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Table 10.1 Present Land Use

Land Use Category	ILUS area		Mara river basin		Total	
	Area (1000ha)	%	Area (1000ha)	%	Area (1000ha)	%
1. Agricultural Land	1,529	39.0	20	2.4	1,549	32.5
1.1 Cultivated land	1,209				1,209	
1) Staple Crops	730		20		750	
2) Cash Crops	327				327	
3) Vegetable & Fruits	13				13	
4) Others	139				139	
1.2 Field Borders	19				19	
1.3 Fallow Land	136				136	
1.4 Managed Pasture	165				165	
2. Natural Vegetation	2,123	54.1	827	97.6	2,950	61.8
2.1 Forest	430		107		537	
2.2 Woodland	178				178	
2.3 Bush	632				632	
2.4 Grassland	762		720		1,482	
2.5 Marshland	79				79	
2.6 Other Vegetation	42				42	
3. Infrastructure	234	6.0			234	4.9
3.1 Transport Network	82				82	
3.2 Homestead Land	94				94	
3.3 Hedges	58				58	
4. Miscellaneous	38	1.0			38	0.8
4.1 Open Water	18				18	
4.2 Barren Areas	14				14	
4.3 Not identified	6				6	
Total	3,924	100.0	847	100.0	4,771	100.0

Source: Ecosystem Ltd., Integrated Land Use Servey (ILUS).

Table 10.2 Natural Vegetation

(Unit:1000 ha)

District	Category of Vegetation							Total Grass Cov.	
	Forest	Woodland	Bush	Grassland	Marshland	Others	Total	1000ha	%
NYANZA									
Kisii	12	2	17	17	1	3	52	27	52
Kisumu	4	5	42	45	13	2	111	81	73
Siaya	6	4	70	48	13	0	141	91	65
South Nyanza	19	41	185	130	6	6	387	259	67
Total	41	52	314	240	33	11	691	458	66
WESTERN									
Bungoma	39	8	38	60	4	4	153	77	50
Busia	5	4	30	43	18	1	101	76	75
Kakamega	45	4	36	56	4	7	152	76	50
Total	89	16	104	159	26	12	406	229	56
RIFT VALLEY									
Kericho	85	20	70	47	3	5	230	84	37
Nandi	45	13	36	58	5	5	162	81	50
Narok	38	53	37	49	1	0	178	105	59
Trans Nzoia	23	3	24	52	3	8	113	67	59
Uasin Gishu	49	17	26	116	7	0	215	146	68
Others	60	4	21	41	1	1	128	49	38
Total	300	110	214	363	20	19	1,026	532	52
Total ILUS	430	178	632	762	79	42	2,123	1,219	57
Mara River Basin	107			720			827	720	87
Total	537	178	632	1,482	79	42	2,950	1,939	66

Source: Same as Table 10.1

Table 10.3 Composition of Agricultural Land

District	Total Land	Agriculture		Cultivated		Field Border		Fallow		Mana. Pasture†	
	1000ha	1000ha	%*	1000ha	%**	1000ha	%	1000ha	%	1000ha	%
NYANZA											
Kisii	223	144	65	117	81	1	1	0	0	26	18
Kisumu	223	89	40	88	99	1	1	0	0	0	0
Siaya	263	93	35	88	95	1	1	4	4	0	0
South Nyanza	626	190	30	175	92	2	1	12	6	1	1
Sub-total	1,335	516	39	468	91	5	1	16	3	27	5
WESTERN											
Bungoma	329	151	46	110	73	2	1	36	24	3	2
Busia	178	63	35	51	81	1	2	11	17	0	0
Kakamega	367	183	50	159	87	2	1	20	11	2	1
Sub-total	874	397	45	320	81	5	1	67	17	5	1
RIFT VALLEY											
Kericho	443	187	42	98	52	2	1	13	7	74	40
Nandi	278	104	37	60	58	2	2	13	13	29	28
Narok	202	22	11	20	91	0	0	0	0	2	9
Trans Nzoia	227	106	47	77	73	2	2	20	19	7	7
Uasin Gishu	386	151	39	137	91	2	1	0	0	12	8
Others	179	46	26	29	63	1	2	7	15	9	20
Sub-total	1,715	616	36	421	68	9	1	53	9	133	22
Total	3,924	1,529	39	1,209	79	19	1	136	9	165	11

Notes: * % in total land
** % in agricultural land
† managed pasture

Source: Same as Table 10.1

Table 10.4 Composition of Cultivated Land

District	Cultivated	Staple Crops*		Cash Crops**		Fruits & Vegetable†		Others††	
	1000ha	1000ha	%	1000ha	%	1000ha	%	1000ha	%
NYANZA									
Kisii	117	75	64	19	16	2	2	21	18
Kisumu	88	28	32	53	60	1	1	6	7
Siaya	88	69	78	13	15	0	0	6	7
South Nyanza	175	110	63	44	25	1	1	20	11
Sub-total	468	282	60	129	28	4	1	53	11
WESTERN									
Bungoma	110	78	71	18	16	1	1	13	12
Busia	51	37	73	6	12	0	0	8	16
Kakamega	159	95	60	39	25	2	1	23	14
Sub-total	320	210	66	63	20	3	1	44	14
RIFT VALLEY									
Kericho	98	46	47	32	33	2	2	18	18
Nandi	60	42	70	13	22	1	2	4	7
Narok	20	11	55	0	0	0	0	9	45
Trans Nzoia	77	58	75	13	17	1	1	5	6
Uasin Gishu	137	61	45	71	52	1	1	4	3
Others	29	20	69	6	21	1	3	2	7
Sub-total	421	238	57	135	32	6	1	42	10
TOTAL	1,209	730	60	327	27	13	1	139	11

Notes:
* Banana, Beans/pulses, Caaava, Cabage, Finger millet, Irish potatoes, Maize/Sorghum, Rice, Sweet potatoes
** Coffee, Cotton, Groundnuts, Pinapple, Pyreyhrum, Plantations sisal, Sugarcane, Tea, Tobacco, Wheat/Barley/Oat
† Citrus, Horticulture, Onions, Passion Fruit, Pawpaw, Pumpkins, Sukmawiki, Tomato
†† Fodder grass, Thatch grass

Source: Same as Table 10.1

Table 10.5 Planted Area of Staple Crops

(Unit: 1000 ha)

District	Maize	Sorghum Millet	Beans	Rice	Cassava	Sweet potatoes	Others*	Total Staple Crops
NYANZA								
Kisii	43	5	12	0	1	4	10	75
Kisumu	15	4	2	1	3	2	1	28
Siaya	27	16	11	0	12	2	1	69
South Nyanza	45	19	13	1	20	8	4	110
Sub-total	130	44	38	2	36	16	16	282
WESTERN								
Bungoma	51	1	14	0	4	3	5	78
Busia	7	3	4	1	19	2	1	37
Kakamega	44	10	23	0	7	4	7	95
Sub-total	102	14	41	1	30	9	13	210
RIFT VALLEY								
Kericho	42	0	3	0	0	0	1	46
Nandi	40	0	1	0	0	0	1	42
Narok	10	0	1	0	0	0	0	11
Trans Nzoia	54	0	3	0	0	1	0	58
Uasin Gishu	57	0	4	0	0	0	0	61
Others	20	0	0	0	0	0	0	20
Sub-total	223	0	12	0	0	1	2	238
TOTAL	455	58	91	3	66	26	31	699

Note: * mainly banana
Source: Same as Table 10.1

Table 10.6 Planted Area of Cash Crops

(Unit: 1000 ha)

District	Coffee	Tea	Cotton	Sugarcane	Wheat Barley	Others	Total Cash Crops
NYANZA							
Kisii	5	11	0	2	0	1	19
Kisumu	0	0	7	45	0	1	53
Siaya	0	0	9	3	0	1	13
South Nyanza	1	0	24	10	0	9	44
Sub-total	6	11	40	60	0	12	129
WESTERN							
Bungoma	3	0	5	10	0	0	18
Busia	0	0	3	1	0	2	6
Kakamega	1	2	1	33	0	2	39
Sub-total	4	2	9	44	0	4	63
RIFT VALLEY							
Kericho	2	26	0	2	2	0	32
Nandi	0	9	0	3	1	0	13
Narok	0	0	0	0	0	0	0
Trans Nzoia	1	0	0	0	12	0	13
Uasin Gishu	0	0	0	0	71	0	71
Others	0	0	0	0	6	0	6
Sub-total	3	35	0	5	92	0	135
TOTAL	13	48	49	109	92	16	327

Source: Same as Table 10.1

Table 10.7 Slope Classification

District	0-2%		2-5%		5-8%		8-16%		16-30%		>30%		Mountain		Total
	1000ha	%	1000ha	%	1000ha	%	1000ha	%	1000ha	%	1000ha	%	1000ha	%	1000ha
NYANZA															
Kisii	4	2	17	8	43	20	84	38	50	23	0	0	21	10	219
Kisumu	84	40	55	26	35	17	5	2	0	0	0	0	30	14	209
Siaya	20	8	100	40	120	48	8	3	0	0	0	0	4	2	252
S. Nyanza	60	11	159	28	211	37	66	12	3	1	0	0	72	13	571
Sub-total	165	13	331	26	409	33	163	13	53	4	0	0	127	10	1,253
WESTERN															
Bungoma	24	8	96	31	90	29	23	7	4	1	32	11	39	13	308
Busia	37	23	55	34	55	34	8	5	0	0	0	0	8	5	163
Kakamega	19	6	55	16	187	53	82	23	0	0	0	0	8	2	351
Sub-total	80	10	206	25	332	40	113	14	4	1	32	4	55	7	822
RIFT VALLEY															
Kericho	4	1	81	16	79	16	145	30	114	23	0	0	67	14	490
Nandi	13	5	33	12	52	19	120	44	15	5	0	0	41	15	271
Nakuru	2	2	8	7	56	48	44	38	2	2	0	0	3	3	115
Narok	16	1	556	50	250	22	90	8	59	5	0	0	146	13	1,117
T.Nzoia	19	8	67	29	40	17	16	7	0	0	0	0	91	39	233
U.Gishu	100	28	94	26	76	21	51	14	10	3	0	0	28	8	359
E.Marakwet	2	2	0	0	18	21	26	30	16	19	0	0	24	28	86
West Pokot	0	0	0	0	3	12	18	71	0	0	4	17	0	0	25
Sub-total	156	6	839	29	574	21	510	20	216	8	4	0	400	16	2,696
Total	404	9	1,376	28	1,315	27	786	17	273	6	36	1	582	13	4,771

Source: STIBOKA, Reconnaissance Soil Map of the Lake Basin Development Authority Area.

Table 10.8 Relation between Land Use Intensity and Expansible Area

(Unit: ha/km2)

	Density of Active Cultivation		Intensibry of Land used for Agricul-ture & Infrastructure	Expansible Area
	Range	Mean		
Class	.(1)	.(2)	.(3)	.(4)
1	0	0.0	0	80
2	<10	5.3	10	70
3	30,608	15.4	25	55
4	20-40	29.1	50	30
5	>40	51.5	>80	0

Notes: (3)=(2)x1.7 rounded
(4)=80-(3)

Source: JICA Study Team

Table 10.9 Land Use Intensity by District

(Unit: 1000ha)

District	Total Land	Land Use Intensity (%) 0-10	10-25	25-50	50-80	>80
NYANZA						
Kisii	223	0	3	3	58	160
Kisumu	223	3	41	52	83	44
Siaya	263	2	57	37	132	35
South Nyanza	626	8	137	225	195	61
Sub-total	1,335	13	238	317	467	300
WESTERN						
Bungoma	329	2	15	37	135	140
Busia	178	0	16	47	92	24
Kakamega	367	62	3	48	109	146
Sub-total	874	64	33	132	336	309
RIFT VALLEY						
Kericho	443	31	88	106	173	46
Nandi	278	5	34	68	140	31
Narok	202	84	56	28	33	2
Trans Nzoia	227	20	5	17	89	96
Uasin Gishu	386	10	38	77	151	110
Others	179	23	70	40	42	12
Sub-total	1,715	173	290	335	627	298
TOTAL	3,924	250	562	783	1,430	907

Source: JICA Study Team

Table 10.10 Agro-Ecological Zones by District

(Unit: km2)

District	Total	Agro - Ecological zone																			
	Land	TA1-2	UH0	UH1	UH2	UH3	LH1	LH2	LH3	LH4	LH0 - UM0	UM1	UM2	UM3	UM4	UM5	LM1	LM2	LM3	LM4	LM5
		(01).	(02).	(03).	(04).	(05).	(06).	(07).	(08).	(09).	(10).	(11).	(12).	(13).	(14).	(15).	(16).	(17).	(18).	(19).	(20).
Nyanza Province																					
Kisii	2226	-	-	-	-	-	757	245	-	-	-	1113	45	-	-	-	45	22	-	-	-
Kisumu	2228	-	-	-	-	-	-	-	-	-	-	22	22	67	-	-	67	602	1025	401	-
Siaya	2632	-	-	-	-	-	-	-	-	-	-	26	-	-	-	-	684	474	869	526	26
south Nyanza	6262	-	-	-	-	-	-	-	-	-	-	125	63	688	63	125	250	1190	2192	877	751
Western Province																					
Bungoma	3286	164	296	66	-	-	197	66	-	-	-	197	263	361	296	-	197	723	427	-	-
Busia	1776	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	551	551	462	213	-
Kakamega	3676	-	-	-	-	-	-	-	-	-	74	882	-	110	772	-	1397	368	74	-	-
Rift Valley Prov.																					
Kericho	4431	-	222	222	310	-	1551	620	222	-	133	310	487	222	-	-	-	89	44	-	-
Nandi	2781	-	-	111	-	-	334	306	612	-	-	473	83	111	306	-	56	195	-	-	-
Narok	2021	-	-	-	-	-	243	121	81	-	-	141	-	1112	263	-	-	81	-	-	-
Trans Nzoia	2267	68	68	136	23	-	-	295	431	181	-	-	91	23	929	-	-	-	-	-	-
Uasin Gishu	3858	-	-	386	270	154	39	39	2122	347	-	-	-	-	502	-	-	-	-	-	-
Others	1795	-	18	521	700	-	162	269	90	-	-	-	-	18	18	-	-	-	-	-	-
Lake Basin Area	39239	232	604	1442	1303	154	3283	1961	3558	528	207	3289	1054	2712	3149	125	3247	4295	5093	2017	777

Source: MOALD, Farm Management Handbook of Kenya

Table 10.12 (1/10) Potential Land for Maize

(Unit: 1000ha)

District	Potential Land				
	Very Good	Good	Fair	Marginal	Total
NYANZA					
Kisii	3	12	0	0	15
Kisumu	0	13	49	0	62
Siaya	0	17	79	0	96
South Nyanza	17	10	203	0	230
Sub-total	20	52	331	0	403
WESTERN					
Bungoma	5	22	17	0	44
Busia	0	21	42	0	63
Kakamega	0	72	0	0	72
Sub-total	5	115	59	0	179
RIFT VALLEY					
Kericho	35	52	0	0	87
Nandi	45	25	0	0	70
Narok	18	88	0	0	106
Nakuru	0	16	0	0	16
Trans Nzoia	2	46	0	0	48
Uasin Gishu	17	75	0	0	92
Elgeyo Marakwet	5	4	0	0	9
West Pokot	4	0	0	0	4
Sub-total	126	306	0	0	432
TOTAL	151	473	390	0	1,014

Table 10.12 (2/10) Potential Land for Wheat

(Unit: 1000ha)

District	Potential Land				
	Very Good	Good	Fair	Marginal	Total
NYANZA					
Kisii	0	0	0	0	0
Kisumu	0	0	0	0	0
Siaya	0	0	0	0	0
South Nyanza	0	0	0	0	0
Sub-total	0	0	0	0	0
WESTERN	0	0	0	0	0
Bungoma	0	0	0	0	0
Busia	0	0	0	0	0
Kakamega	0	0	0	0	0
Sub-total	0	0	0	0	0
RIFT VALLEY	0	0	0	0	0
Kericho	0	30	13	0	43
Nandi	0	32	1	0	33
Narok	0	3	33	0	36
Nakuru	0	12	4	0	16
Trans Nzoia	0	10	2	0	12
Uasin Gishu	0	61	6	0	67
Elgeyo Marakwet	0	4	4	0	8
West Pokot	0	2	0	0	2
Sub-total	0	154	63	0	217
TOTAL	0	154	63	0	217

Table 10.12 (3/10) Potential Land for Rice

(Unit: 1000ha)

District	Potential Land				
	Very Good	Good	Fair	Marginal	Total
NYANZA					
Kisii	0	0	0	0	0
Kisumu	0	62	0	0	62
Siaya	0	3	0	0	3
South Nyanza	0	15	7	0	22
Sub-total	0	80	7	0	87
WESTERN					
Bungoma	0	3	0	0	3
Busia	0	3	0	0	3
Kakamega	0	0	0	0	0
Sub-total	0	6	0	0	6
RIFT VALLEY					
Kericho	0	0	3	0	3
Nandi	0	0	0	0	0
Narok	0	0	0	0	0
Nakuru	0	0	0	0	0
Trans Nzoia	0	0	0	0	0
Uasin Gishu	0	0	0	0	0
Elgeyo Marakwet	0	0	0	0	0
West Pokot	0	0	0	0	0
Sub-total	0	0	3	0	3
TOTAL	0	86	10	0	96

Table 10.12 (4/10) Potential Land for Coffee

(Unit: 1000ha)

District	Potential Land				
	Very Good	Good	Fair	Marginal	Total
NYANZA					
Kisii	0	3	0	0	3
Kisumu	0	0	0	0	0
Siaya	0	0	0	0	0
South Nyanza	0	0	4	8	11
Sub-total	0	3	4	8	14
WESTERN					
Bungoma	0	6	3	0	9
Busia	0	0	0	0	0
Kakamega	0	0	14	0	14
Sub-total	0	6	17	0	23
RIFT VALLEY					
Kericho	0	0	24	7	31
Nandi	0	0	10	0	10
Narok	0	0	51	10	61
Nakuru	0	0	0	0	0
Trans Nzoia	0	0	1	2	3
Uasin Gishu	0	0	0	0	0
Elgeyo Marakwet	0	0	0	0	0
West Pokot	0	0	0	0	0
Sub-total	0	0	86	19	105
TOTAL	0	9	107	27	142

Table 10.12 (5/10) Potential Land for Robusta Coffee

(Unit: 1000ha)

District	Potential Land				
	Very Good	Good	Fair	Marginal	Total
NYANZA					
Kisii	0	0	0	0	0
Kisumu	0	0	0	0	0
Siaya	0	22	11	0	33
South Nyanza	0	10	0	0	10
Sub-total	0	32	11	0	43
WESTERN					
Bungoma	0	2	9	0	11
Busia	0	22	13	0	35
Kakamega	0	27	8	0	35
Sub-total	0	51	30	0	81
RIFT VALLEY					
Kericho	0	0	0	0	0
Nandi	0	0	0	0	0
Narok	0	0	0	0	0
Nakuru	0	0	0	0	0
Trans Nzoia	0	0	0	0	0
Uasin Gishu	0	0	0	0	0
Elgeyo Marakwet	0	0	0	0	0
West Pokot	0	0	0	0	0
Sub-total	0	0	0	0	0
TOTAL	0	83	41	0	124

Table 10.12 (6/10) Potential Land for Tea

(Unit: 1000ha)

District	Potential Land				
	Very Good	Good	Fair	Marginal	Total
NYANZA					
Kisii	0	7	2	0	9
Kisumu	0	0	0	0	0
Siaya	1	22	0	0	23
South Nyanza	0	10	0	0	10
Sub-total	1	39	2	0	42
WESTERN					
Bungoma	3	1	0	0	4
Busia	0	21	0	0	21
Kakamega	11	28	0	0	39
Sub-total	14	50	0	0	64
RIFT VALLEY					
Kericho	21	0	15	0	36
Nandi	7	7	1	0	15
Narok	0	2	13	0	15
Nakuru	0	0	0	0	0
Trans Nzoia	0	0	0	4	4
Uasin Gishu	0	0	0	0	0
Elgeyo Marakwet	0	0	0	0	0
West Pokot	0	1	0	2	3
Sub-total	28	10	29	6	73
TOTAL	43	99	31	6	179

Table 10.12 (7/10) Potential Land for Cotton

(Unit: 1000ha)

District	Potential Land				
	Very Good	Good	Fair	Marginal	Total
NYANZA					
Kisii	0	0	0	0	0
Kisumu	0	21	15	11	47
Siaya	0	33	17	29	79
South Nyanza	0	66	36	19	121
Sub-total	0	120	68	59	247
WESTERN					
Bungoma	0	26	0	0	26
Busia	0	28	1	10	39
Kakamega	0	7	0	0	7
Sub-total	0	61	1	10	72
RIFT VALLEY					
Kericho	0	0	0	0	0
Nandi	0	3	0	0	3
Narok	0	0	0	0	0
Nakuru	0	0	0	0	0
Trans Nzoia	0	0	0	0	0
Uasin Gishu	0	0	0	0	0
Elgeyo Marakwet	0	0	0	0	0
West Pokot	0	0	0	0	0
Sub-total	0	3	0	0	3
TOTAL	0	184	69	69	322

