	Urban	Livestock	Industry
Bungoma District	23,176	10,093	6,645	1,370	35,874	29,022	8,482	2,468	58,099	50,163	10,674	3,440
Lwandanyi	521	0	130	0	826	0	161	0	1,374	0	199	0
Lwakhakha	429	0	107	0	680	0	133	0	1,133	0	164	0
Sirisia	996	159	250	57	1,575	375	313	105	2,624	589	388	152
Malakisi	737	376	199	171	1,153	1,035	255	316	1,893	1,605	319	455
North Bukusu	2,036	0	542	0	3,176	0	673	0	5,195	0	831	0
West Bukusu	1,318	0	425	0	1,958	0	527	0	3,004	0	651	0
Bumala	801	0	223	0	1,237	0	277	0	1,996	0	342	0
South Bukusu	910	0	227	0	1,440	0	282	0	2,396	0	348	0
Kanduyi	515	4,265	211	766	793	12,236	358	1,353	1,278	21,417	532	1,831
East bukusu	1,851	0	460	0	2,932	0	571	0	4,884	0	705	0
Kimilili	2,578	940	669	0	4,064	2,696	853	0	6,732	4,719	1,072	0
Bokoli	2,740	0	726	57	4,280	209	904	105	7,009	296	1,117	152
Ndivisi	1,205	0	451	0	1,741	0	560	0	2,564	0	691	0
Webuye	445	3,846	200	148	677	11,033	335	274	1,073	19,311	494	394
Naitiri	972	0	391	57	1,390	0	486	105	2,016	0	600	152
Ndalu	725	0	308	0	1,023	249	387	0	1,459	352	478	0
Cheptais	1,465	405	387	57	2,299	952	487	105	3,784	1,499	606	152
Elgon and Kaptama	*1,168*	*0*	290	*0*	*1,849*	*0*	360	*0*	3,080	*0*	*445*	*0*
Elgon	1,764	102	449	57	2,781	237	560	105	4,605	375	692	152

4 Action Plan

4.1 Urban Water Supply

Urban Name	Population	Present Raw Water Source	Future Raw Water Source	G/P	Pipe line (km)	Pump lift (m)	Cost 1000 US$
Mawalie + Malakisi	10,700		Malikisi river	p	1.5	60	3,319
Bungoma	142,700	Kuywa River	Kuywa River	p	18.7	60	26,771
Kimilili	31,500	Kimilili River	Kimilili River	g	5.5	0	7,318
Webuye	128,700	Nzoia River	Nzoia River	p	4.8	100	20,038
Chaptais	10,000		Sasuri river	p	0	20	2,693

g: gravity p; pump

4.2 Small Scale Irrigation Scheme

Scheme Name	Area (ha)	Farmers No (Nos)	Division	Location	Type of Project	Imp. Agency	Cost million Kshs	Basin
Lelekwe	80	0	Kanduyi	West Bukusu	Drainage	IDB	3.28	LAG
Sioya	150	250	Kanduyi	S/Bukusu	Irrigation	MOA	6.15	LAG
Kanduyi Child Home	5	Institution	Kanduyi	N/Kanduyi	Irrigation	Partnership	0.205	LAG
Kanduyi	0	0	?	?	Drainage	MOA	11	LAG

4.3 Large Scale Irrigation Project

Project	Area (ha)	Water Source	Water Demand (MCM)	Cost (million)		Major Crops
				US$	K£	
Upper Nzoia	7,550	Nzoia River	68.4	88.0	110.9	Fruits, Maize

4.4 Hydropower Development

Project	Description	Executing Agency	Cost(million)		Implementation Schedule																
			US$	K£	93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10
-	-	-	-	-																		

★ Design ☆ Study ● Construction

4.5 Flood Mitigation Project

Project	Description	Executing Agency	Cost(million)		Implementation Schedule																
			US$	K£	93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10
-	-	-	-	-																		