Table 10.12 (8/10) Potential Land for Sugarcane

(Unit: 1000ha)

District	Potential Land				
	Very Good	Good	Fair	Marginal	Total
NYANZA					
Kisii	0	0	0	0	0
Kisumu	0	0	3	0	3
Siaya	0	29	4	0	33
South Nyanza	0	13	45	0	58
Sub-total	0	42	52	0	94
WESTERN					
Bungoma	0	3	5	1	9
Busia	0	22	13	0	35
Kakamega	0	34	0	1	35
Sub-total	0	59	18	2	79
RIFT VALLEY					
Kericho	0	0	0	0	0
Nandi	0	0	0	0	0
Narok	0	0	0	0	0
Nakuru	0	0	0	0	0
Trans Nzoia	0	0	0	0	0
Uasin Gishu	0	0	0	0	0
Elgeyo Marakwet	0	0	0	0	0
West Pokot	0	0	0	0	0
Sub-total	0	0	0	0	0
TOTAL	0	101	70	2	173

Table 10.12 (9/10) Potential Land for Tobacco

(Unit: 1000ha)

District	Potential Land				
	Very Good	Good	Fair	Marginal	Total
NYANZA					
Kisii	0	0	0	0	0
Kisumu	0	0	31	0	31
Siaya	0	0	33	0	33
South Nyanza	0	0	102	0	102
Sub-total	0	0	166	0	166
WESTERN					
Bungoma	0	3	20	0	23
Busia	0	3	0	0	3
Kakamega	0	0	7	0	7
Sub-total	0	6	27	0	33
RIFT VALLEY					
Kericho	0	0	1	0	1
Nandi	0	0	2	0	2
Narok	0	0	3	0	3
Nakuru	0	0	0	0	0
Trans Nzoia	0	0	0	0	0
Uasin Gishu	0	0	0	0	0
Elgeyo Marakwet	0	0	0	0	0
West Pokot	0	0	0	0	0
Sub-total	0	0	6	0	6
TOTAL	0	6	199	0	205

Table 10.12 (10/10) Potential Land for Horticultural Crops

(Unit: 1000ha)

District	Potential Land				
	Very Good	Good	Fair	Marginal	Total
NYANZA					
Kisii	0	8	5	0	13
Kisumu	0	0	0	0	0
Siaya	0	0	0	0	0
South Nyanza	0	0	0	0	0
Sub-total	0	8	5	0	13
WESTERN					
Bungoma	3	3	1	0	7
Busia	4	3	0	0	7
Kakamega	10	0	0	0	10
Sub-total	17	6	1	0	24
RIFT VALLEY					
Kericho	7	39	18	0	64
Nandi	9	8	9	0	26
Narok	0	0	0	0	0
Nakuru	0	0	0	0	0
Trans Nzoia	0	1	4	0	5
Uasin Gishu	0	1	3	0	4
Elgeyo Marakwet	0	0	0	0	0
West Pokot	0	0	0	0	0
Sub-total	16	49	34	0	99
TOTAL	33	63	40	0	136

Source: Same as Table 10.10

Table 10.13 Pasture Requirement under Scenarios 1 and 2

District	Total LU 1000 LU	Feed Available 1000 LU	Feed Required 1000 LU	Carry. Capa. LU/ha	Pasture Required 1000 ha	Grass. Cover. 1000 ha	Land for Agri. &Infr. Devel. 1000 ha
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
NYANZA							
Kisii	198	308	0	1.5	0	27	27
Kisumu	121	117	4	0.9	6	81	75
Siaya	130	130	0	0.9	0	91	91
South Nyanza	324	237	87	0.9	138	259	121
Sub-total	772	792			144	458	314
WESTERN							
Bungoma	154	140	14	1.2	17	77	60
Busia	74	55	19	1.0	27	76	49
Kakamega	191	228	0	1.4	0	76	76
Sub-total	419	423			44	229	185
RIFT VALLEY							
Kericho	430	416	14	1.4	14	84	70
Nandi	214	203	11	1.1	14	81	67
Narok	203	201	2	1.0	3	105	102
Trans Nzoia	156	135	21	1.0	30	67	37
Uasin Gishu	251	185	66	1.6	59	146	87
Others	110	94	16	1.2	19	49	30
Sub-total	1,359	1,234			139	532	393
ILUS Area	2,550	2,447			327	1,219	892
MARA BASIN	246	14	232	0.4	682	720	38
TOTAL	2,797	2,461			1,009	1,939	930

Remarks:
(1) 1,036,000 LU of grade cattle, 1,678,000 LU of local cattle and 87,000 LU of sheep and goats
(2) 599,000 LU of managed pasture, 1,324,000 LU of fodder crops and 538,000 LU of crop residue
(3) (2)-(1)
(5) (3)/(4)/D40; utilization efficiecy=70%
(7) (6)-(5)

Sources:
MoALD, Farm Management Handbook of Kenya.
ILACO, agricultural Compendium, 1981.

Table 10.14 Possible Irrigation Projects

Project	Irrigation Area (ha)	Water Sources	Proposed crops	District concerned
Kano Plain South	8,540	Sondu	maize, rice, cotton	Kisumu, South Nyanza
Kano Plain North	12,000	Sondu, Nyando Yala	maize, rice	Kisumu, South Nyanza
Yala Swamp	17,500	Yala	maize	Busia, Siaya
Kuja	1,900	Kuja	maize, pulses, groundnuts, cotton	South Nyanza
Upper Nzoia	5,030	Nzoia	orange,maize, vegetable	Trans Nzoia, Uasin Gishu
Lower Nzoia	6,420	Nzoia	maize, rice, cotton	Busia, Siaya
Small scale scheme	2,100	Nzoia	maize, rice, cotton	Busia
	1,100	Awach Tende	maize, rice	South Nyanza
	2,000	Awach Kibuon		

Source: Compiled by JICA Study Team

Table 10.15 Land Use Plan under Both Scenarios in ILUS Area

(Unit: 1000 ha)

Land Use Category	1985 Existing	Scenario 1 Existing	Scenario 1 Expansion	Scenario 2 Existing	Scenario 2 Expansion
I. FOOD CROPS					
Maize	455	690	235	455	0
Sorghum & Millet	58	83	25	58	0
Beans	91	140	49	91	0
Wheat, Barley and Oat	92	190	98	92	0
Rice	3	30	27	18	15
Cassava and Sweet Potatoes	92	116	24	92	0
Others	31	31	0	31	0
Sub-total (I)	822	1,280	458	837	15
II. CASH CROPS					
Coffee	13	13	0	80	67
Tea	48	48	0	80	32
Cotton	49	49	0	59	10
Sugarcane	109	109	0	134	25
Others	16	16	0	46	30
Sub-total (II)	235	235	0	399	164
III. FRUITS & VEGETABLE	13	13	0	70	57
IV. FODDER CROPS	139	246	107	246	107
Sub-total (I to IV)	1,209	1,774	565	1,552	343
V. MANAGED PASTURE	165	165	0	165	0
VI. FALLOW LAND	136	136	0	136	0
VII. OTHERS	19	19	0	19	0
Sub-total (V to VII)	320	320	0	320	0
AGRICULTURAL LAND (I to VII)	1,529	2,094	565	1,872	343
VIII NATURAL VEGETATION					
Tree and Bush Cover	904	903	-1	904	0
Grass Cover	1,219	327	-892	548	-671
Sub-total (VIII)	2,123	1,230	-893	1,452	-671
IX. INFRASTRUCTURE & OTHERS	272	600	328	600	328
TOTAL LAND	3,924	3,924	0	3,924	0

Source: JICA Study Team

Table 10.16 Agricultural Land Development by District under Scenario 1

(Unit: 1000 ha)

District	Maize	Sorghum & Millet	Beans	Wheat & Barley	Paddy	Root Crops	Fodder Crops	Total
NYANZA								
Kisii	9	0	2	0	0	0	0	11
Kisumu	15	4	2	0	15	0	13	49
Siaya	30	2	5	0	3	5	8	53
South Nyanza	50	7	8	0	4	15	16	100
Sub-total	104	13	17	0	22	20	37	213
WESTERN								
Bungoma	15	2	4	0	2	0	0	23
Busia	10	6	3	0	2	4	0	25
Kakamega	16	2	8	0	1	0	0	27
Sub-total	41	10	15	0	5	4	0	75
RIFT VALLEY								
Kericho	20	1	4	19	0	0	0	44
Nandi	15	0	2	15	0	0	7	39
Narok	10	1	2	21	0	0	32	66
Trans Nzoia	10	0	4	10	0	0	10	34
Uasin Gishu	18	0	5	26	0	0	13	62
Others	17	0	0	7	0	0	8	32
Sub-total	90	2	17	98	0	0	70	277
Total	235	25	49	98	27	24	107	565

Source: JICA Study Team

Table 10.17 Agricultural Land Development by District under Scenario 2

(Unit: 1000 ha)

District	Arabica Coffee	Robusta Coffee	Tea	Cotton	Sugar cane	Other Cash Cro.	Fruits & Vegetables	Paddy	Fodder Crops	Total
NYANZA										
Kisii	3	0	5	0	0	1	4	0	0	13
Kisumu	0	1	0	5	0	3	0	15	13	37
Siaya	0	15	0	1	0	1	0	0	8	25
South Nyanza	3	10	0	3	10	1	8	0	16	51
Sub-total	6	26	5	9	10	6	12	15	37	126
WESTERN										
Bungoma	7	3	6	0	5	3	2	0	0	26
Busia	0	10	0	1	0	5	5	0	0	21
Kakamega	2	1	3	0	10	2	5	0	0	23
Sub-total	9	14	9	1	15	10	12	0	0	70
RIFT VALLEY										
Kericho	6	0	7	0	0	2	20	0	0	35
Nandi	6	0	5	0	0	2	13	0	7	33
Narok	0	0	3	0	0	4	0	0	32	39
Trans Nzoia	0	0	1	0	0	4	0	0	10	15
Uasin Gishu	0	0	0	0	0	1	0	0	13	14
Others	0	0	2	0	0	1	0	0	8	11
Sub-total	12	0	18	0	0	14	33	0	70	147
Total	27	40	32	10	25	30	57	15	107	343

Source: JICA Study Team

Table 10.18 Expansion of Maize, Sorghum and Beans under Scenario 3

(Unit: 1000 ha)

District	Existing* Field	Expansible Area	Very Good >6t/ha**	Good >4t/ha**	Fair >2.2t/ha**	Total Expansion
Nyanza						
Kisii	60	15	2	2	0	4
Kisumu	21	62	21	0	0	21
Siaya	54	96	0	15	15	30
South Nyanza	77	230	10	10	42	62
Sub-total	212	403	33	27	57	117
Western						
Bungoma	66	44	0	15	0	15
Busia	14	63	0	0	20	20
Kakamega	77	72	0	25	0	25
Sub-otal	157	179	0	40	20	60
Rift Valley						
Kericho	45	87	21	4	0	25
Nandi	41	70	17	0	0	17
Narok	11	106	10	2	0	12
Trans Nzoia	57	48	4	8	0	12
Uasin Gishu	61	92	16	0	0	16
Others	20	29	4	11	0	15
Sub-total	235	432	72	25	0	97
Total	604	1,014	105	92	77	274
Proportion			38%	34%	28%	100%

Notes: * Total existing area of maize (455,000ha), sorghum (58,000ha) and beans (91,000ha) and beans (91,000ha)
** Potential yield of maize at Production Level III

Source: JICA Study Team

Table 10.19 Expansion of Wheat and Rice under Scenario 3

(Unit: 1000 ha)

District	Wheet & Barley			Rice		
	Existing	Potent.	Expans.	Existing	Potent.	Expans.
Nyanze						
Kisii	0	0	0	0	0	0
Kisumu	0	0	0	1	62	15
Siaya	0	0	0	0	3	3
South Nyanza	0	0	0	1	22	4
Sub-otal	0	0	0	2	87	22
Western						
Bungoma	0	0	0	0	3	2
Busia	0	0	0	1	3	2
Kakamega	0	0	0	0	0	1
Sub-otal	0	0	0	1	6	5
Rift Valley						
Kericho	2	43	5	0	3	0
Nandi	1	33	10	0	0	0
Narok	0	36	0	0	0	0
Trans Nzoia	12	12	10	0	0	0
Uasin Gishu	71	67	19	0	0	0
Others	6	26	0	0	0	0
Sub-otal	92	217	44	0	3	0
Total	92	217	44	3	96	27

Source: JICA Study Team

Table 10.20 Expansion of Coffee and Tea under Scenario 3

(Unit: 1000ha)

District	Arabica Coffee			Robusta Coffee			Tea		
	Existing	Potent.	Expans.	Existing	Potent.	Expans.	Existing	Potent.	Expans.
Nyanza									
Kisii	5	3	3	0	0	0	11	9	6
Kisumu	0	0	0	0	3	1	0	0	0
Siaya	0	0	0	0	30	7	0	23	0
South Nyanza	1	11	0	0	10	5	0	10	0
Sub-total	6	14	3	0	43	13	11	42	6
Western									
Bungoma	3	9	4	0	11	3	0	4	0
Busia	0	0	0	0	35	8	0	21	0
Kakamega	1	13	2	0	35	8	2	39	7
Sub-total	4	22	6	0	81	19	2	64	7
Rift Valley									
Kericho	2	31	4	0	0	0	26	36	7
Nandi	0	10	4	0	0	0	9	15	4
Narok	0	61	0	0	0	0	0	15	0
Trans Nzoia	1	4	0	0	0	0	0	4	0
Uasin Gishu	0	0	0	0	0	0	0	0	0
Others	0	0	0	0	0	0	0	3	0
Sub-total	3	106	8	0	0	0	35	73	11
Total	13	142	17	0	124	32	48	179	24
National Expansion Programme			75			50			41
LBDA's share in Expansion Program.			23%			64%			59%

Source: JICA Study Tem

Table 10.21 Expansion of Sugarcane, Cotton and Horticultural Crops

(Unit: 1000ha)

District	Sugarcane			Cotton			Fruit & Vegetable		
	Existing	Potent.	Expans.	Existing	Potent.	Expans.	Existing	Potent.	Expans.
Nyanze									
Kisii	2	0	0	0	0	0	2	13	2
Kisumu	45	3	0	7	47	5	1	0	0
Siaya	3	33	0	9	79	1	0	0	0
South Nyanza	10	58	5	24	121	3	1	0	0
Sub-otal	60	94	5	40	247	9	4	13	2
Western									
Bungoma	10	9	10	5	26	0	1	7	0
Busia	1	35	0	3	39	1	0	7	0
Kakamega	33	35	10	1	7	0	2	10	3
Sub-otal	44	79	20	9	72	1	3	24	3
Rift Valley									
Kericho	2	0	0	0	0	0	2	64	5
Nandi	3	0	0	0	3	0	1	26	5
Narok	0	0	0	0	0	0	0	0	0
Trans Nzoia	0	0	0	0	0	0	1	5	0
Uasin Gishu	0	0	0	0	0	0	1	4	0
Others	0	0	0	0	0	0	1	0	0
Sub-total	5	0	0	0	3	0	6	99	10
Total	109	173	25	49	322	10	13	136	15

Source: JICA Study Team

Table 10.22 Agricultural Land Development under Scenario 3

(Unit: 1000ha)

District	Maize	Sorg.	Beans	Wheat	Rice	Arabica Coffee	Robusta Coffee	Tea	Sugar cane	Cotton	Fruit & Veg.	Fodder Crop	Total
Nyanze													
Kisii	3	0	1	0	0	3	0	6	0	0	2	0	15
Kisumu	15	4	2	0	15	0	1	0	0	2	0	11	50
Siaya	19	5	6	0	3	0	7	0	0	1	0	7	48
S. Nyanza	47	7	8	0	4	0	5	0	5	3	0	12	91
Sub-total	84	16	17	0	22	3	13	6	5	6	2	30	204
Western													
Bungoma	12	0	3	0	2	4	3	0	10	0	0	0	34
Busia	10	4	6	0	2	0	8	0	0	1	0	0	31
Kakamega	14	3	8	0	1	2	8	7	10	0	3	0	56
Sub-total	36	7	17	0	5	6	19	7	20	1	3	0	121
Rift Valley													
Kericho	20	1	4	5	0	4	0	7	0	0	5	0	46
Nandi	15	0	2	10	0	3	0	4	0	0	5	7	46
Narok	10	1	1	0	0	0	0	0	0	0	0	32	44
T. Nzoia	10	0	2	10	0	1	0	0	0	0	0	10	33
U. Gishu	16	0	0	19	0	0	0	0	0	0	0	13	48
Others	15	0	0	0	0	0	0	0	0	0	0	8	23
Sub-total	86	2	9	44	0	8	0	11	0	0	10	70	240
Total	206	25	43	44	27	17	32	24	25	7	15	100	565

Source: JICA Study Team

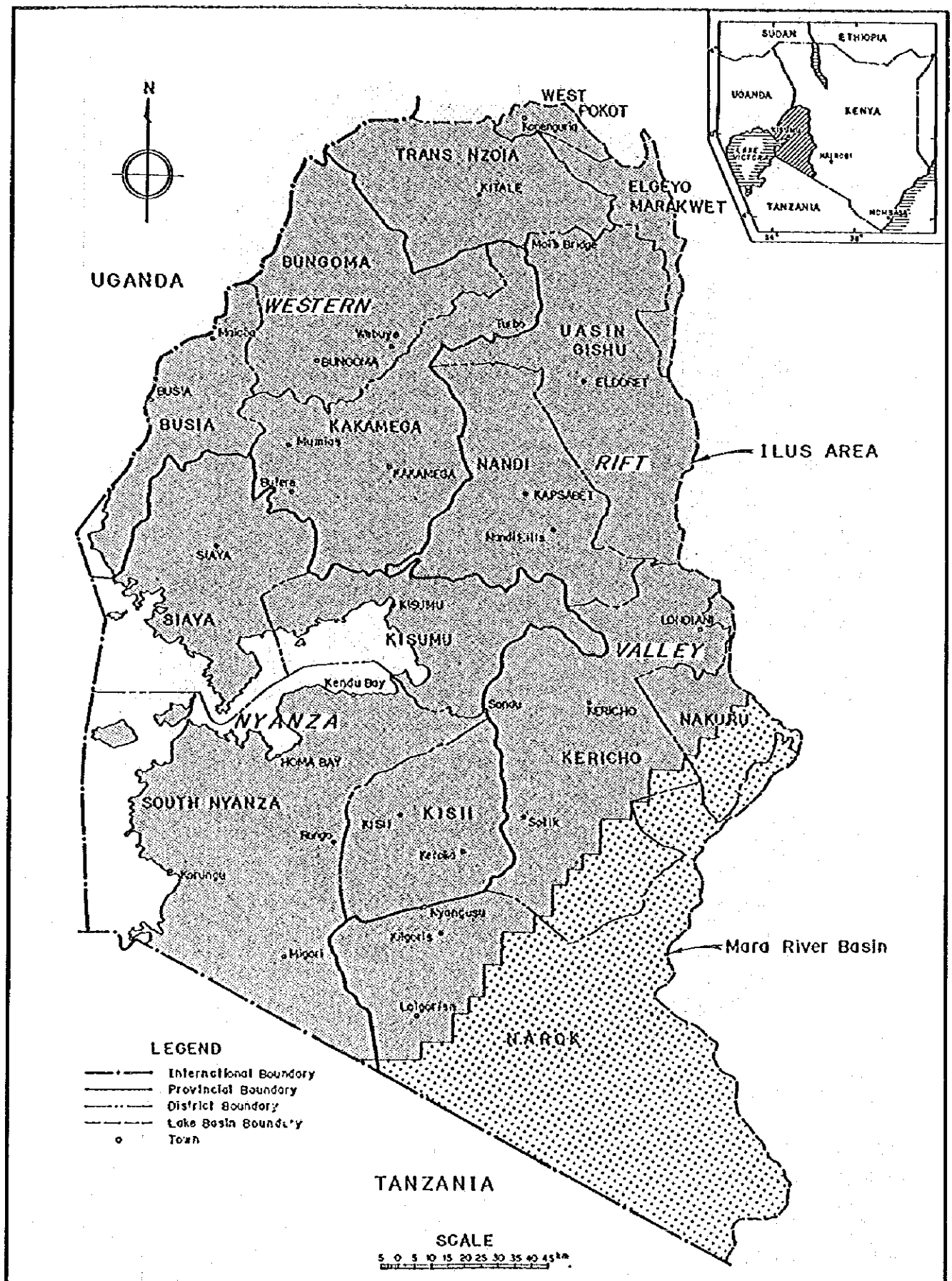

Figure 10.1 Area Division by Data Availability

REPUBLIC OF KENYA LAKE BASIN DEVELOPMENT AUTHORITY
THE STUDY OF INTEGRATED REGIONAL DEVELOPMENT MASTER PLAN FOR THE LAKE BASIN DEVELOPMENT AREA
JAPAN INTERNATIONAL COOPERATION AGENCY

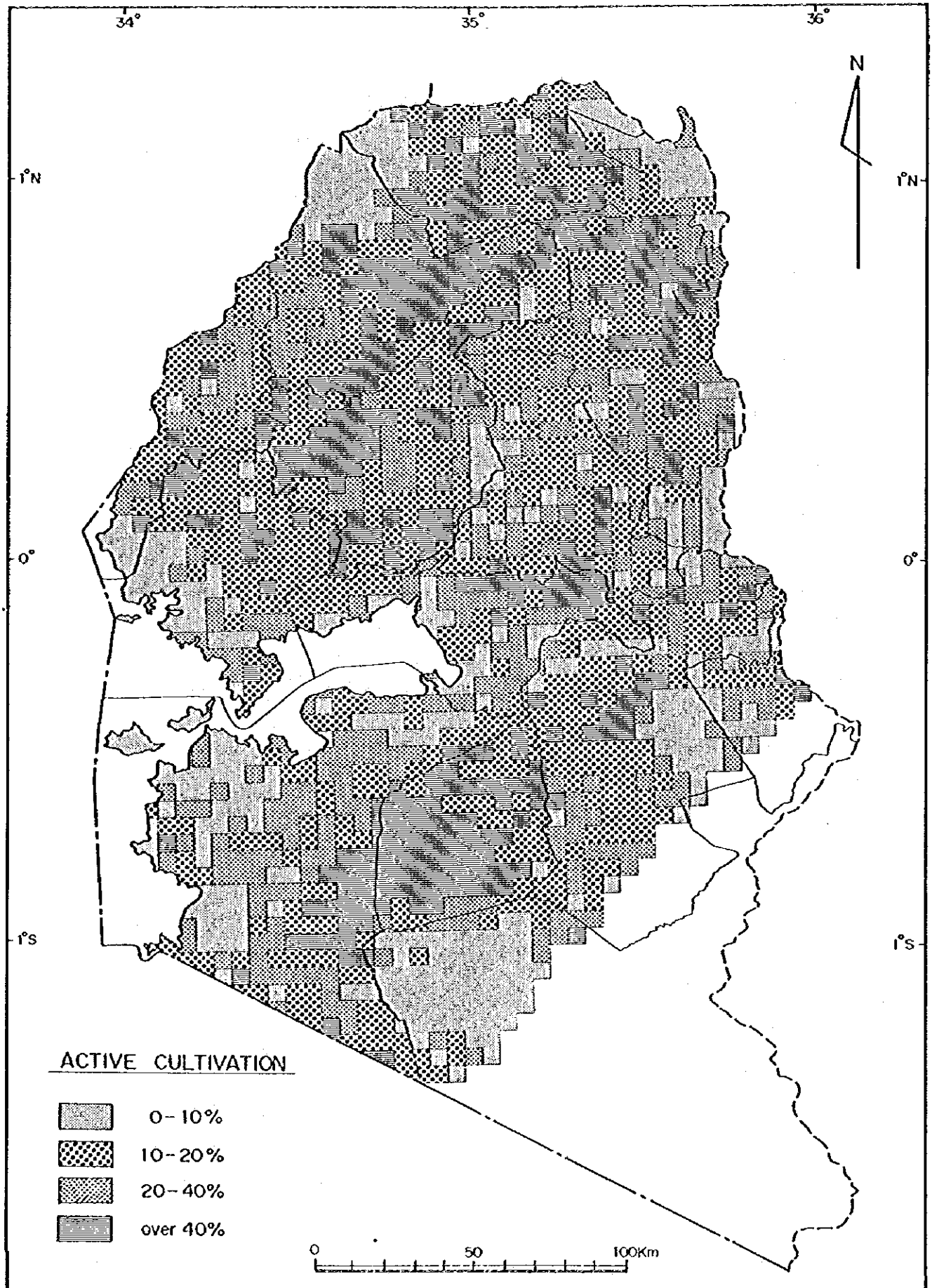

Figure 10.2 Spatial Distribution of Active Cultivation Area

REPUBLIC OF KENYA LAKE BASIN DEVELOPMENT AUTHORITY
THE STUDY OF INTEGRATED REGIONAL DEVELOPMENT MASTER PLAN FOR THE LAKE BASIN DEVELOPMENT AREA
JAPAN INTERNATIONAL COOPERATION AGENCY

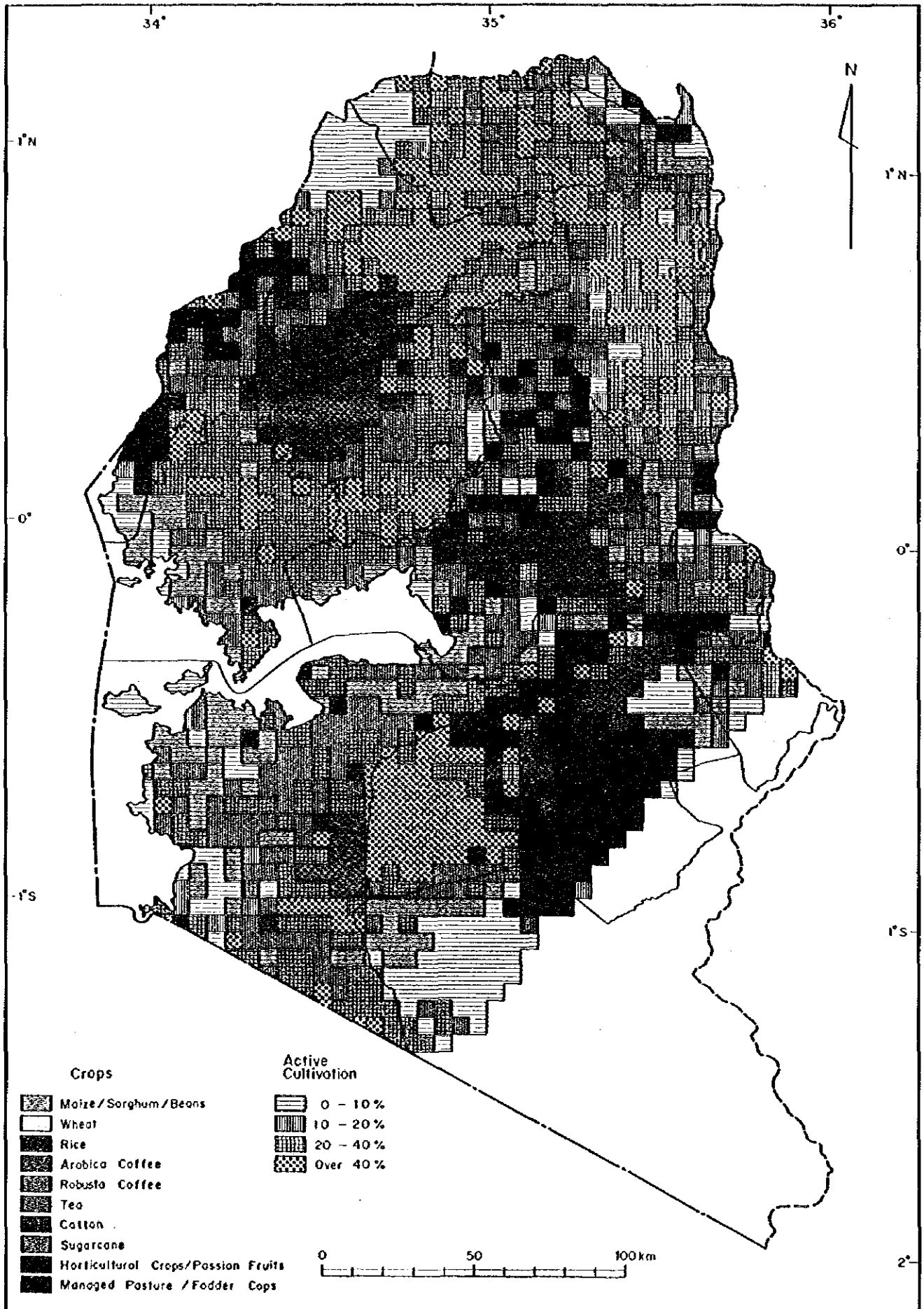

Figure 10.3 Spatial Distribution of Crops

REPUBLIC OF KENYA LAKE BASIN DEVELOPMENT AUTHORITY
THE STUDY OF INTEGRATED REGIONAL DEVELOPMENT MASTER PLAN FOR THE LAKE BASIN DEVELOPMENT AREA
JAPAN INTERNATIONAL COOPERATION AGENCY

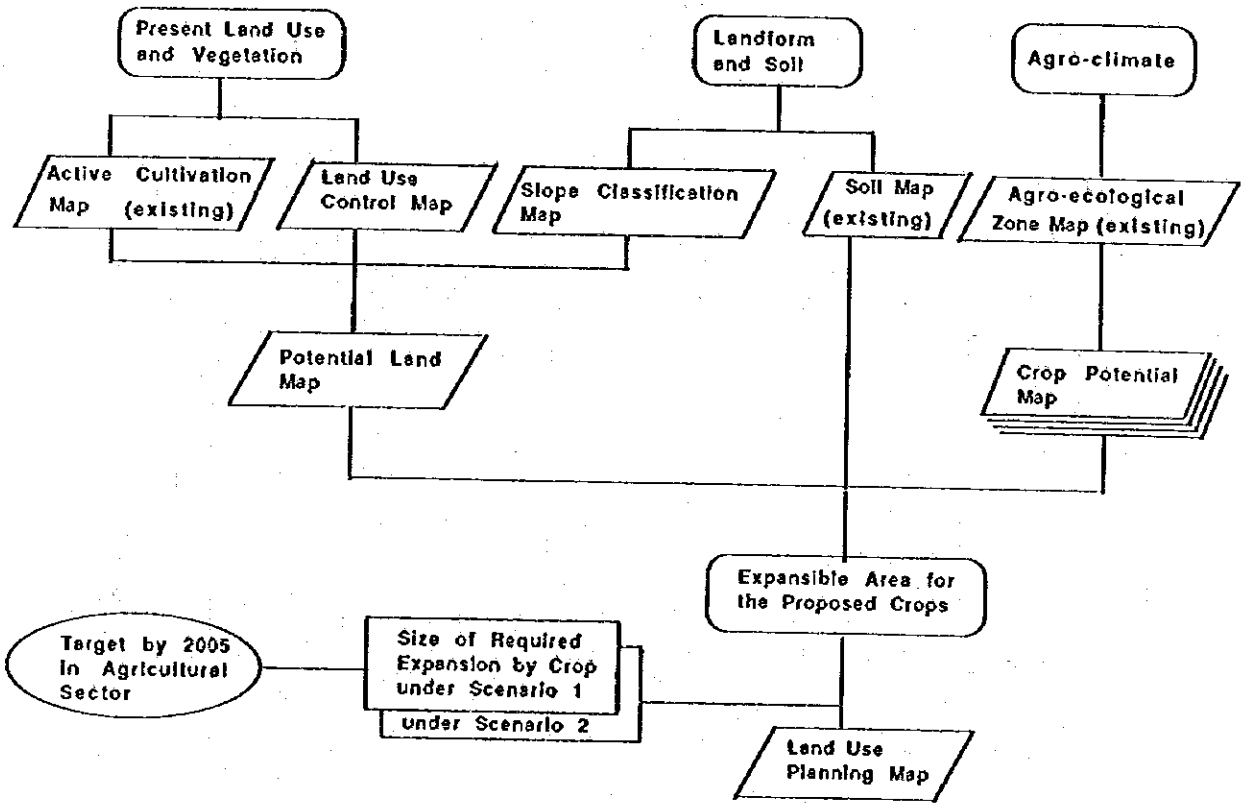

Figure 10.4 Workflow of Land Evaluation

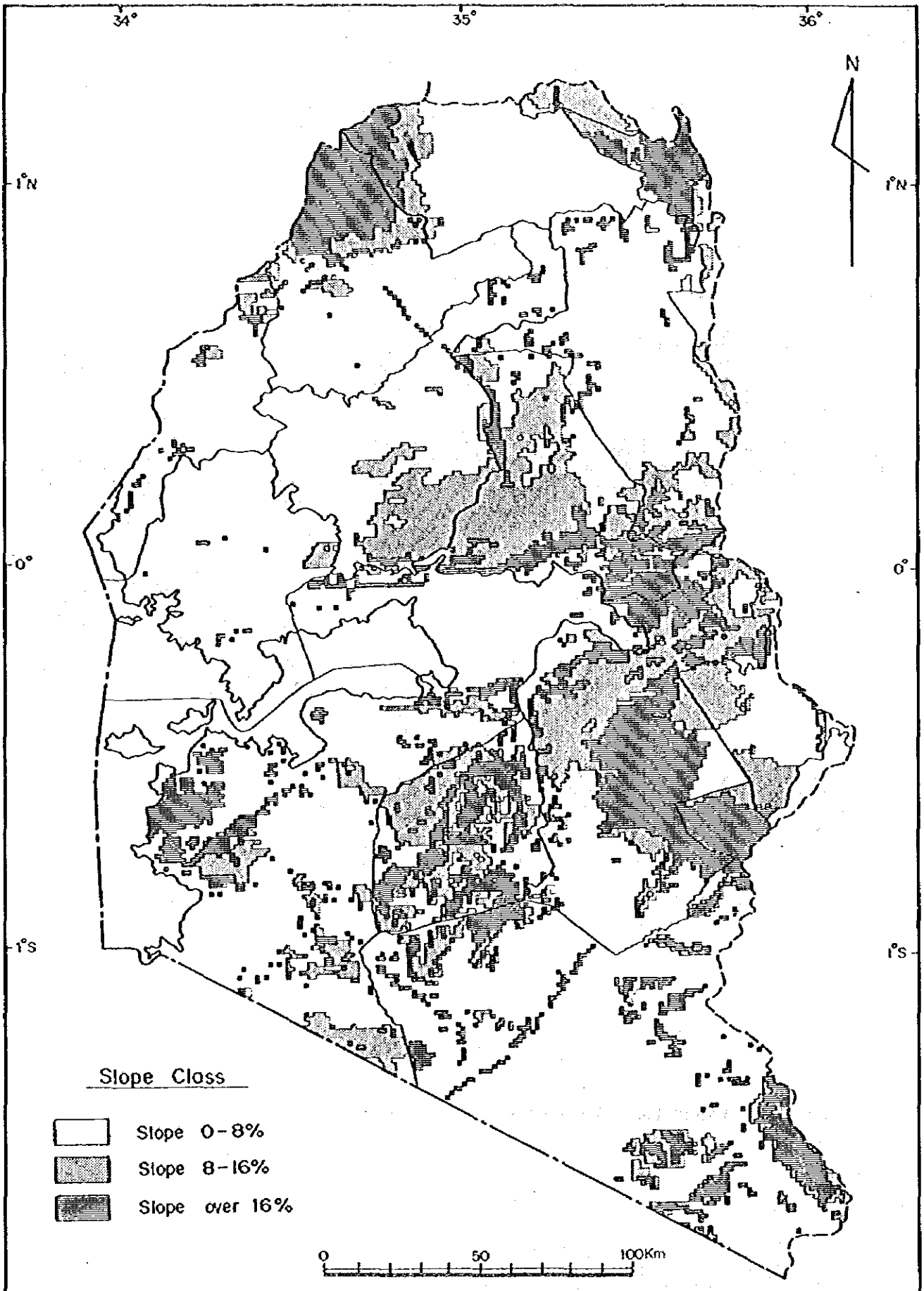

Figure 10.5 Slope Classification Map

REPUBLIC OF KENYA LAKE BASIN DEVELOPMENT AUTHORITY
THE STUDY OF INTEGRATED REGIONAL DEVELOPMENT MASTER PLAN FOR THE LAKE BASIN DEVELOPMENT AREA
JAPAN INTERNATIONAL COOPERATION AGENCY

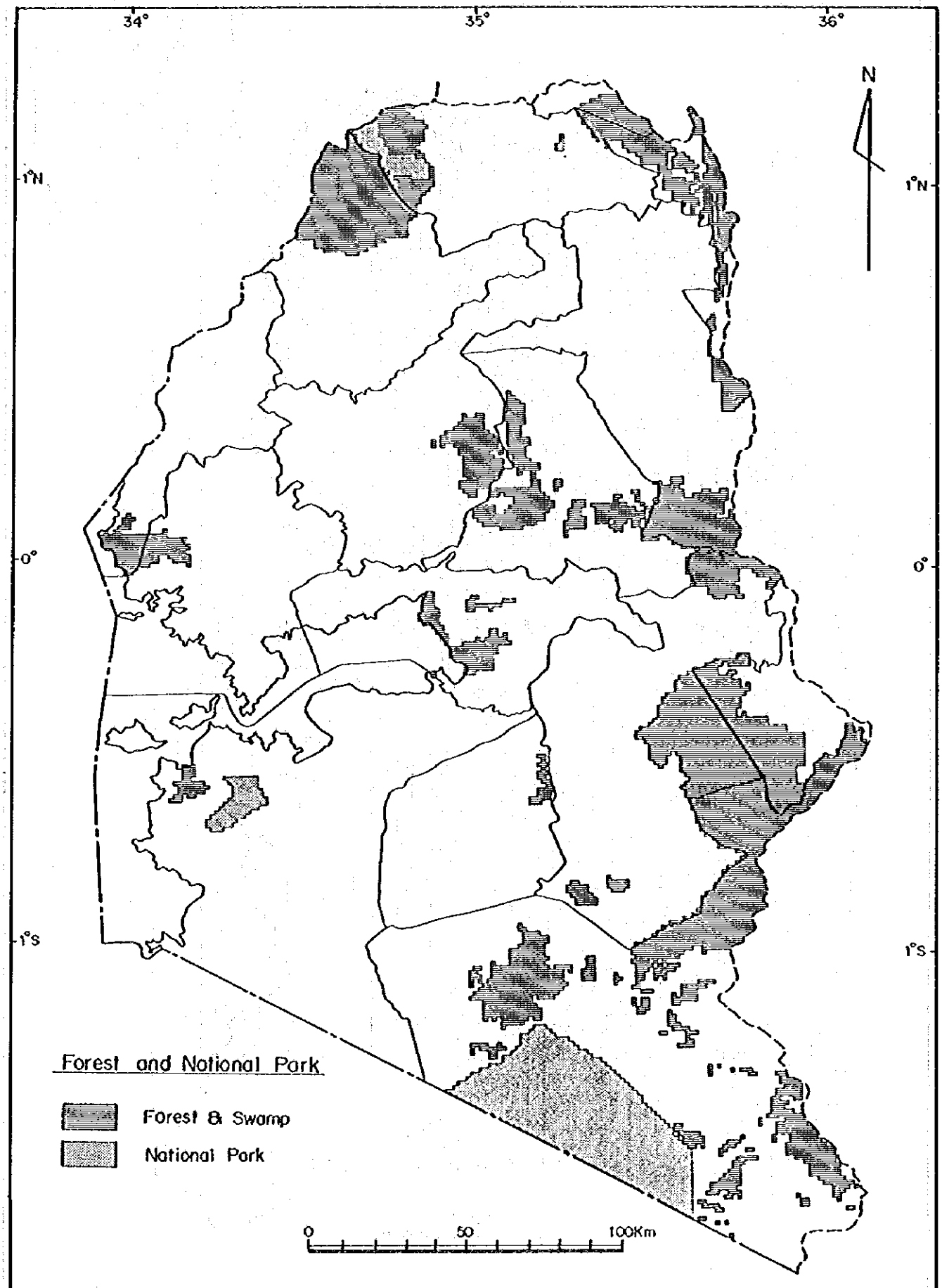

Figure 10.6 Land Use Control Map

REPUBLIC OF KENYA LAKE BASIN DEVELOPMENT AUTHORITY
THE STUDY OF INTEGRATED REGIONAL DEVELOPMENT MASTER PLAN FOR THE LAKE BASIN DEVELOPMENT AREA
JAPAN INTERNATIONAL COOPERATION AGENCY