★ Design ☆ Study ● Construction

4.6 Urban Drainage and Ad-hoc River Improvement Projects

Project	Population	Area (Km2)	Executing Agency	Cost (million)		Implementation Schedule																
				US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Bungoma	29,500	1.9	MOLG	15.0	18.8								☆	☆	☆	●	●	●				
Webuye	26,600	0.2	MOLG	1.8	2.3								☆	☆	☆	●	●	●				

★ Design ☆ Study ● Construction

4.7 Dam Development Plan

Damsites	C.A. (km2)	Purpose	FSL (El. m)	Storage (MCM)	Yield (m3/s)	Height (m)	Cost (1,000US$)
-	-	-	-	-	-	-	-

W:Water Supply I:Irrigation P: Power

4.8 Groundwater Development Projects

Proposed Numbers				Executing Agency	Cost (million)		Implementation Schedule																	Remarks
Drinking		Livestock																						
(B/H+D)	(S/W+H)	(B/H+D)	(S/W+H)		US$	K£	93	94	95	96	97	98	99	20	01	02	03	04	05	06	07	08	09	10	
75	1150	9	84	MOCSS	23.1	29.1	☆	●	●	●	●	●													Small communication supply

★ Design ☆ Study ● Construction

4.9 Source Development Plan for Rural Water Supply

District	Source Development Plan									Total	Implementation Program (%)	
	Surface Water	Borehole	Shallow Well	Roof Catch	Small Dam	Subsur-face Dam	Sand Dam	Rock Catch	Existing Pipeline		Up to 2000	2001-2010
- Quantity (m3/d)	46,022	2,867	5,728	0	2,210	0	0	258	977	58,062	36.4	63.6
- No. of Facilities	0	75	1,150	0	18	0	0	15	0	1,258		
- Cost (mill.US$)	0	9.71	5.68	0	1.19	0	0	0.25	0	16.83		
(mill.K£)	0	12.24	7.16	0	1.51	0	0	0.31	0	21.22		

4.10 Source Development Plan for Livestock Water Supply

District	Source Development Plan							Total	Implementation Program (%)	
	Surface Water	Borehole	Shallow Well	Small Dam	Subsur-face Dam	Sand Dam	Existing Pipeline		Up to 2000	2001-2010
- Quantity (m3/d)	8,921	167	409	425	0	0	0	9,922	45.6	54.4
- No. of Facilities	0	9	84	19	0	0	0	112		
- Cost (mill.US$)	0	0.57	0.4	0.22	0	0	0	1.19		
(mill.K£)	0	0.72	0.5	0.28	0	0	0	1.5		

4.11 Watering Points in Nomadic Pasturage Area

Asumed Nomadic Pasturage Area (km2)	No. of Watering Points (Nos)	Executing Agency	Cost (million)		Implementaion of Watering Points (No.)	
			US$	K£	up to 2000	2001-2010
-	-	-	-	-	-	-

5 Future Water Resources Developmet Potential and Study Proposal

5.1 Potential Water Source for Future Development

Potential Water Source for Future Development	Purpose	Schemes		
		Water Supply	Irrigation	Hydropower
Teremi Dam	P	-	-	Teremi

W:Water Supply I:Irrigation P: Power

5.2 River Basin Developmetn Study

Description	Executing Agency	Cost (million)		Implementation Schedule																
		US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Sio/Malaba River Basin Study	LBDA	2.0	2.5					☆	☆	☆											
Nzoia/Yala River Basin Study	LBDA	*3.0*	*3.8*		☆	☆	☆														

★ Design ☆ Study ● Construction

5.3 District Water Resource Study

Related Basin Study Proposed	Remarks	Executing Agency	Cost (million)		Implementation Schedule																
			US$	K£	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Nzoia		MOWD	2.0	2.5		o	o	o	☆	☆												

☆ Study

o River Basin Study (proposed under separate programme)