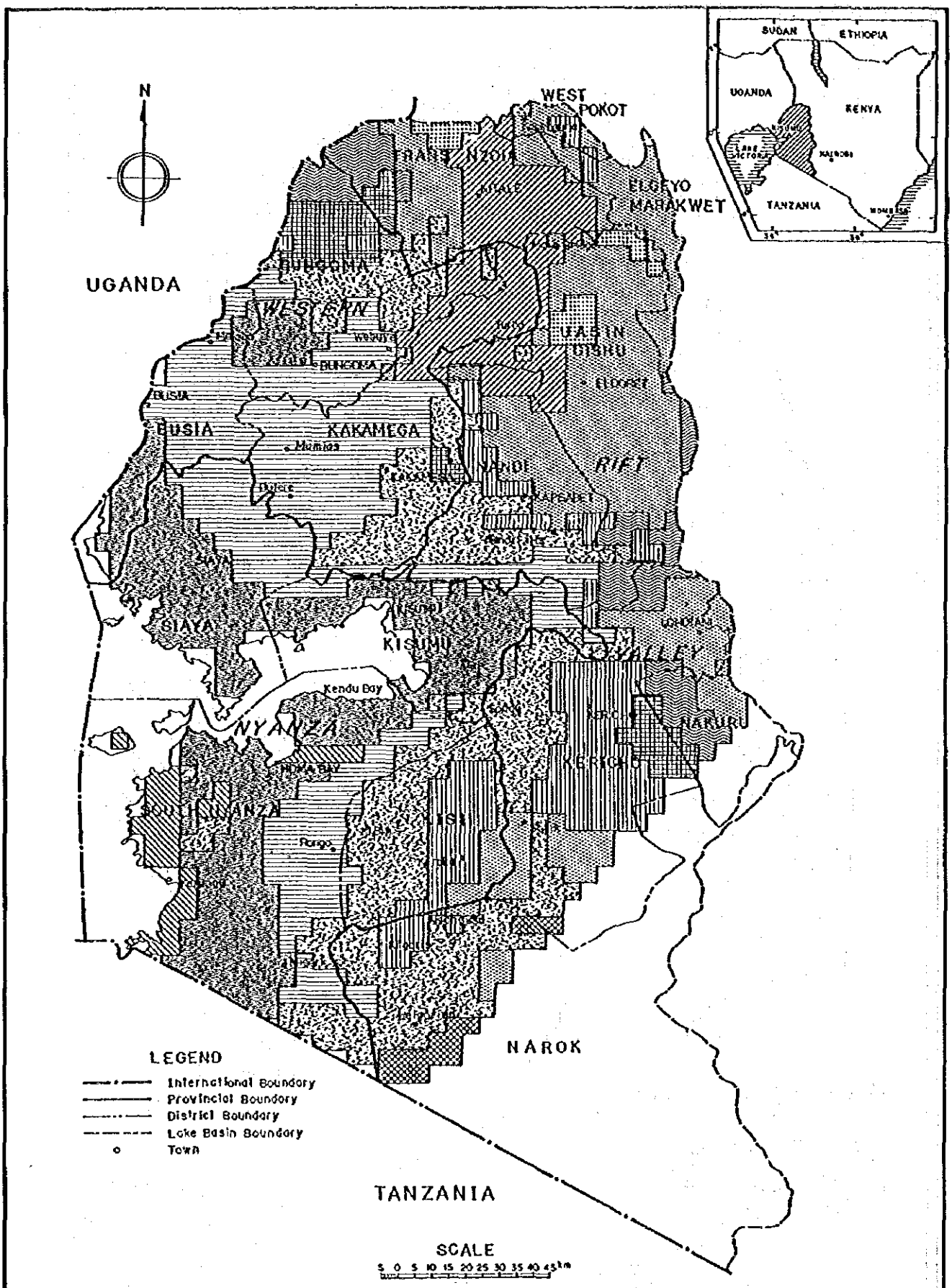

Figure 10.7 Agro-Ecological Zones In Lake Basin Development Area

REPUBLIC OF KENYA LAKE BASIN DEVELOPMENT AUTHORITY
THE STUDY OF INTEGRATED REGIONAL DEVELOPMENT MASTER PLAN FOR THE LAKE BASIN DEVELOPMENT AREA
JAPAN INTERNATIONAL COOPERATION AGENCY

Legend for Figure 10.7 Agro-Ecological Zones In Lake Basin Development Area

Main Zone / Belt of Z.	0 perhumid	1 humid	2 subhumid	3 semi-humid	4 transitional	5 semi-arid	6 arid	7 perarid
TA Tropical Alpine Zones Ann. mean 2-10°C	Glacier / Mountain swamps	* I. Cattle-Sheep Zone	*	II. Sheep Zone			High altitude deserts	
UH Upper Highland Zones Ann. mean 10-15°C Seas. night frost	*	* Sheep Dairy Zone	* Pyrethrum-Wheat Zone	* Wheat-Barley Zone	U.Highland Ranching Zone	U.H. Nomadism Zone		
LH Lower Highl. Zones Ann. mean 15-18°C M. min. 8-11°C norm. no frost	*	* Tea-Dairy Zone	* Wheat/Maize-Pyrethrum Zone 1)	* Wheat/(M) 1) Barley Zone	* Cattle-Sheep-Barley Zone	L.Highland Ranching Zone	L.H. Nomadism Zone	
UM Upper Midland Zones Ann. mean 18-21°C M. min. 11-14°C	*	* Coffee-Tea Zone	* Main Coffee Zone	* Marginal Coffee Zone	* Sunflower-Maize 2) Zone	* Livestock-Sorghum Zone	U. Midland Ranching Zone	U. Midland Nom. Zone
LM Lower Midland Zones Ann. mean 21-24°C M. min. 14°C	*	* L. Midland Sugar-cane Zone	* Marginal Sugarcane Zone	* L. Midland Cotton Zone	* Marginal Cotton Zone	* L.Midland Livestock-Millet Zone	L. Midland Ranching Zone	L. Midland Nom. Zone
L Lowlan Zones IL Inner Lowl. Z. Ann. mean 24°C Mean max. 31°C		Rice-Taro Zone	Lowland Sugarcane Zone	Lowland Cotton Zone	Groundnut Zone	Lowland Livestock-Millet Zone	Lowland Ranching Zone	Lowland Nom. Zone
CL Coastal Lowl. Zones Ann. mean 24°C Mean max. 31°C		Cotton Oilpalm Zone	Lowland Sugarcane Zone	Coconut-Cassava Zone	Cashewnut-Cassava Zone	Lowland Livestock-Millet Zone	Lowland Ranching Zone	Lowland Nom. Zone

Remarks: * identified in the Lake Basin development area
1) Wheat or maize depending on farm scale, topography and others
2) Maize is a good cash crop here, but maize also in LH1, UM1-3, LM and L1-4

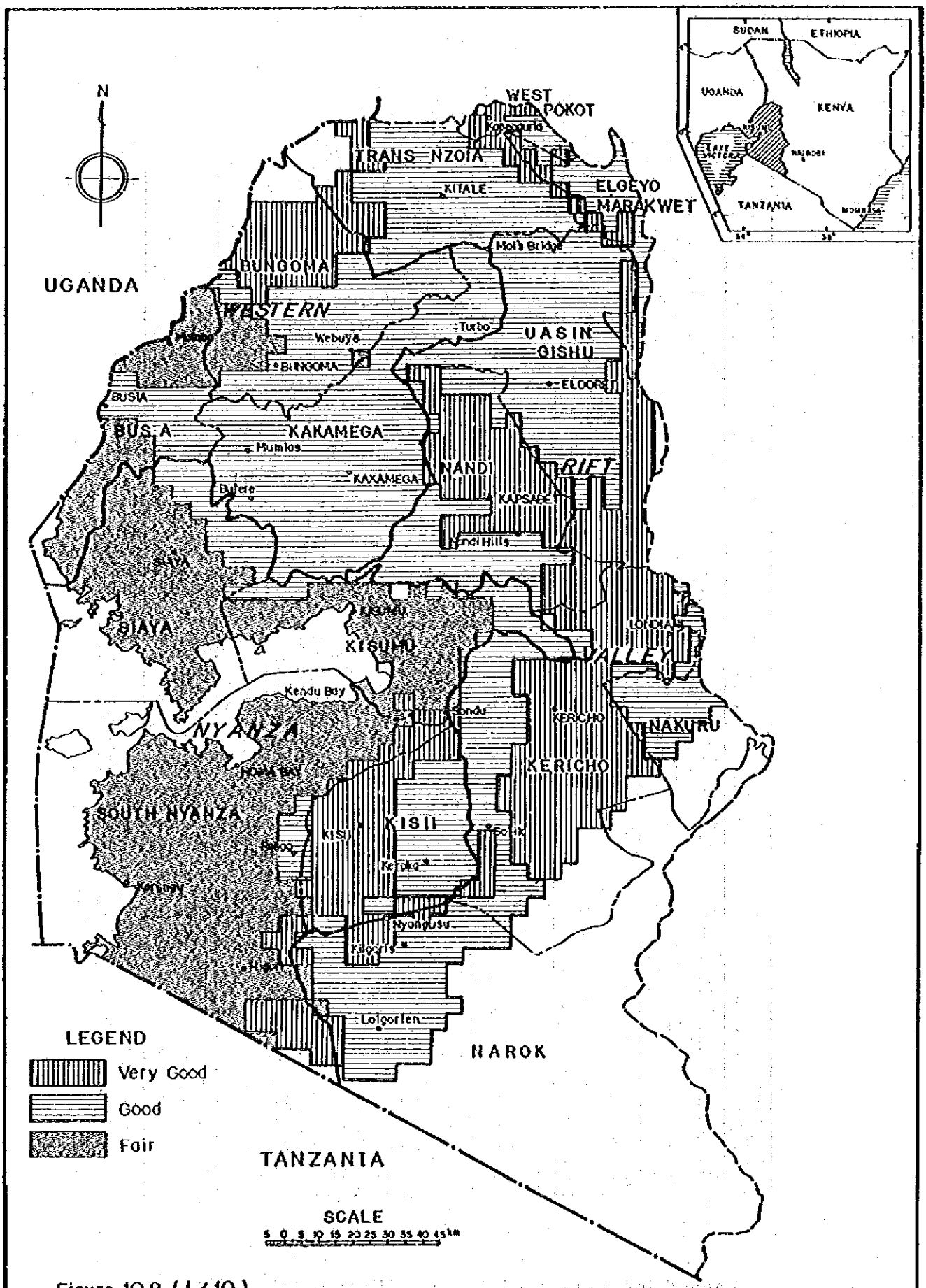

Figure 10.8 (1/10)
Crop Suitable Zone for Maize

REPUBLIC OF KENYA LAKE BASIN DEVELOPMENT AUTHORITY
THE STUDY OF INTEGRATED REGIONAL DEVELOPMENT MASTER PLAN FOR THE LAKE BASIN DEVELOPMENT AREA
JAPAN INTERNATIONAL COOPERATION AGENCY

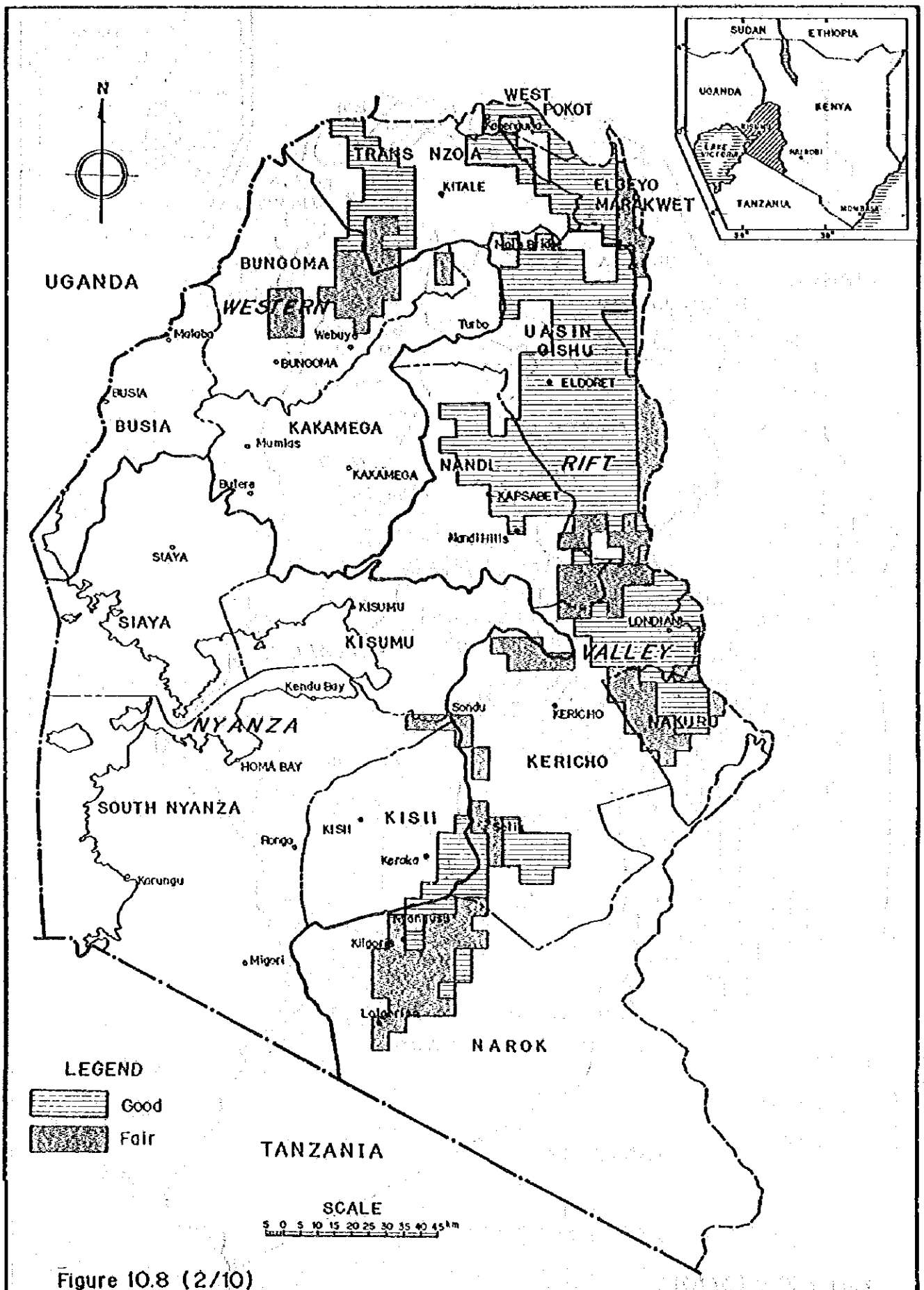

Figure 10.8 (2/10)
Crop Suitable Zone for Wheat

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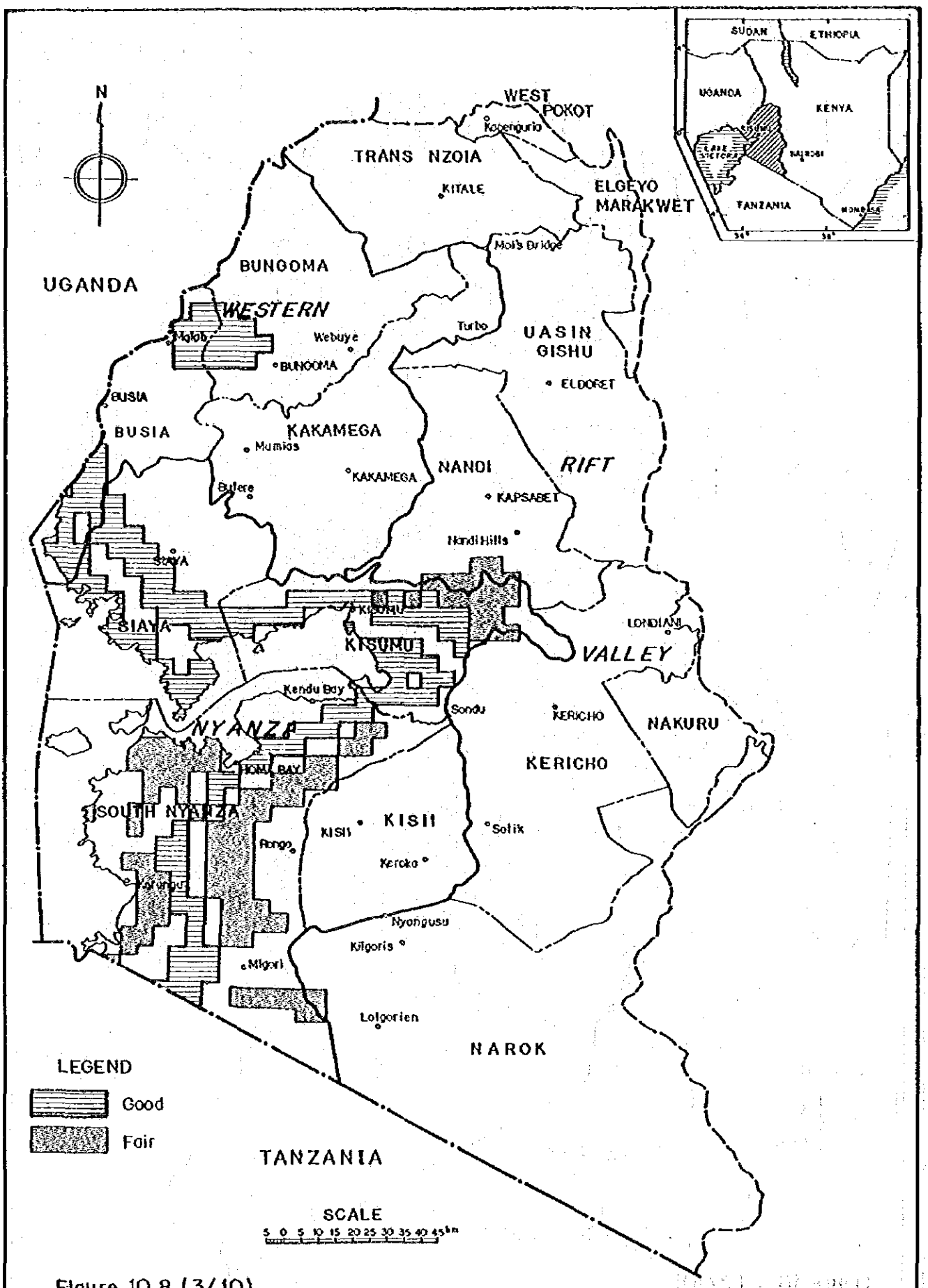

Figure 10.8 (3/10)
Crop Suitable Zone for Rice

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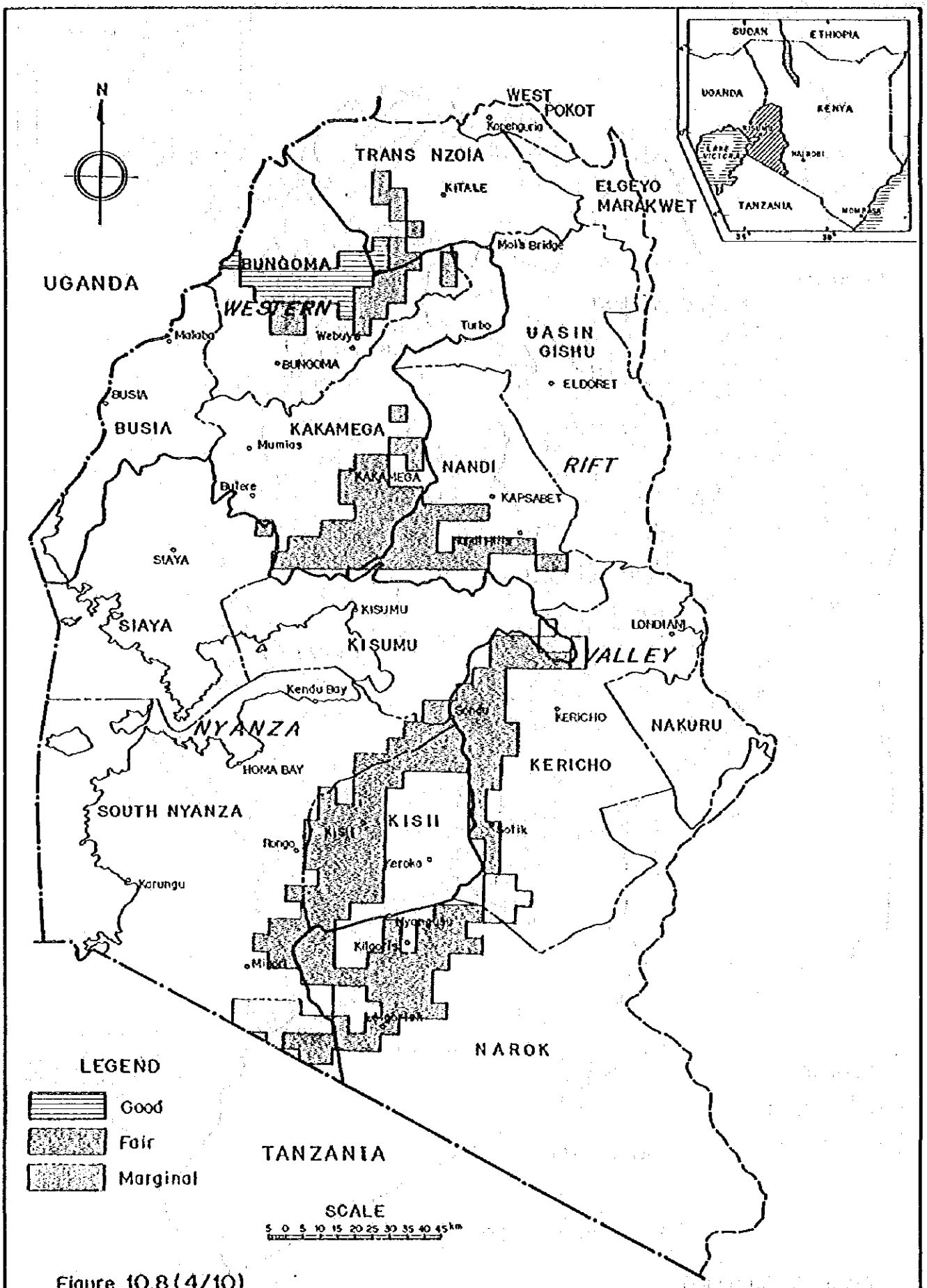

Figure 10.8 (4/10)
Crop Suitable Zone for Arabica Coffee

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THE STUDY OF INTEGRATED REGIONAL DEVELOPMENT MASTER PLAN FOR THE LAKE BASIN DEVELOPMENT AREA
JAPAN INTERNATIONAL COOPERATION AGENCY

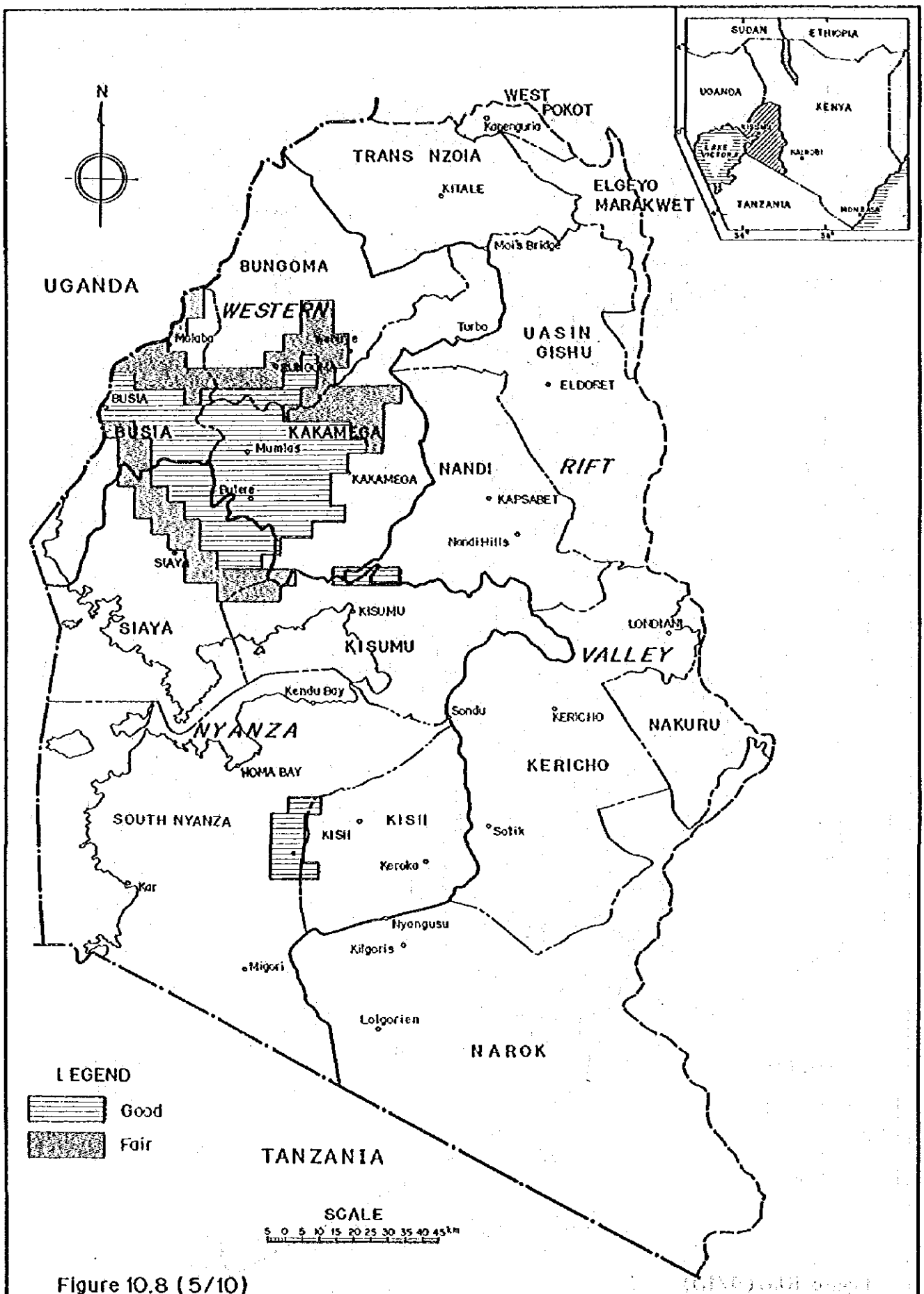

Figure 10.8 (5/10)
Crop Suitable Zone for Robusta Coffee

REPUBLIC OF KENYA LAKE BASIN DEVELOPMENT AUTHORITY
THE STUDY OF INTEGRATED REGIONAL DEVELOPMENT MASTER PLAN FOR THE LAKE BASIN DEVELOPMENT AREA
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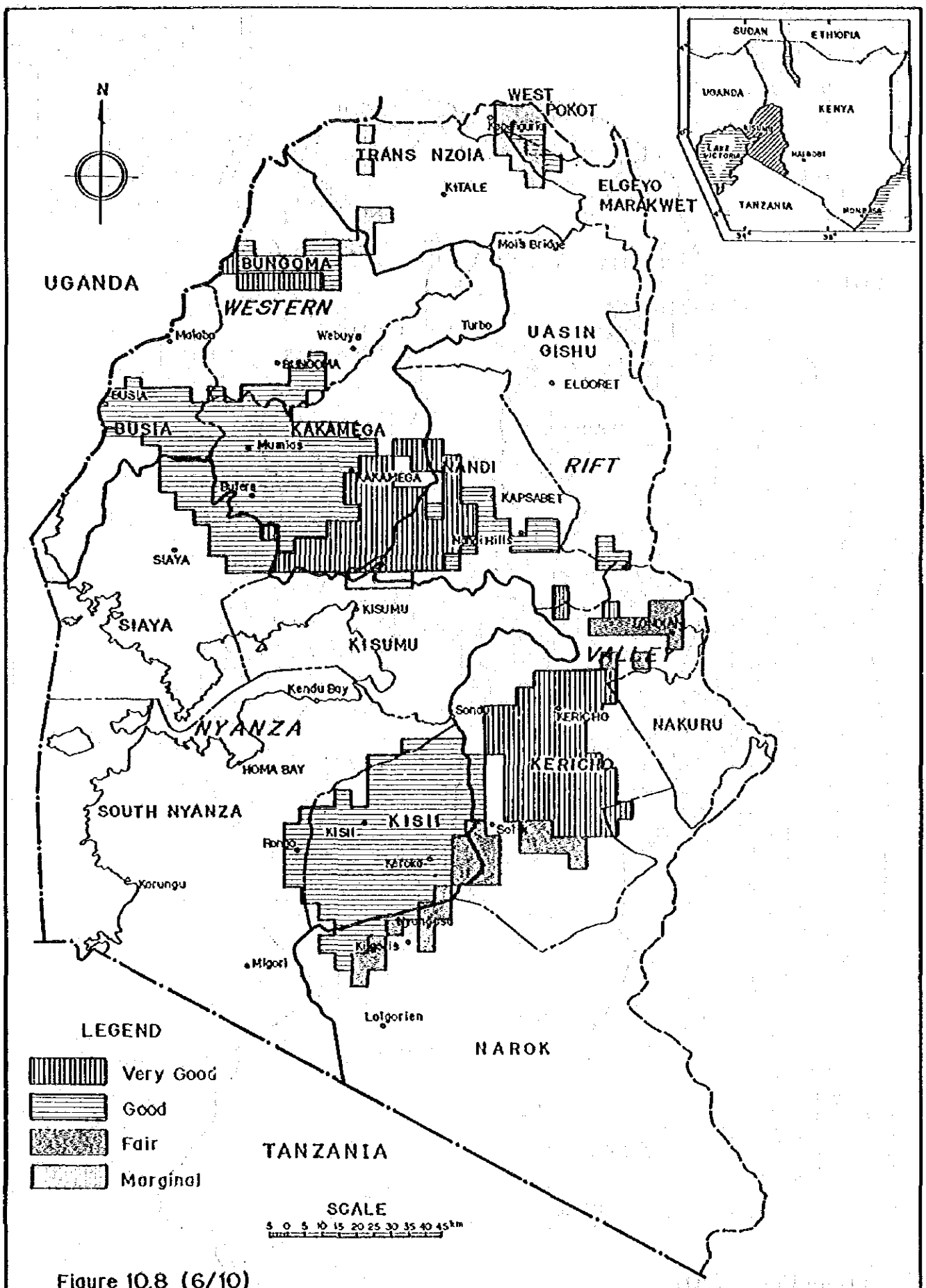

Figure 10.8 (6/10)
Crop Suitable Zone for Tea

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THE STUDY OF INTEGRATED REGIONAL DEVELOPMENT MASTER PLAN FOR THE LAKE BASIN DEVELOPMENT AREA
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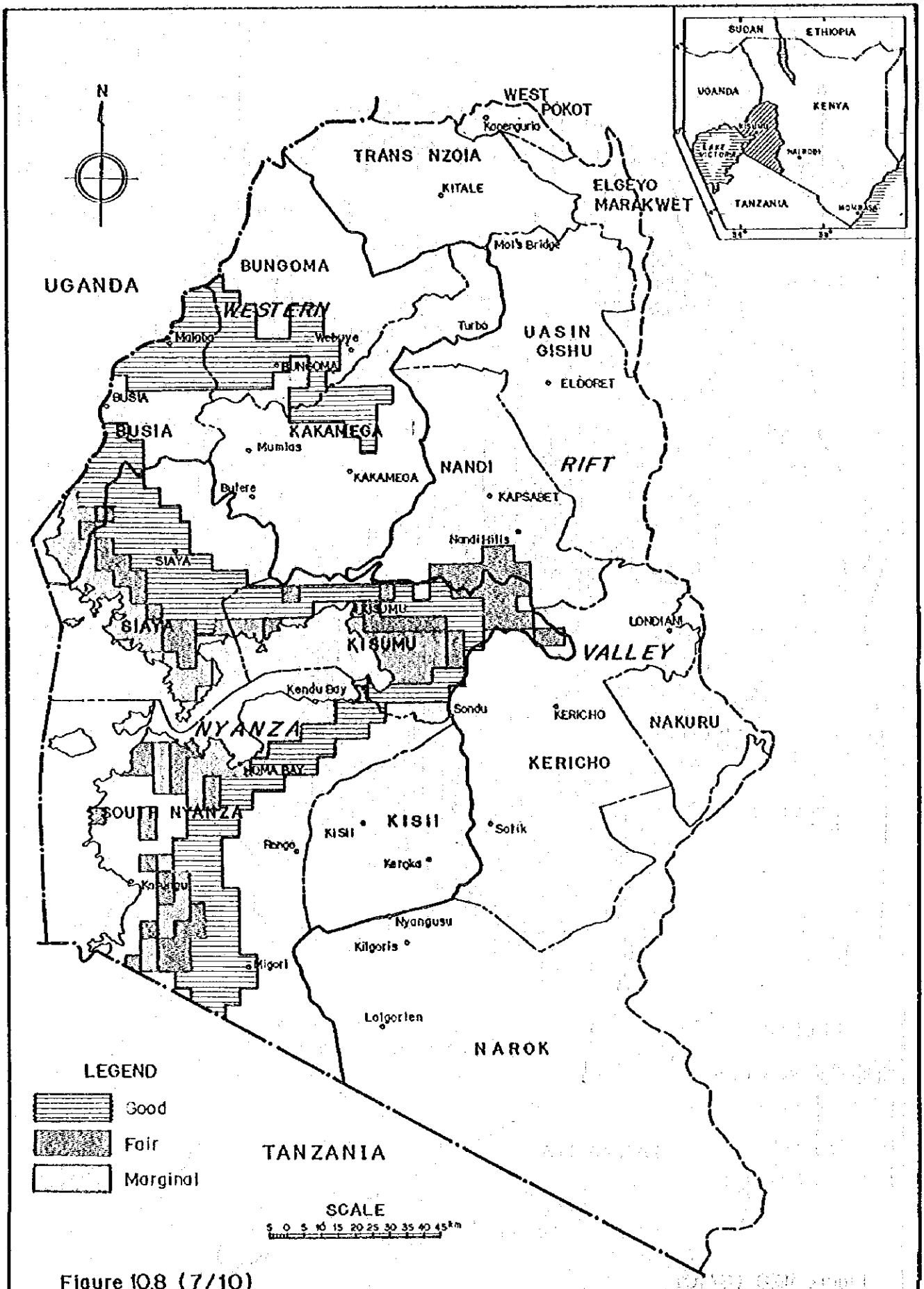

Figure 10.8 (7/10)
Crop Suitable Zone for Cotton

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THE STUDY OF INTEGRATED REGIONAL DEVELOPMENT MASTER PLAN FOR THE LAKE BASIN DEVELOPMENT AREA
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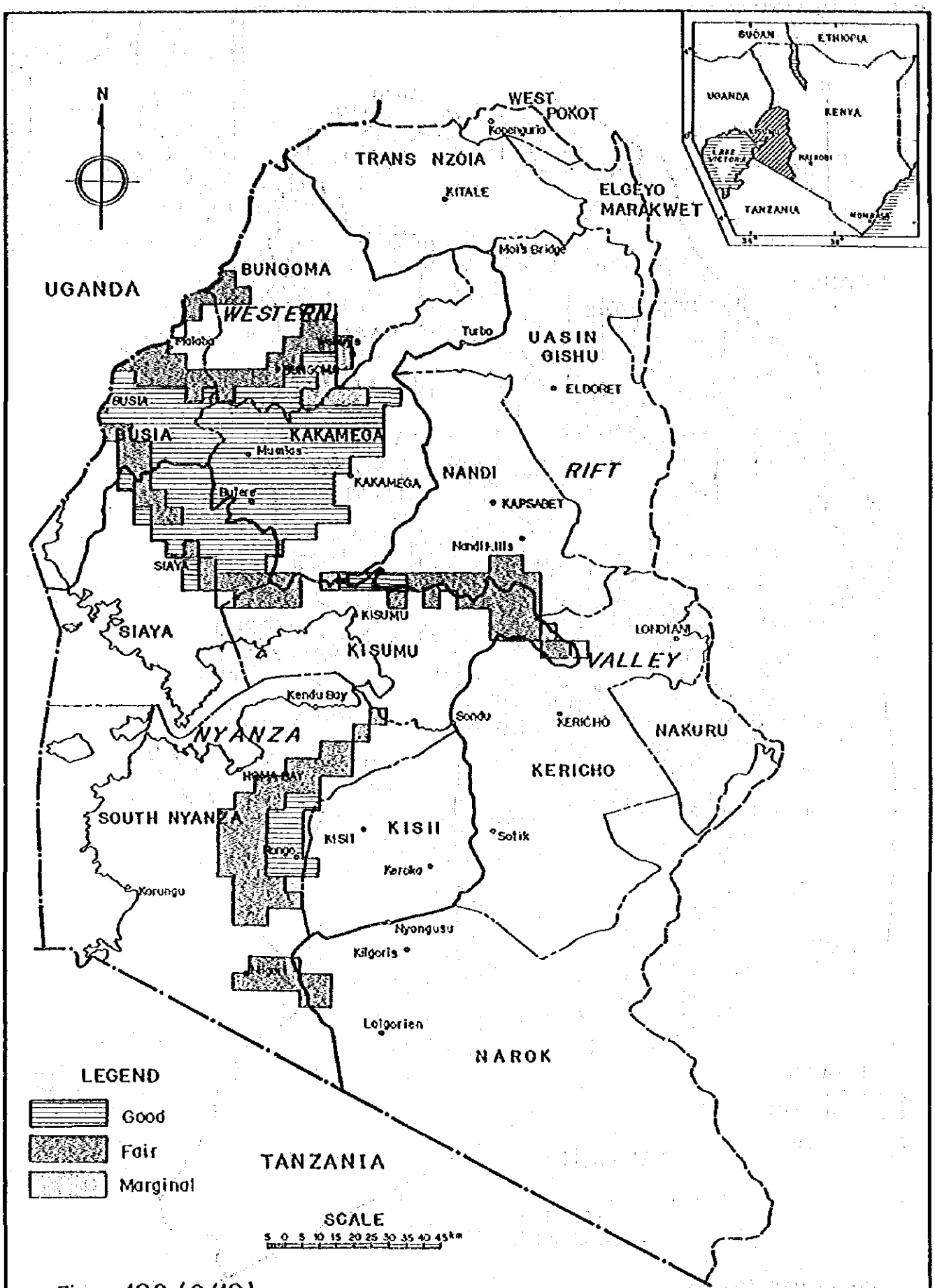

Figure 10.8 (8/10)
Crop Suitable Zone for Sugarcane

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THE STUDY OF INTEGRATED REGIONAL DEVELOPMENT MASTER PLAN FOR THE LAKE BASIN DEVELOPMENT AREA
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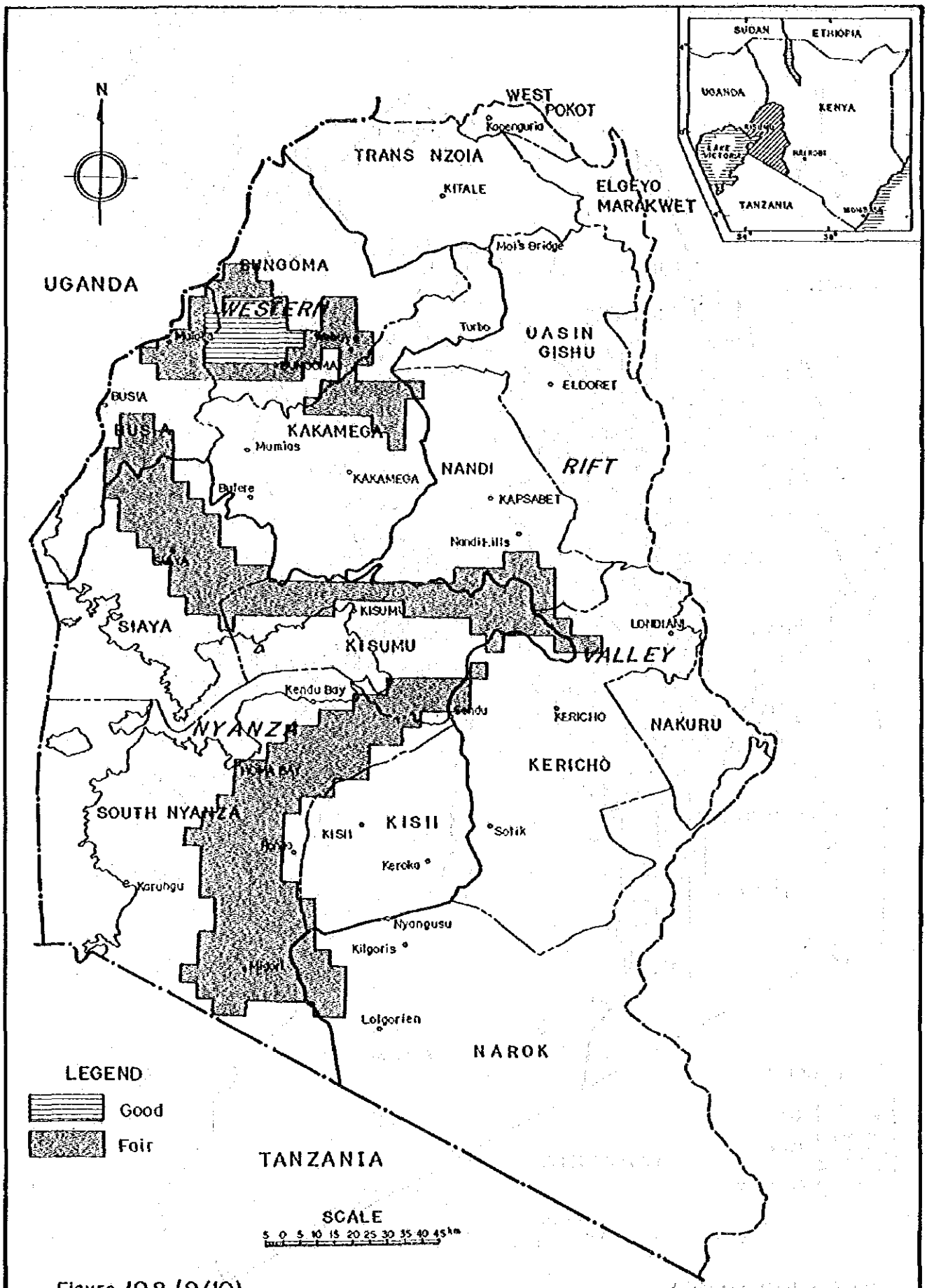

Figure 10.8 (9/10)
Crop Suitable Zone for Tobacco

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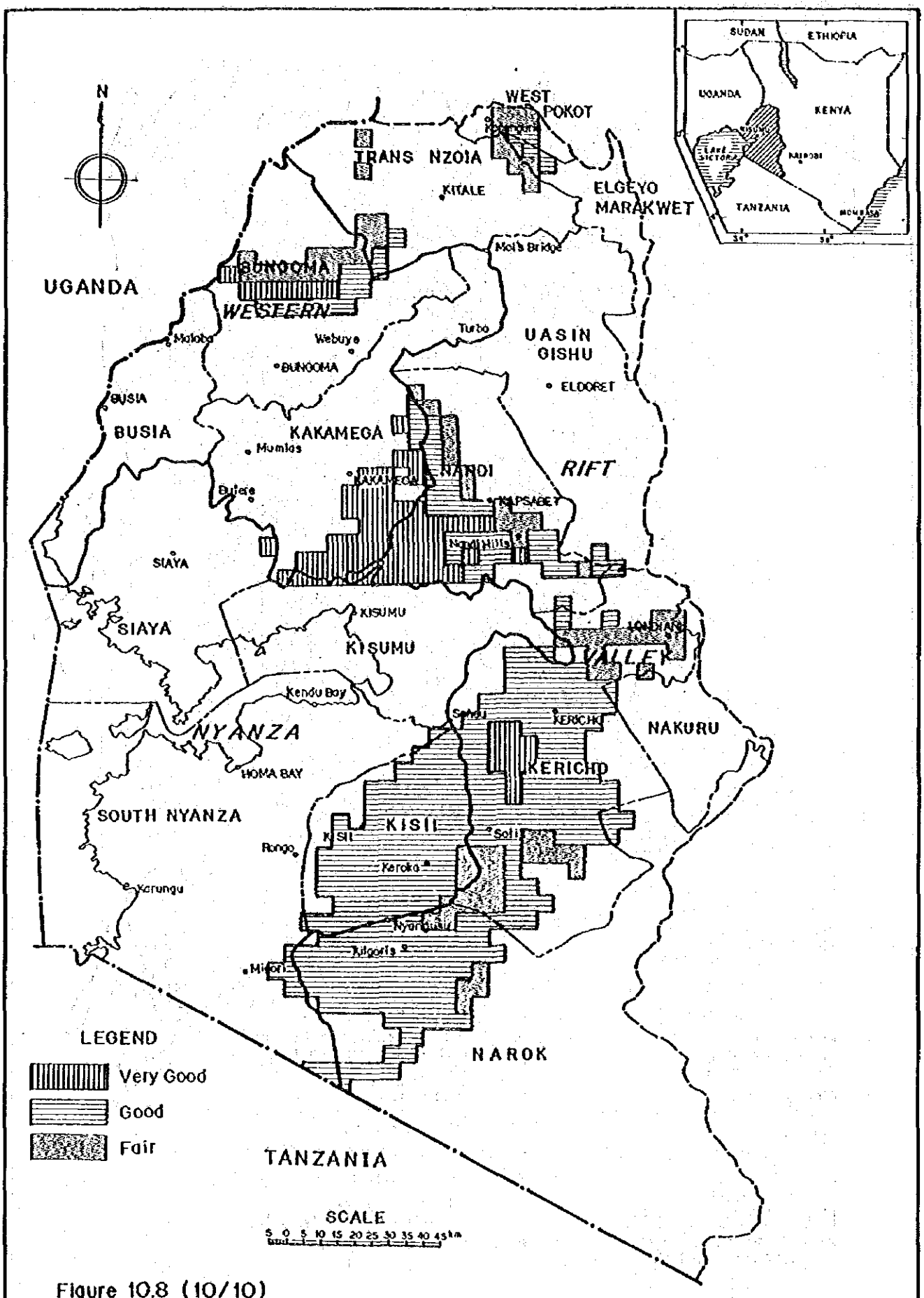

Figure 10.8 (10/10)
Crop Suitable Zone for
Horticultural Crops

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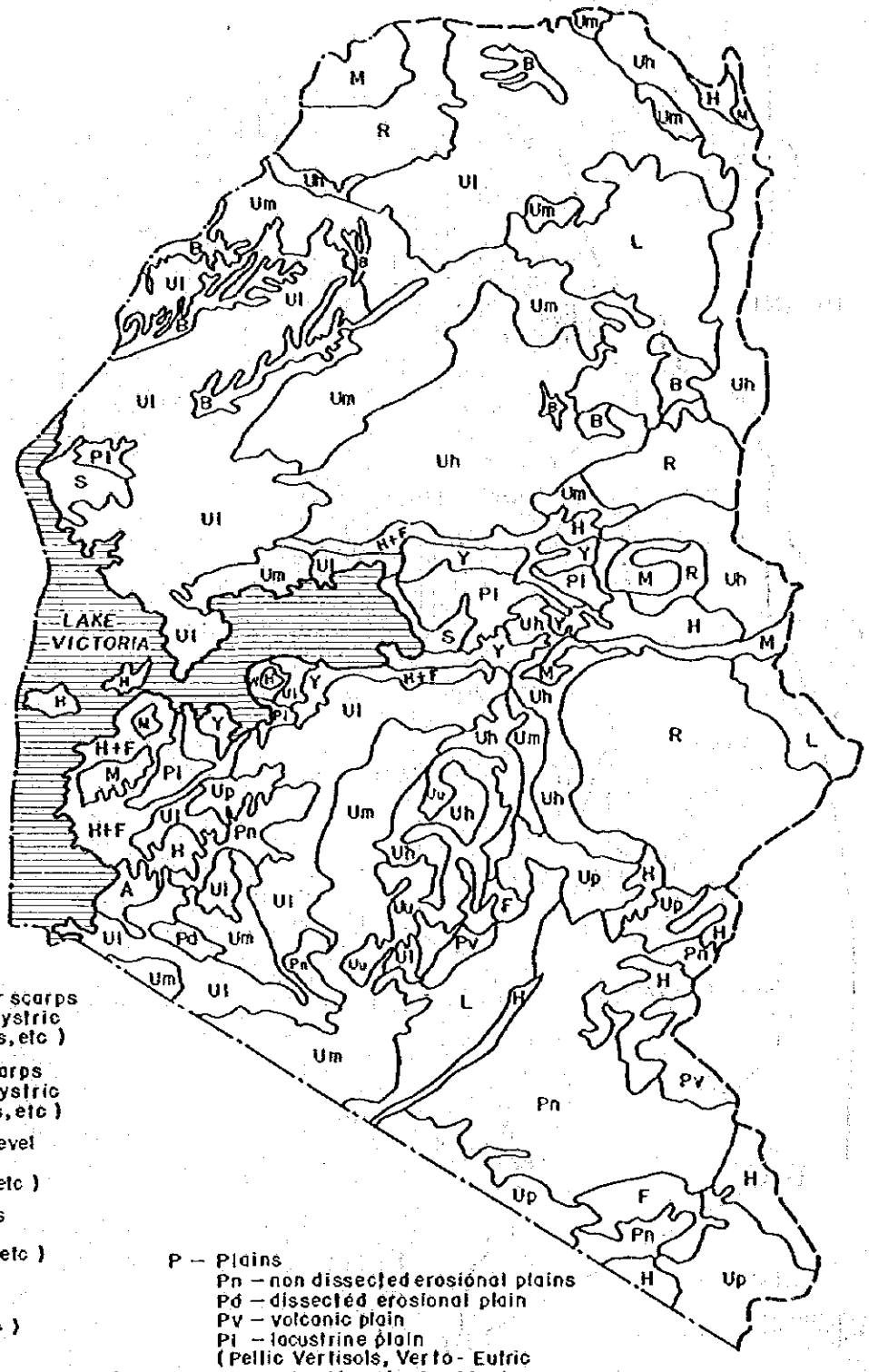

LEGEND

M — Mountain and Major scarps
(Humic Cambisols, Dystric Histosols, Lithosols, etc)

H — Hills and Major scarps
(Eutric Regosols, Dystric Regosols, Lithosols, etc)

L — Plateaus and high level structural plains
(Rhodic Ferralsols, etc)

R — Volcanic footridges
(Humic Arenosols, Humic Cambisols, etc)

F — Foot slopes
(Ferric Arenosols, Humic Acrisols, etc)

Y — Piedmont plains
(Verto - Eutric planosols, etc)

U — Uplands
Uu — upper level,
Uh — upper middle level
Um — lower middle level
Ul — lower level
(Mollic Nitosols, Humic Nitosols, Humic Cambisols Ferro - Chromic Acrisols, Rhodic Ferralsols, Orthic Ferralsols, etc)

P — Plains
Pn — non dissected erosional plains
Pd — dissected erosional plain
Pv — volcanic plain
Pl — lacustrine plain
(Pellic Vertisols, Verto - Eutric Planosols, Chromic Cambisols Chromic Vertisols, etc)

A — Floodplains (Humic Gleysols, etc)

B — Bottomlands (Dystric Planosols, etc)

S — Swamps (Humic Gleysols, Dystric Histosols, etc)

W — Badlands (solonetz, etc)

Figure 10.9 Physiographic Soil Map

REPUBLIC OF KENYA LAKE BASIN DEVELOPMENT AUTHORITY
THE STUDY OF INTEGRATED REGIONAL DEVELOPMENT MASTER PLAN FOR THE LAKE BASIN DEVELOPMENT AREA
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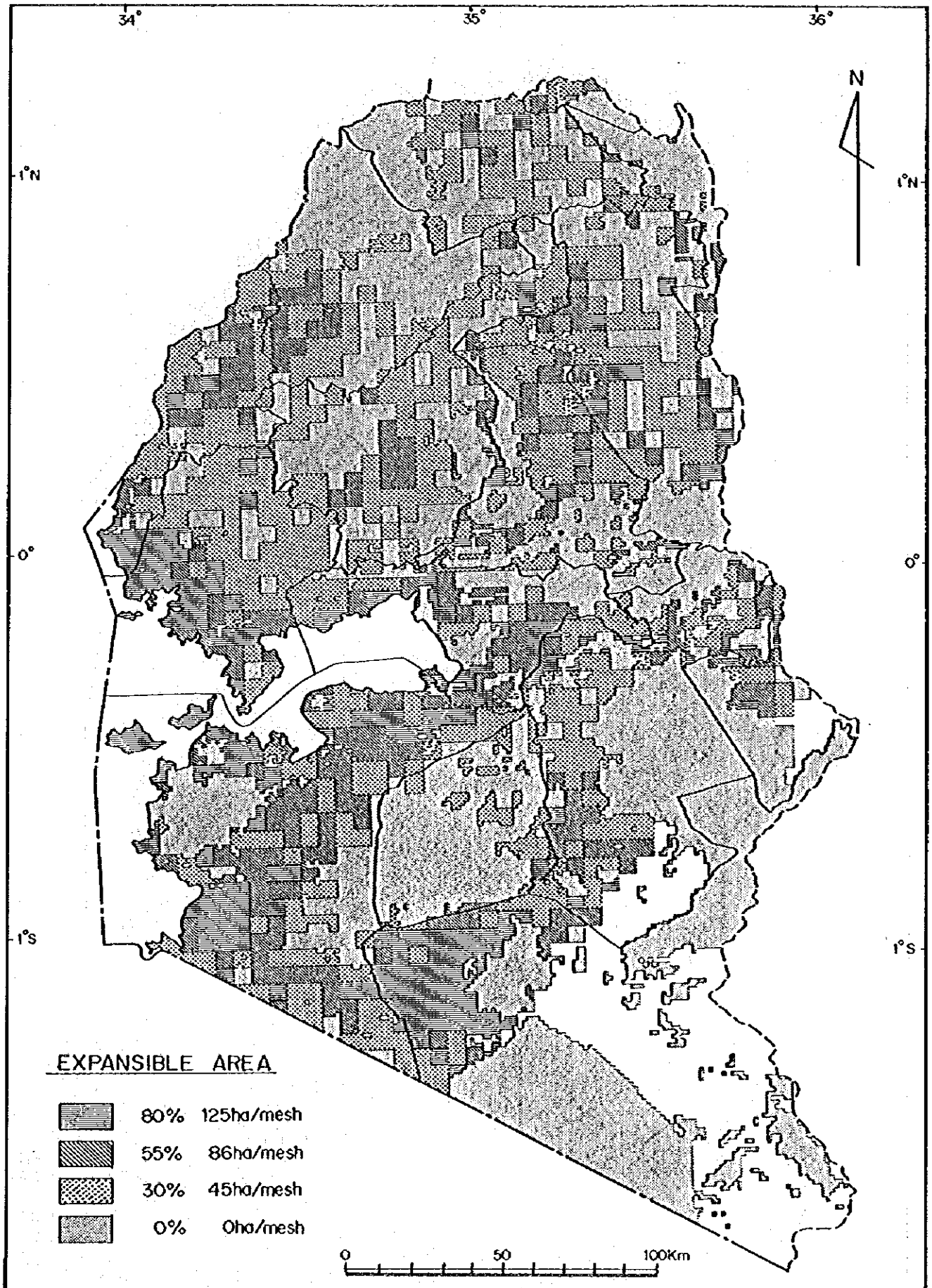

Figure 10.10 Expansible Area Map

REPUBLIC OF KENYA LAKE BASIN DEVELOPMENT AUTHORITY
THE STUDY OF INTEGRATED REGIONAL DEVELOPMENT MASTER PLAN FOR THE LAKE BASIN DEVELOPMENT AREA
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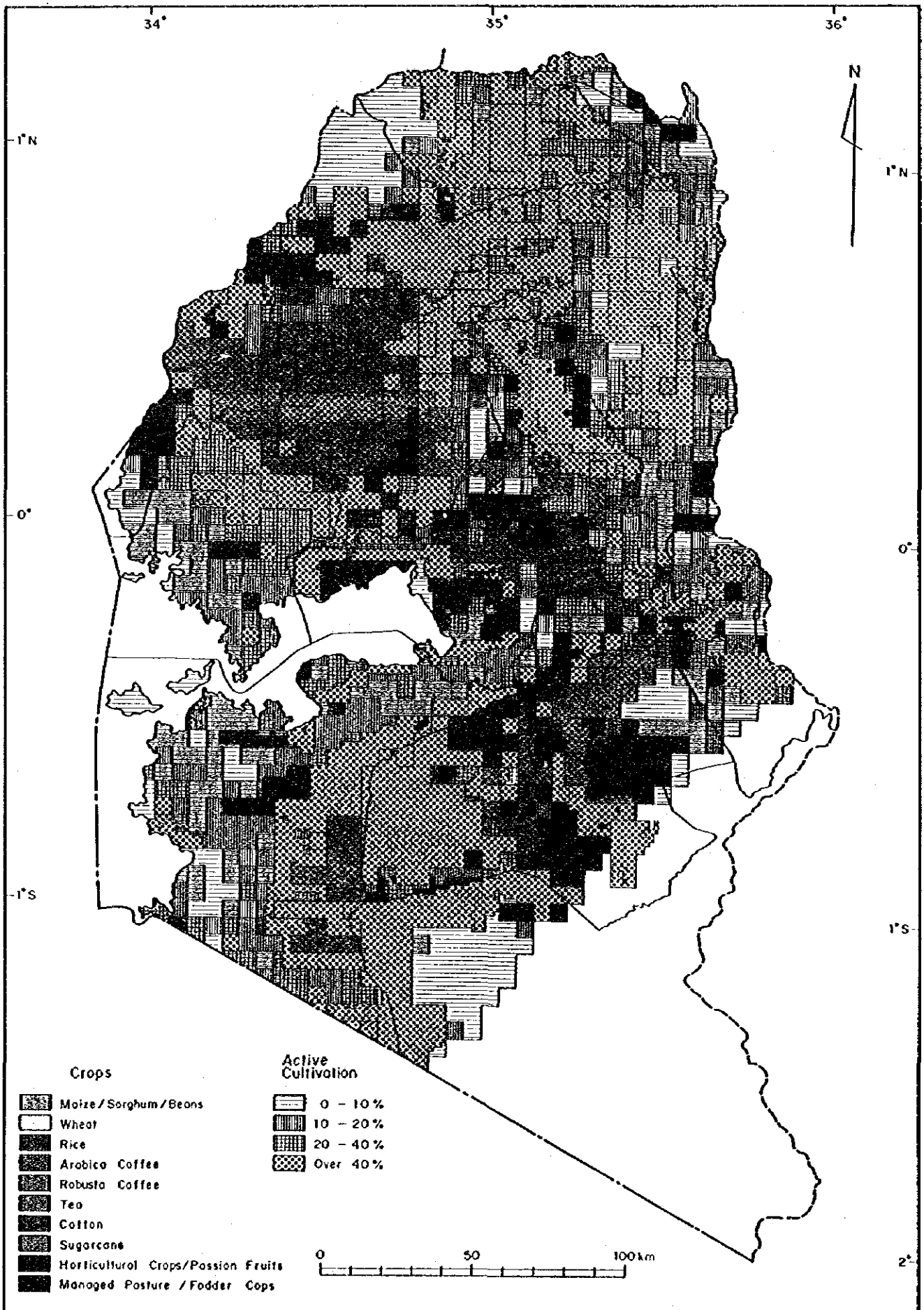

Figure 10.11 General Land Use Planning Map

REPUBLIC OF KENYA LAKE BASIN DEVELOPMENT AUTHORITY
THE STUDY OF INTEGRATED REGIONAL DEVELOPMENT MASTER PLAN FOR THE LAKE BASIN DEVELOPMENT AREA
JAPAN INTERNATIONAL COOPERATION AGENCY

Chapter 11 HUMAN RESOURCES

A study of human resources has been conducted, associated with the Integrated Regional Development Master Plan study for the LBDA region. The study has been carried out by the JICA expert assigned to this function and his LBDA counterpart in close collaboration with a Kenya consultant employed by LBDA. The report prepared by the Kenyan consultant and the LBDA staff provided the basis for the study, but additional data collection and analysis have been done by the JICA team member in order to incorporate the essential contents of the report in this Master Plan study for consistency and integration.

This chapter consists of four sections, covering different aspects of human resources and manpower development. Section 11.1 outlines the people, population and its movement as a general background of the planning. Section 11.2 deals with education and training. Present situation is examined with respect to system, structure and standards of education and technical training. Needs for expanding education facilities and improving the quality are clariffied, and roles of LBDA are proposed.

Section 11.3 deals with public health. Based on the examination of prevalent diseases and other health problems and on-going measures for improving public health, major directions for health development are clarified. In Section 11.4, some social aspects are described as related to the regional development.

Chapter 11 HUMAN RESOURCES

Contents

Tables

Figures

11.1 People in the Region

11.1.1 People

Kenya's population consists of some forty different ethnic groups and races. The majority of the people are broadly divided into three linguistic classes: viz. Cushitic, Nilotic and Bantu.

Although the dominant peoples in the Region are Nilotic, all the three classes of peoples are involved in the formation of the present ethnic composition in the Region. Majority of Kisii, Kuria and Luo live in Nyanza Province and Teso and Luhya are mostly from Western Province. Rift Valley Province is the homeground of most of Kalenjin and Masai.

11.1.2 Population distribution

To better understand the population distribution in the Region, it may be useful to trace the development in the past several decades. When the railway reached Kisumu in 1901, there were only a few market centers in the Region. Chief among them, other than Kisumu, was Mumias which was a converging point for ivory trade, reached by the Slater Road from the East in 1896.

Between 1903 and 1909 several Asian trading centers were established in the Region. These included Mumias,Yala, Marama, Malakisi and Kakamega. Major economic and trading activities were concentrated in the central western part of the Region as illustrated in Figure 11.1 (a). During this period, there was still some resistence to the British in the highlands.

This situation gradually changed, as the railway lines were extended from Nakuru to Eldoret and further north to Kitale and west to Jinja in Uganda, passing Bungoma (see Figure 11.1 (b) - (d)). The first extension of railway to Eldoret was based presumably on the recognition by the British on the strategic importance of this place as a center of the productive land newly brought under control.

Accumulation of population and economic activities progressed along the railway lines as they were extended. Centres for economic and trading activities slowly moved from the area mentioned above to the corridors along the railway lines, although Kisumu stayed an important centre as it was also connected to Uganda by a steamer. The development of the trunk road A104 generally along the railway lines further accelerated the shift of population centres.

The population distribution pattern in the Region at present is basically what has been established in the process outlined above. Population accumulation is observed along the railway lines as well as in Kisumu. Most of those centres in the interior developed at the first stage are now comparatively less populated along secondary roads, except Kakamega situated at a nodal point connecting Kisumu and other centres along the railway lines.

The present population distribution in the Region may be characterized among others by the lack of primacy. The population of Kisumu Municipality, whose territory was expanded in 1971 from mere 19 km^2 to 417 km^2, accounts only for about 3.5 percent of the total population in the Region. The population of major towns along the trunk road (or the main railway line) combined would well counter-balance the accumulation in Kisumu. Additionally, the Region has several more towns of secondary class in population, including Kitale, Kericho, Kisii and Homa Bay.

Each of these towns remains primarily to be a service center for the respective rural hinterland or a distribution center of agricultural and other products. There are several major industrial establishments and numerous small- and medium- scale agro-processing industries all over the Region, but only in Kisunu and Eldoret any significant accumulations of such productive activities are observed.

These towns in the Region do not have sufficient capacity to attract and assimilate people from rural areas. Significant drifts of people occur only in connection with major development projects such as the Chemelil Sugar Company in Kisumu district, Tea Plantation in Kericho, Sotik Settlement Scheme in Kisii and Awendo Sugar Development in South Nyanza.

11.1.3 Migration

Table 11.1 shows the net change between "in" migration and "out" migration, based on the 1969 and the 1979 censuses. The table indicates the following. Nyanza and Western are net out-migrating provinces, and it is true of all districts in these provinces. Net out-migrants in both the provinces had remarkably increased from 1969 to 1979, except for Kisumu and Kakamega districts, and amounted to about 280 thousands during the inter-census period.

On the other hand, Rift Valley is a net in-migration province as a whole and also at district level except for Elgeyo Marakwet. Net in-migrants had grown and reached to some 146 thousands during the inter-census period.

Destinations of out-migrants may be represented by the distribution of those who were enumerated outside the provinces of birth place at the censuses.

(Unit: %)

Province of	Province of enumeration											
	Nairobi		Coast		R. Valley		Nyanza		Western		Others		Total	
Birth place	1969	1979	1969	1979	1969	1979	1969	1979	1969	1979	1969	1979	1969	1979
Nyanza	19.3	32.9	16.0	12.7	25.6	38.1	-	-	21.4	8.3	17.7	8.0	100	100
Western	21.7	29.0	10.6	7.3	32.3	46.1	20.2	10.9	-	-	15.2	6.7	100	100

(Source: Calculated from Analytical Reports of 1969 and 1979 Population Census.)

Over 70% of out-migrants from Nyanza and Western provinces have settled in either Rift valley Province or Nairobi. Besides, there is a tendency of those out-migrants to increasingly concentrate on the two places above.

An analysis of census data indicates that out-migration from Nyanza and Western Provinces tends to be biased toward male, younger working age group and those with higher education. The sex ratios (the ratio of male population to the female) of age group 15-44 were 81.7 and 81.8% for Western and Nyanza respectively in 1979, which were the lowest among all the provinces for the same age group and also the lowest of all the age groups in each of Western and Nyanza Provinces. Of the male migrants in age group 15-24 originated from these provinces, 38% took secondary education, while 25% of male non-migrants in the same age group had the equivalent.

This bias is caused probably "due either to raised expectations among the educated or to the greater probability of securing a job in the case of migrants with some years of education" (ILO, "Rural Development, Employment and Incomes in Kenya", 1981). This explanation is implicitly underlain by the shortage of employment in Nyanza and Western as depicted in 11.2.1,(5).

11.2 Education

11.2.1 Present situation

(1) Literacy rate

Literacy rate is a basic index to show a general situation of human resources in a country, especially in view of social and economic development. Table 11.2 presents literacy in rural Kenya, one of the results of 1980/81 Rural Survey. If literacy rate reflects the educational performance in the past, the performance in the Region as a whole had not been so good as compared with other areas.

Western Province can be taken as historically among the average or a little advanced in education, judged from the ratio of those with ability to read and to write: 48% and 46% respectively. On the other hand, the literacy ratios in Nyanza and Rift Valley Provinces, in particular among women in Nyanza, are lower than the national average.

(2) Education system

Kenya's education system has undergone a major structural change since 1985: i.e. the shift from 7-6-3 system into 8-4-4. The old system is expected to phase out finally in 1989. The structure of the old system consisted of 7 years of primary, 6 years of secondary (4 years for "O" level and 2 years for "A" level) and 3 years of minimum university education. The equivalents of the new structure are 8, 4 and 4 years for primary, secondary and minimum university education respectively.

The main objectives of the reform in education system are the following:

1) to make education more relevant to the needs of the majority of school-leavers, especially from basic education, and hence

2) to put a greater emphasis on practical subjects and diversification in curricula (e.g. the introduction of workshops and home science in primary and secondary education).

The establishment of the objectives above is attributed to the Government's recognition that the majority of children would end either at primary or secondary level, and "be forced to look for employment in the informal sector, non-urban activities, especially small-scale agriculture and rural non-farm activities" (Development Plan 1984-1988). Therefore the new system also intends to provide the new opportunities for primary and secondary school leavers to be trained at post-school institutions in different occupations and professions (MOEST,"Development of Education in Kenya 1984-1986").

(3) Standards of Education

Primary school enrollment ratios have increased from less than 50% in early 1960's to over 90% at present, owing much to large Government expenditure, self-help efforts, i.e. Harambee, reflecting the positive attitude of parents toward education and the elimination of school fees. Secondary school enrollment has expanded even faster though to a less satisfactory degree than primary schools, and reached to just under 500,000 in 1985, representing around 25% of the relevant age group. Enrollment in university education still represents a small proportion of the eligible age group.

The ratio of those with no education in age-group 5-14 is presented in Table 11.3 for each district in the Region and compared with the ratio in Central Province and Nairobi as well as the national average. Figures in the table indicate that the standards of primary education are generally good in the Region with the exception of some districts, especially Narok and West Pokot in Rift Valley Province. The ratio of those with education form 1-4 of secondary school in age group 20-24, also shown in Table 11.3, indicates that the standards of secondary education in the Region are lagging behind, except Kisii and Kisumu districts in Nyanza Province,Bungoma and Kakamega in Western Province and Nakuru in Rift Valley Province. Also female's enrollment in secondary education is much smaller than male's, although it has been increasing rapidly.

However, the situation depicted above may even be optimistic because enrollment ratio often understates the problem of extensive repetition and drop-outs (Development Plan 1984-1988). Indeed, those over 17 years old in secondary school amounted to 54% and 44% of the total enrollment in 1977 for Nyanza and Western Provinces respectively (CBS, "Educational Trends 1973-1977").

Tables 11.4 and 11.5 show to some degree, the present situation of primary and secondary education in the Region, under the influence of structural change in the education system.

Table 11.4 shows that the Region, excluding Nakuru, West Pokot, Narok and Elgeyo Marakwet districts, enrolls at primary school some 2.12 million of children , corresponding to about 109% of those aged 7-14 ("Official" primary school age). The estimation of "official" school age population is based on the following data and procedures:

(i) to obtain the population of "official" school age group from the population projection of 1985 by age group carried out by JICA team,
(ii) to adjust the figures obtained to those of 1986, assuming annual growth rate of 3.8% in the Region, and
(iii) to delete the relevant population in Nakuru, West Pokot, Narok and Elgeyo Marakwet from the figures obtained in (ii) (about 3% of total population).

This high figure of enrollment ratio could be attributed to existence either of the pupils who were admitted into school at earlier ages or, more importantly those aged over 14 who still remain at school as regulars or repeaters.

The quality of primary education is to some extent clarified by pupil-teacher ratio and ratio of trained teachers also shown in Table 11.4. The pupil-teacher ratios or the number of pupils per teacher in the Region are 33,36 and 33 for Nyanza, Western and Rift Valley respectively, which are considered relatively good as compared with the national average, 34. However the ratio of trained teachers in Nyanza (61%) is much lower than the national average (70%), though those in Western and Rift Valley are almost as high as the national average.

There existed about 170,000 secondary school pupils in the Region in 1986, representing 22% enrollment ratio. Unlike the case of primary education, the quality of secondary education in the Region seems lower in terms of pupil teacher ratio and the ratio of trained teachers. In Western Province, the pupil teacher ratio of 33 is much higher than the national average of 20 pupils per teacher, and the ratio of trained teacher is 45% as compared with national average of 55%. In Rift Valley, the quality of secondary education seems good as far as these indices are concerned.

(4) Constraints on advancement to higher education

An index to show the standards of secondary education is the ratio of pupils passing to Form 1, who would then be permitted to enter secondary schools. Pupils in Western Province generally perform better than the national average, but those in Rift Valley and Nyanza Province are below, as shown in Figure 11.2

The low standard for the latter provinces may be attributed mainly to the following factors:

1) shortage of facilities in secondary schools,
2) lower education quality in primary schools, and
3) socio-economic conditions.

The shortage of facilities in secondary schools is clarified, to some extent, by the number of secondary schools per 1,000 eligible population ("Official" age group 13-18) in 1979, calculated from the 1979 census and Provincial statistics. Western Province ranked the first with 0.95, followed by Nyanza Province with 0.88 and Rift Valley Province with 0.49. These figures may be compared with the national average of 0.79. This situation owes much to the levels of household income because many secondary schools are provided by communities, viz., Harambee efforts. In addition, there seem to be few well-equipped facilities, especially of domestic science rooms, laboratories and workshops necessary for

teaching sciences and practical subjects as well as fewer qualified teachers than required. These defects may be incorporated in the results of examination: poor performance in science and mathematics.

The lower educational quality in primary school is reflected in the results of examination. Table 11.6 presents mean standard score performance in Kenya Certificate of Primary Education as a terminal examination, which is now used to select candidates for either secondary education or training in various occupations and professions. The performance in each Province of Nyanza and Western is lower than the national means for almost all the subjects. The performance in Nairobi and Central Provinces, however, are over the national means in almost all the subjects. This problem is attributed partly to inadequate facilities such as domestic science rooms, laboratories, workshops, equipment and materials necessary for teaching sciences and practical subjects as well as physical structures such as teachers' housing.

Nairobi and Central Provinces are better off economically compared to the districts in the Region. As long as government policy remains to be such that parents provide schools' physical facilities and equipment, those schools in economically better off regions will continue to provide education and training of high quality than those schools in economically disadvantaged regions.

The disparity above may also be attributed to other socio-economic conditions as external factors, such as urbanization and social needs. First, pupils in urban area are considered to have a better environment to study mainly due to the development of transportation, preference of trained teachers to live in cities and abundant information and materials on education. Indeed, pupils in Kisumu and Eldoret municipalities in the Region have good scores in KCPE: the national mean plus 16 points and about 40 points respectively.

Secondly, the social needs for child labour are still strong, especially in agricultural works. According to the Rural Labour Force Survey (1977/78), a large portion of the rural youth, including those at schools, engage in works of some sort. About 42% of boys aged 8-14 are actually at work, almost entirely on the farm holdings, while about 35% of girls are in the same situation. This seems to apply more to the Region in comparison with the other regions due to:

- larger shares of farm households and of poor smallholders, and
- larger proportion of female headed households.

(5) School leavers and technical education

As mentioned above, majority of graduates from primary schools deviate from formal academic education: 56.7% in Western, 62.5% in Nyanza and 70.1% in Rift Valley in 1983. Accordingly, many of them have to be technically educated in post-primary level schools to obtain jobs.

In the past, Kenya did not give technical education the priority it deserved in social and economic development of the country. As a result, the majority of students did not opt to take occupations that demanded technical education. The social status of blue collar jobs

was much lower than that given to white collar jobs. Salaries and wages paid to blue collar jobs were much lower compared to those paid to white collar jobs. The majority of students who opted for technical training were those who missed placement in other academic institutions and reluctantly took technical education as the last training opportunity.

In 1985, Kenya had two National Polytechnics, one in Nairobi and the other in Mombasa,19 Technical Secondary Schools and 19 Harambee Institutes of Technology established mainly in 1978. There were also about 320 Youth Polytechnics sponsored by the Government. In addition to these, there was the Kenya Industrial Training Centre in Nairobi with branches in the Provinces, to conduct Government Trade Tests to those who have been through some apprenticeship programme.

With the background above, the opportunities for technical education have been limited in the Region as well as in Kenya as a whole. Considerable opportunities of technical education have been provided by Youth Polytechnics, previously called Village Polytechnics, which cater mainly for primary school leavers to be equipped with basic skills for self-reliance and job acquirement. Still the total enrollments in the Region are only some 7,000 as shown in Table 11.7. Also observed are inadequate facilities as well as poor management as in the cases of primary and secondary schools.

Physical facilities and equipment for technical education and training are very costly. Teachers and instructors in technical education and training are relatively few compared to other kinds of teachers. This may be one of the reasons why communities have not been able to establish as many Youth Polytechnics as were needed for the ever increasing numbers of primary school leavers. There were also eight secondary technical schools and seven Harambee institutes of technology in the Region in 1985 . All these were government assisted.

There are two main problems for the graduates who have received post-primary technical education:

1) difficulty in further improving professional skills and expertises, and
2) unemployment.

The first problem is mainly attributable to the entrance system of advanced technical institutions like Kenya polytechnics. Such institutions do not require prior training in technical education but rather good academic performance in sciences and mathematics. Youth Polytechnics were not even a part of any progressive training system despite its relative importance in terms of the number. This problem, however, is going to be alleviated as described later.

The second problem is more serious in the Region not only for school leavers at primary level but for those with technical education at post-primary level. Rural Labour Force Survey indicates that unemployment is generally higher among the youth than in the older and main work force in rural areas. About 40 per cent of male and 30 per cent of female in age group 15-19 are not employed. The figures include those at school, but still high unemployment among the rural youth cannot be denied.

The table below shows the number of primary school leavers who could not obtain a job in 1967, a result of study of primary school leavers (L. Brownstein, "Education and Development in Rural Kenya", 1972).

	Those not at home(%)	Those at home (%)	Total respondents(%)
Nyanza	17(7.7)	32(14.5)	221(100)
Kericho	3(1.3)	67(28.4)	236(100)
Other areas	19(5.0)	71(18.8)	377(100)
Total	39(4.7)	170(20.4)	834(100)

It is indicated that about a quarter of those sampled could not get an employment and most of them were at home. Although no updated data are available, the problem of unemployment at present must have become more serious than observed 20 years ago.

11.2.2 Prospects

(1) Policy

Major government policies affecting development of human resources may be summarized from the Sessional Paper No.1 of 1986 and Development of Education 1984-1986 as follows:

To share the costs of education with communities,
To make education more relevant to the manpower needs for social and economic development of the country, and
To reduce employments in the civil service gradually to a sustainable level.

The important strategies designed to implement the new policies above are as follows:

- Introduction of the new 8-4-4 education system,and
- Emphasis on the utilization of qualified locals in non-national education and training institutions.

Some important points will be described below in more detail.

Cost sharing

Formal education and training have been the most costly social services in the country since independence. In 1985/86, the services accounted for 34% of the national recurrent budget with the introduction of new 8-4-4 eduction system.

The Government has realised that it can no longer afford to meet all the rapidly rising costs of formal education and training, and decided to restrict its share of costs to 29% of the national budget and expect parents to meet the costs of most physical facilities and equipment. In addition, the Government is trying to do the following:

- Devising cheaper methods of preparing educational materials and equipment, and
- Encouraging educational institutions such as Universities and polytechnics to be production- and application-oriented.

Consideration of local needs

The Government intends that about 85% of students from the less developed regions are allowed to find places in local non-national schools as long as they have minimum admission requirements. This strategy however, demands that local communities establish sufficient physical facilities and equipment to enable all those from their community who have minimum admission requirements for further education to find places in local schools.

Since government funds for formal education and training are not forthcoming for physical facilities and some equipment, parents in richer communities or more developed parts of Kenya will in the long run establish more and better education and training institutions for their children. The imbalance in the availability of adequate and better education and training institutions will be furthered, if those economically disadvantaged parts of Kenya do not receive special consideration for assistance.

8-4-4 system

There are some points which should be added to the description mentioned before: viz. (i) reorganization of the management and administrative structure for greater efficiency and (ii) introduction of the technical and vocational training programmes as a component of the new system.

The training programmes above consist of post-primary and post secondary education, and are characterized by merits in diversifying training institutions in different trades and provision of opportunities for advancement to a higher training. Students in Youth Polytechnics and other existing institutions are also given the opportunities to obtain higher qualification and to advance to higher institutions.

(2) Requirement of facilities by 2005

It is estimated that the population of primary school age (7-14) in the Region will be about 3,105,000 in year 2005.*1 Assuming 100% of enrollment ratio and 40 pupils per class, some 77,600 classrooms would be required for primary schools in 2005.

In 1986, there were about 53,000 class-rooms to accommodate 212 million pupils in the Region, assuming 40 pupils per class. Hence, for all the children of primary school age to be in school, about 24,500 new class-rooms must be built in the next 19 years.

*1: excluding the population in Nakuru, Narok, West Pokot and Elgeyo Marakwet districts, which are estimated at some 3% of the total population in the Region.

	1986	2005
Population of age group 7-14 ($x10^3$)	1,937	3,105
Enrollment ratio (%)	109	100
No. of class-rooms	53,000	77,600

In 2005, the population of secondary school age (15-18) in the Region are estimated at about 1,236,000. Assuming 25% of enrollment ratio and 40 pupils per class-room, then there would be some 7,730 class-rooms in the Region in 2005 (case 1). Assuming, as an alternative, 30% of enrollment ratio, and 45 pupils per class-room, then there would be some 8,240 class-rooms in 2005 (case 2)

As a result, 3,480 new class-rooms, in the case of 25% of enrollment ratio, will be required in the Region by 2005, while 3,990 in the case of 30% of enrollment ratio and 45 pupils per class-room.

	1986	2005	
		Case 1	Case 2
Population of age group 15-18 ($x10^3$)	754	1,236	1,236
Enrollment ratio (%)	22	25	30
Class-room accommodation	40	40	45
No. of class-rooms	4,250	7,730	8,240

(3) Consideration of building costs

Building schools with the required number of classrooms as estimated above would involve a considerable amount of money. In order to estimate the building costs, the following conditions have yet to be clarified:

1) Composition of school types: i.e. single and double streams, day and boarding schools, and

2) Number, capacity and facilities of Harambee schools which may be constructed at smaller costs.

Table 11.8 gives the building costs of primary and secondary schools estimated by the Ministry of Education, Science and Technology (MOEST) on the basis of facilities and equipment which are recommended to be provided at respective kinds of schools. If these costs are applied to the number of schools to be newly required by 2005, the total building costs would become excessively high as the examples in Table 11.9 show. These costs do not include the cost of land and labour. In the case of primary schools, the cost of teachers' houses is also excluded, as they are expected mostly to be local residents in accordance with the new national development strategy mentioned above.

The cumulative public development expenditure of MOEST to be allocated to the Region is projected in this section, reflecting the Government policy of reducing the public finance. The following assumptions are made for this purpose:

1) The share of the Government's development expenditure distributed to MOEST is set at 4%, smaller than the current share of about 5%;

2) The shares of the total expenditure by MOEST used for primary and secondary education are assumed at 8% and 10% respectively, equivalent to the current shares;

3) The proportion of the expenditure for primary and secondary education allocated to the Region is taken to be 30%, slightly higher than the current share of 27%.

The estimated cumulative expenditure for primary and secondary education in the Region thus amounts to K£ 12.4 million and K£ 15.5 million, respectively. This expenditure is equivalent to 44 full double stream primary schools and 35 full double day secondary schools (case C in Table 11.9), far short of required number of respective schools. Therefore, major efforts for increasing the number of primary and secondary schools will have to come from Harambee and other volunteer activities.

Increasing demand for primary and secondary education cannot be met without an efficient use of resources. First, cheaper methods of building should be adopted by using locally available materials and labour force. Second,the existing and new facilities should be more effectively used by increasing the number of pupils per class room, introducing double shifting and expansion of double-stream schools especially in highly populated areas.

(4) Employment prospect

The crux of human resources development is that more skilled and educated people would be required as the economy develops and conversely the economic growth would create more employment opportunities for the development of human resources. Thus the balance between labour demand and supply is most important in planning manpower development.

Labour demand

Tables 11.10 and 11.11 summarize the estimated employment opportunities in the Region by sector, in 1985 and 2005, respectively. Employment opportunities in agriculture and manufacturing sectors have been taken from the results of respective sector studies, and those in modern service sector have been estimated based on the results of past study (CBS, "Wage Employment and Earnings in the Modern Sector, 1985").

Employment opportunities in the modern sector are expected to increase from 294 thousand in 1985 to 975 thousand in 2005, expanding the share of this sector in the total employment opportunities from 11.8% to 15.7%.

Assuming that most employees in the modern sector and about 10% of employees, including owners/managers, would require high quality labour, the total demand for high

quality labour is estimated to increase from about 500 thousand in 1985 to about 1,500 thousand in 2005.

Labour supply

The increase in labour supply in the Region in the next 20 years is estimated to be some 3.8 million (subsection 4.3.1, Main Report). The increase in employment opportunities during the same period is calculated to be about 3.7 million (Tables 11.10 and 11.11), almost sufficient to employ all the additional labour force.

More high quality labour would be demanded, as the economy develops. Assuming that the high quality labour would be provided mostly by secondary school leavers, additional high quality labour to be generated in the next 20 year period will be about 1.1 million. This is just sufficient to meet the demand for high quality labour estimated above.

(5) Roles of LBDA

LBDA can perform important roles for human resources development in the Region. More important ones are suggested here.

As suggested above, the number of primary and secondary schools that can be constructed with the central Government fund is so far short of the total requirement in the Region, and thus more schools have to be constructed by efforts of parents and other individuals. In view of less developed status of the Region, LBDA can secure more fund from the central Government. Such an additional fund, however, should not be used to construct a few number of higher standard schools, but to lessen the burden of parents in constructing more low cost schools. For this to be possible, requests from districts for new educational facilities need to be coordinated by LBDA and the fund properly channelled.

Second, LBDA can solicit foreign aids to supplement the central Government's efforts in providing the Region with more proper education and training facilities. They can be used for the following purposes:

1) Primary schools with full facilities as demanded by the new 8-4-4 system;

2) Youth multipurpose training center offering technical skills up to the Government Grade III Certificate level;

3) Secondary schools specializing in good teaching of mathematics and science in order to ensure a reasonable supply of qualified candidates for institutions of higher learning; and

4) Multipurpose technical and vocational training center offering skills from the Government Grade II Certificate level up to the National Ordinary Diploma level.

These model schools are to be established at district or location level. In addition, the following may be established at inter-province level:

5) Multipurpose institute of higher technical and vocational training offering skills up to the National Higher Diploma level; and

6) Secondary science and technical teachers' college at Diploma level.

Third, the establishment of a special education and training fund would encourage the following people to study:

i) pupils and students whose parents/guardians are unable to meet school fees and other payments; and

ii) graduates of vocational and technical training centers to obtain tools and other necessary equipment to start their practise.

Fourth, LBDA can assist in identifying the needs of employers in the Region so that the leavers from technical institutions can more easily get jobs. Also, LBDA can engage some of them at the centers proposed in this Master Plan.

Fifth, LBDA could provide some opportunities for technical training and its graduates to be improved. The Authority could assist polytechnics and their graduates by purchasing in bulk most raw materials and supplying them relatively cheaply.

11.3 Public Health

11.3.1 Present Situation

(1) Diseases

Prevalence of diseases in the Region may be seen from Table 11.12, which presents out - patient morbidity by disease and province. The following observations are in order.

- the highest prevalence of malaria, which accounts for one-third of total out-patient morbidity in Nyanza and Western Provinces, and the larger share of the patients with malaria in these provinces, compared with the national average,

- the highest prevalence of acute respiratory infections in Rift Valley Province, one-fifth of total out-patient morbidity, and

- other diseases mainly affecting the people in the Region, such as diarrheal diseases, intestinal worms and diseases of skin.

The intensity of each disease can be represented by case rate per 100,000 population by cause, which allows possible inter-regional comparison (See Table 11.13). The table shows a considerable intensity of malaria in Nyanza and Western Provinces: the case rate in Nyanza is almost twice as high as the national average. Water-born diseases prevailed in the Region include cholera, typhoid, schistosomiasis, leprosy and tuberculosis. Of the main

diseases prevailing in the Region, intensity of diarrheal diseases is higher in Rift Valley and Nyanza Provinces than the national average. In addition, there is relatively higher prevalence of common childhood diseases such as whooping cough and measles which can be fatal to the children. Table 11.14 summarizes details and countermeasures of the main diseases in the Region, which are some results of "Master Plan (Integrated Rural and Urban Health Programme) for LBDA plan Period (1989 - 2005)"(Draft Master Plan).

(2) Health facilities and manpower

System of health facilities

Health facilities in Kenya are systematized in the following way (LBDA, "Draft Master Plan"). First, mobile clinics and dispensaries belong to the lowest category, offering curative and Maternal Child Health/Family Planning services. Mobile clinics, usually expensive, are often provided by Non Governmental Organizations (NGO). They are useful especially for covering very remote areas.

Dispensaries are settled and usually have no ambulance nor bed. They are headed by community enrolled nurses, who are expected to get mastery of psychiatry, family planning, midwifery, general medicine and surgery as well as the basics of diagnosis, therapeutics and operations of cold-chain storage systems for vaccines and immunizing procedures.

In the second lowest category, health centres also offer curative and MCH/FP services, headed by clinical officers in rural areas and by medical officers in municipalities. A health centre is usually equipped with an ambulance and at least twelve beds. It serves a population of 15,000 - 20,000, who are expected to live within a radius of 8 kilometres of the centre (approximately 150 km^2). Health centres are referral centres for dispensaries in respective catchment area.

Third, hospitals (sub-district, district, company or mission) can contribute to health services as an integral part of rural and urban health systems in addition to offering curative and preventive/promotive services for a population of about 200,000. They are referral centres for dispensaries and health centres.

Next category includes the provincial hospitals which initiates evaluation of health activities. With specialized curative and diagnostic services, they are referral centres for district and subdistrict hospitals and expected to cover up to ten district hospitals.

Existing conditions of health facilities

The provision of health facilities in the Region has not kept pace with the population growth. For instance, the number of beds and cots per 100,000 population has remarkably decreased in Nyanza and Western Provinces during the period from 1980 to 1985, as shown in Table 11.15. Additionally, quality of health facilities may be inadequate since subcenters and dispensaries occupy a fairly high proportion of total facilities.

Table 11.16 presents the existing health facilities by district and type in the Region. There are regional variations among the districts. Kisumu district has the most adequate facilities

for health services, judging from numbers of facilities and of beds and cots per 100,000 people, followed by Uasin Gish district. The two districts have large cities; Kisumu and Eldoret. Siaya and South Nyanza districts have the health facilities to the least degree.

The provision of health facilities should be also analyzed from the extent of access to them. In Kenya, only 42% of households live within four kilometres of health facilities and about 30% of the population live within easy reach (2 km) of a health facility. In the Region, 21.7% of households are located farther than 8 km from a health facility as compared with 7.5% in Central Province (LBDA, "Draft Master Plan").

Manpower

There is a shortage of manpower working in the field of heath services, which can be represented by population per doctor and those per registered medical personnel in 1980 as shown below.

Province	Population per doctor<1	Population per medical personnel<2
Nyanza	31,200	3,981
Western	44,535	3,090
Rift Volley	19,769	3,666

Note: <1; including dentists
<2: including clinical officers, registered nurses, and enrolled community nurses in addition to doctors and dentists

Sources: Calculated from Provincial Statistical Abstract.

Number of registered medical personnel by province and district is presented in Table 11.17.

(3) Malnutrition

The infant mortality rate in Kenya dropped from 120 in 1963 to 86 in 1982. However the infant mortality is quite high in the Region, especially in Nyanza and Western Provinces except in Kisii and Bungoma districts (see Table 11.19). This may be partly attributed to high prevalence of malnutrition in the Region. Indeed, the proportion of children who are nutritionally stunted is generally higher in Nyanza and Western as shown below:

Province	Stunted children (%)
Nyanza	28.9
Western	25.7
Rift Valley	19.8
Kenya	24.0

Sources: CBS, Third Rural Child Nutrition Survey 1982.

Intensity of malnutrition in the Region is also clarified by the out-patient morbidity of malnutrition and anaemia. The following are case rates of such morbidity per 100,000 population.

Province	Malnutrition	Anaemia	Total
Nyanza	1,623	2,136	3,759
Western	1,207	1,068	2,275
Rift Valley	859	552	1,411
Central	508	335	843
Coast	1,665	4,959	6,624
Eastern	521	460	981
North Eastern	923	1,571	2,494
Kenya	1,001	1,289	2,290

Source: MOH, Status of health 1980, 1985

Malnutrition often results in (i) lowering the body's defenses against infections, (ii) preventing children's growth from physically and mentally normal development, and (iii) affecting earnings due to close links between nutrition and productivity.

It is considered that malnutrition is caused by food shortage due to insufficient income, and ignorance of good nutritional practices. Indeed, average food consumption per head in the Region, especially in Nyanza and Western Provinces, is the lowest in Kenya as observed in the table below.

	Average household food consumption	Mean household size	Food consumption per head
Nyanza	2,039	6.6	309
Western	2,108	7.4	285
Rift Valley	2,564	7.5	341
Central	3,118	7.0	449
Coast	2,613	8.0	325
Eastern	3,068	6.7	455
Kenya	2,594	7.0	372

Source: Integrated Rural Survey, 1974 - 75.

The fact above may give a warning to an excessive introduction of cash crops, which sometimes leads to shortage of food crops.

(4) Family planning

The natural increase of population in the Region is estimated to be around 4.0% per annum, although the social increase was at about 3.7% per annum between 1979 and 1985 due to substantial out-migration. Thus prevalence of family planning methods is considered to be

one of key issues in the Region. Contraceptive Prevalence Survey carried out in 1984 discloses that family planning methods prevail to the least degree in Nyanza and Western Provinces: 8.6% in Nyanza and 4.6% in Western (see Table 11.20).

According to the analysis in the same survey, there is a tendency that family planning methods are used more by married women who have more living children, received more education and are currently working (CBS, Kenya Contraceptive Prevalence Survey 1984, First Report).

The tendency may also apply to Nyanza and Western Provinces but in a reverse way: i.e. high mortality rate and fewer women who received higher education. In addition, socio-cultural factors may affect the prevalence of family planning methods. For example, marriage of women at an earlier age in the Region is considered to reflect ,to some degree, a traditional socio-cultural pressure on women to marry, to produce children, and to extend the kinship network. Besides, as mentioned in subsection 11.4.1, the role and status of women in agriculture and within the family may also be related to the prevalence of methods: women's desire for children to help them in works and in future (World Bank, Kenya: Population and Development, 1980).

(5) Rural sanitation

Sanitary conditions can be improved through expansion of water supply system and relevant sewerage facilities. Otherwise water scarcity contributes to prevalence of infections through bad hygiene and it becomes worse without appropriate disposal of feces and refuses. Table 11.21 illustrates the sanitary conditions in the Region, in terms of access to water, piped water and sewerage facilities. The table indicates poor sanitary conditions in Siaya and South Nyanza districts and generally poor access to water and dissemination of piped water in Nyanza Province as a whole. Similar problems are observed in Western Province to a lesser degree. In Rift Valley Province, sewerage facilities are deficient.

(6) Education for public health

Education can make a contribution to improvement in public health, or proper nourishment and prevention of diseases. A study on nutritional situation in low income areas in Kisumu clarifies that 27% of health workers consider lack of knowledge as a cause of malnutrition, followed by lack of money with 55% and lack of enough food with 29% (A. Leemans and E. Kors, "Malnutrition in peri-urban Kisumu", 1985).

A substantial number of people in the Region do not seem to practice an appropriate hygiene. According to the study carried out in Nyanza, about one third of 236 people interviewed have unhygienic habits and lack proper knowledge about the prevention of common diseases (LBDA, "A Socio-cultural investigation into the Use and Functioning of the Completed Shallow Wells in Nyanza Province").

11.3.2 Prospects

(1) Policies

The Kenya Government aims at "Health For All by the Year 2000 A.D." (HFA/2000) and sustaining better health for all in the following years.
Major policies on public health are described in "Development plan 1984 - 1988" as follows:

1) Increase in coverage and accessibility of health services in rural areas,

2) Enforcement of preventive and promotive health programmes,

3) Further consolidation of urban, rural, curative, and preventive/promotive services,

4) Increased emphasis on Maternal/Child Health and Family Planning services for reducing morbidity, mortality and fertility,

5) To strengthen Ministry of Health management capabilities with emphasis at the district level,
6) Increase in interministerial co-ordination, and

7) Increase in alternative financing mechanisms.

Among the above policies, preventive and promotive health programmes could be emphasized due to its cost-effectiveness. The latest comprehensive policies of the Government put stress on the restraint of public outlays for basic needs and the provision of them in a cheaper and more efficient way ("Sessional Paper No. 1 of 1986").

As mentioned before, there are needs for methods of reducing costs through improved management of health facilities and the health care system. There is an integrated approach, called primary health care (PHC), not only with relatively low cost but with extensive influence and local involvement.

The primary health care consists of the following activities as defined in the International Conference on Primary Health Care meeting in 1978:

1) education about health problems, and preventive and control methods,
2) promotion of food supplies and appropriate nutrition,
3) supply of safe water and basic sanitation,
4) maternal and child health care including family planning,
5) immunization,
6) prevention and control of locally anaemic diseases,
7) proper treatment of common diseases and injuries, and
8) provision of essential drugs.

In short, this approach aims at health promotion and disease prevention.

(2) Objectives of health development

The existing conditions and policies of public health discussed so far justify the following objectives of health development in the Region.

1) To improve the health and socio-economic status of the people of Lake Basin;

2) To integrate the public health programmes into the district focus strategy for rural development;

3) To reduce fertility rates so that a desirable population growth is achieved which compares favourably with economic and social growth within the resources of the Lake Basin;

4) To increase the number of health delivery points so that at least every household in the Lake Basin is within 8 kilometres of a health facility by the year 2005;

5) To reduce the infant mortality in all the LBDA districts to below 50 by the year 2005;

6) To have a 144 bedded hospital for each 200,000 of the population by 2005;

7) To have the full complement of professional health staff in each hospital, health centre and dispensary;

8) To have the community health workers for each community of about 400 people in the Region;

9) The communities to generate enough funds to finance the health activities in their areas; and

10) Each household, school, health facility and all the public buildings to have adequate clean water supply and at least basic sanitation.

The following are conditions and priorities which should be considered for the achievement of the objectives.

1) Higher priority of preventive measures over curative services: more stress on the activities in health centres, dispensaries and simple PHC rather than on sophisticated clinical medicine;

2) Increased attention paid to the overall needs of a geographic or administrative area and regionally equitable development of the health services; and

3) Prompt and proper activities in response to changes in socio-economic conditions:

   - greater need for health programmes in city slums and poorer suburbs due to a high growth of city population,

- increased diseases of adult people such as athrists, heart ailments and cancer

(3) Measures for health development

Promotive and preventive services

A primary health care project is being executed in Western Province by Ministry of Health with the aid of Finland. Objectives of the Project may be reduced to the assistance in the establishment of "community based services". This implies: active participation by communities in decision making and planning, based on community needs identified, and dialogue between providers of services and consumers, including the mobilization of local human resources such as traditional birth attendants as community health workers (KENAFYA, "The Proceedings on Primary Health Care Programme Provincial Workshop", 1984).

It is too early to evaluate the projects, but an attention should continuously be paid to the project as a new approach in public health for the following reasons.

1) Reduction of budgetary allocation to this field requires new approaches with lower cost and more efficiency and effectiveness;

2) Harambee activities, which only provide facilities, are in a position to change into a new style due to the more limited finance of Government than before; and

3) Primary health care aims at communities self-reliance.

The role of District Development Committees (DDC) will be especially emphasized since PHC requires integration and coordination of the ministries and agencies such as health, agriculture, education, information, culture and social services, water, environment and transport and communications.

Curative services

The Draft Master Plan for public health in the Region clarifies the features of and the countermeasures against main diseases in the Region (see Table 11.14). The countermeasures shown in the table suggest the necessity of integration of all the aspects in public health, such as modern medical techniques, health facilities with appropriate equipment, education, water supply, sanitary facilities and institutions. Besides, preventive and promotive health measures are taken as complemental to curative measures.

The Draft Master Plan also proposes the construction plan for health facilities by division in each district. Table 11.18 presents proposed new facilities up to 2005 only on a district basis. The plan is probably established on the criteria for achieving regionally equitable development within the Region, mainly according to spatial distribution and projected population growth.

Roles of LBDA

The measures above are divided into two axes:

- to root and extend preventive/promotive health services (PHC), and
- to increase health facilities and manpower in quantity and quality, and manage them in an effective and efficient way.

These are mutually complementary and, hence could achieve the objectives when the balanced development is made on the axes as observed in the case of countermeasures against the main diseases. The higher priority, however, should be on the promotion of PHC since it is localized at present and expected to prevail in the Region due to its cost-effectiveness and other benefits. It is accordingly proposed that LBDA should coordinate the agencies concerned, especially hospitals and DDC's, which are expected to take integral parts for PHC. Moreover, the Authority is expected to mediate between communities and the organizations concerned.

11.4 Social Aspects

11.4.1 Division of labour and family economy

In the traditional societies, work was allocated mainly according to age and sex groups in the community. Men, in general, were in charge of the kind of work in agriculture involving physical strength in short peak periods, such as clearance of land. They were also responsible for construction of houses, breeding of livestock and hunting. On the other hand, women were in charge of the daily work, with the children's assistance, in agriculture, including planting, weeding and harvesting. They were mainly responsible for the provision of food to their families from their cultivation. Fetching firewood and water, housekeeping and taking care of the children were also shouldered on women.

Table 11.22, showing the percentage of workers in agriculture by attribute, indicates to some degree the present situation in the Region, where almost all the wives and children studied were engaged in agricultural works. The extent to which the husbands work in agriculture varies between average peasants and the rich ones: 61% of the former studied and 26% of the latter, averaged into less than half of the husbands as workers in agriculture. The husbands' main functions are probably supervisory.

The study with field research in Western Kenya in 1975-77 suggests that the traditional division of labor has undergone some changes (P. Kongstad and M. Monsted, "Family, Labour and Trade in Western Kenya ", 1980). First of all the work burden of women has increased, though the type of their work did not change much, maybe due to:

- increasing emphasis on cultivation relative to livestock,
- introduction of cash crop production in addition to food production,
- males' out-migration, and
- reduced availability of child labour due to the education development.

As a result, women have to work in agriculture for more than 4 days in a week during busy season and 1-3 days during slack season, though there are regional variations, as shown in Table 11.23. Besides, some of other works became more difficult for them to do: for instance, fetching firewoods.

While women's workload has been increased, men's appears to have been reduced or changed in quality, partly because certain household services are more and more commercialized and/or turned over from women to men. For example, the men's work of breaking new land was replaced by the use of manure fertilizer. Maize grinding outside the home, traditionally done by women, is now undertaken by men. Men tend to be perceived as managers of cash crops and being in charge of decision-making relating to cultivation and sale (World Bank, "Kenya: Population and Development", 1980).

Men may be also engaged mainly in non-farm activities, which are a usual way of cash-earning. Integrated Rural Survey indicates that a fairly large proportion of rural households surveyed are worked in more than one non-farm activity: 60% for Nyanza, 55% for Western and 40% for Rift Valley.

According to the study carried out by Kongstad and Monsted, husband's cash contributions to the household expenses are not substantial, probably only a small part of his incomes; a half of the landless surveyed gave the families nothing or so; some 60% of the average peasants less than 60 Kshs. per month but 25% did in kind, as shown in Table 11.24. This situation may be terrible for the family economy as compared even with the amounts required for purchased food per month for a rural household on average in 1974-75: 83,73 and 101 Kshs. for Nyanza, Rift Valley and Western respectively (Integrated Rural Survey, 1974-75).

11.4.2 Self-help activities

National efforts toward socio-economic development since Independence has encouraged new expressions of self-help activities, viz. "Harambee" and Women's group.

The importance of Harambee is partly explained by the fact that it has provided capital equivalent to the share between 4 and 10 per cent of Government's annual development expenditures over the years (National Development Plan 1984-88). It has made substantial contribution to the construction of schools, clinics and other facilities. This role of Harambee is further emphasized in the Sessional Paper No.1 of 1986. Self-help activities are taken as attempts at "development from below" in the sense that local people identify their needs, mobilize local resources and implement the projects to cater for the needs by themselves and for themselves. Therefore these activities are complement to the Government's development efforts," development from top"

Harambee projects tend to be confined to a specific field or "social services" in contrast with "economic-oriented" projects. This may be attributed to the following:

1) "Social service" projects are often easier to be organized than "economic-oriented" projects, which may need more planning, coordination and maintenance;

2) Many people take "economic-oriented projects" as a territory of governments and other agencies; and

3) "a family cannot build a school or a health center but produce crops (Reynolds and Wallis," Self-help and Rural Development in Kenya").

Self-help activities are under control of District Community Development Committee, (DCDC), which is one of subcommittees of District Development Committee (DDC). DCDC mobilises self-help activities and makes recommendation to DDC about which projects should be granted authority to begin operations and which have priority for government support (Reynolds and Wallis, op. cit.). Therefore DDC makes the final decision to approve the commencement of self-help activities and to recommend assistance in some projects to the Government. According to interviews with officers of Eldoret district and West Pokot district, DDC usually does not refuse Harambee group's offers, and sometimes adds some financial assistance to them if the finance from DCDC is inadequate.

The administration side has to be careful in selecting projects on recommendation and in controlling over projects without killing their momentum. Otherwise their projects may come to the wastes of local resources. On the other hand, people's initiative without relevant planning on administration side may cause confusion in future.

11.4.3 Determinants of peoples' participation

A few typical issues which may be involved at grass-root level in implementing public projects are mentioned here[*2]. First, local people tend to pay more serious attention to projects constructed with their funds and hands, with respect to maintenance of facilities and payment of user charges.

Second, success of any project would depend much on how local people could identify it in practical terms or how they see their own benefits. Success of rehabilitating a silted-up dam, for instance, will depend on whose land it is situated in and what the intended uses of the dam is.

Third, relocation and compensation always pose serious social problems. Inadequate compensation has often caused the destruction of family institutions and ties, psychological maladjustments and ultimately widespread rural poverty. Guarantee of proper land title, rather than the issue of temporary occupation licenses as done for a few projects in the Region, is to be considered a prerequisite.

The following are usual land acquisition procedure for public projects:

1) boundaries of affected area are gazetted,

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*2 This part is based on the discussions with Prof. S.B. Migot- Adholla of Institute of Development Studies.

2) a list of land owners, acreage, types of development and existing facilities is prepared, and
3) compensation is determined - agricultural rates are usually applied rather than commercial rates.

In addition to the above notices, more attention has to be paid to women in development planning and projects, e.g. agricultural and rural development (see 11.4.1).