

**Table 3.9 Livestock Water Development (3/4)
- Proposed Implementation Programme**

Code	District	Source Development Plan							Total	Implementation Program (%)		
		Surface Water	Borehole	Shallow Well	Small Dam	Subsurface Dam	Sand Dam	Existing Pipeline		Up to 2000	2001-2010	
Nyanza Province												
610	Kisii										33.3	66.7
	- Quantity (m3/d)	13,430	275	299	563	0	0	0	14,567			
	- No. of Facilities	0	10	63	26	0	0	0	99			
	- Cost (mill.US\$)	0	1.01	0.29	0.29	0	0	0	1.58			
	(mill.K£)	0	1.27	0.37	0.36	0	0	0	2			
620	Kisumu										27.9	72.1
	- Quantity (m3/d)	6,489	1,377	2,940	287	0	0	0	11,093			
	- No. of Facilities	0	41	384	16	0	0	0	441			
	- Cost (mill.US\$)	0	5.09	1.83	0.15	0	0	0	7.07			
	(mill.K£)	0	6.42	2.3	0.19	0	0	0	8.92			
630	Siaya										34.9	65.1
	- Quantity (m3/d)	4,776	1,484	3,221	263	0	0	13	9,757			
	- No. of Facilities	0	62	623	28	0	0	0	713			
	- Cost (mill.US\$)	0	5.55	2.94	0.1	0	0	0	8.59			
	(mill.K£)	0	6.99	3.71	0.13	0	0	0	10.83			
640	South Nyanza										36.0	64.0
	- Quantity (m3/d)	3,025	1,428	2,148	209	8	8	0	6,826			
	- No. of Facilities	0	68	366	47	8	8	0	497			
	- Cost (mill.US\$)	0	5.38	1.77	0.1	0.02	0.02	0	7.28			
	(mill.K£)	0	6.79	2.23	0.13	0.02	0.02	0	9.18			
	Sub-total										31.1	68.9
	- Quantity (m3/d)	27,720	4,564	8,608	1,322	8	8	13	42,243			
	- No. of Facilities	0	181	1,436	117	8	8	0	1,750			
	- Cost (mill.US\$)	0	17.03	6.83	0.64	0.02	0.02	0	24.52			
	(mill.K£)	0	21.47	8.61	0.81	0.02	0.02	0	30.93			
Rift Valley Province												
710	Kajiado										47.7	52.3
	- Quantity (m3/d)	9,193	9,559	7,539	593	160	190	174	27,408			
	- No. of Facilities	0	328	1,311	11	25	30	0	1,705			
	- Cost (mill.US\$)	0	37.2	6.52	0.8	0.46	0.4	0	45.37			
	(mill.K£)	0	46.91	8.22	1.01	0.57	0.5	0	57.21			
720	Kericho										43.6	56.4
	- Quantity (m3/d)	25,541	281	238	1,148	0	0	0	27,208			
	- No. of Facilities	0	10	50	27	0	0	0	87			
	- Cost (mill.US\$)	0	1.12	0.22	0.61	0	0	0	1.94			
	(mill.K£)	0	1.41	0.27	0.77	0	0	0	2.44			
730	Laikipia										27.0	73.0
	- Quantity (m3/d)	6,650	9,227	1,816	943	113	91	0	18,840			
	- No. of Facilities	0	279	360	20	21	18	0	698			
	- Cost (mill.US\$)	0	35.51	1.75	1.22	0.32	0.19	0	38.99			
	(mill.K£)	0	44.77	2.21	1.53	0.4	0.24	0	49.16			
740	Nakuru										19.7	80.3
	- Quantity (m3/d)	19,604	14,484	2,694	1,925	182	117	1,762	40,768			
	- No. of Facilities	0	470	277	26	25	22	0	820			
	- Cost (mill.US\$)	0	56.82	1.44	1.64	0.52	0.24	0	60.66			
	(mill.K£)	0	71.65	1.81	2.07	0.66	0.3	0	76.49			
750	Narok										55.4	44.6
	- Quantity (m3/d)	25,717	11,730	13,201	1,954	151	139	77	52,969			
	- No. of Facilities	0	392	2,326	28	22	21	0	2,789			
	- Cost (mill.US\$)	0	44.52	11.27	1.63	0.43	0.29	0	58.14			
	(mill.K£)	0	56.14	14.22	2.05	0.54	0.37	0	73.32			
760	Trans Nzoia										35.1	64.9
	- Quantity (m3/d)	6,529	0	0	268	0	0	0	6,797			
	- No. of Facilities	0	0	0	15	0	0	0	15			
	- Cost (mill.US\$)	0	0	0	0.17	0	0	0	0.17			
	(mill.K£)	0	0	0	0.21	0	0	0	0.21			
770	Uasin Gishu										22.9	77.1
	- Quantity (m3/d)	11,335	0	0	466	0	0	0	11,801			
	- No. of Facilities	0	0	0	22	0	0	0	22			
	- Cost (mill.US\$)	0	0	0	0.28	0	0	0	0.28			
	(mill.K£)	0	0	0	0.35	0	0	0	0.35			

**Table 3.9 Livestock Water Development (4/4)
- Proposed Implementation Programme**

Code	District	Source Development Plan							Total	Implementation Program (%)	
		Surface Water	Borehole	Shallow Well	Small Dam	Subsurface Dam	Sand Dam	Existing Pipeline		Up to 2000	2001-2010
810	Baringo									42.5	57.5
	- Quantity (m3/d)	3,932	3,067	1,574	210	30	26	51	8,890		
	- No. of Facilities	0	97	172	31	16	12	0	328		
	- Cost (mill.US\$)	0	11.11	0.84	0.18	0.08	0.05	0	12.25		
	(mill.K£)	0	14.01	1.05	0.23	0.1	0.07	0	15.45		
820	Elgey Marakwet									40.8	59.2
	- Quantity (m3/d)	9,895	1,730	4,028	455	24	0	207	16,339		
	- No. of Facilities	0	63	675	25	3	0	0	766		
	- Cost (mill.US\$)	0	6.61	3.46	0.39	0.07	0	0	10.52		
	(mill.K£)	0	8.33	4.36	0.49	0.09	0	0	13.27		
830	Nandi									51.8	48.2
	- Quantity (m3/d)	12,211	0	0	414	0	0	0	12,625		
	- No. of Facilities	0	0	0	23	0	0	0	23		
	- Cost (mill.US\$)	0	0	0	0.22	0	0	0	0.22		
	(mill.K£)	0	0	0	0.28	0	0	0	0.28		
840	Samburu									36.7	63.3
	- Quantity (m3/d)	909	4,702	6,544	86	112	155	2	12,510		
	- No. of Facilities	0	242	1,287	6	21	24	0	1,580		
	- Cost (mill.US\$)	0	20.68	5.98	0.12	0.32	0.32	0	27.42		
	(mill.K£)	0	26.07	7.54	0.15	0.4	0.41	0	34.57		
850	Turkana									34.7	65.3
	- Quantity (m3/d)	3,781	22,265	34,948	64	1,157	1,417	0	63,632		
	- No. of Facilities	0	796	5,765	2	124	150	0	6,837		
	- Cost (mill.US\$)	0	80.87	29.46	0.09	3.35	3.02	0	116.78		
	(mill.K£)	0	101.97	37.15	0.11	4.22	3.8	0	147.26		
860	West Pokot									52.0	48.0
	- Quantity (m3/d)	1,588	692	2,095	75	20	10	0	4,480		
	- No. of Facilities	0	38	417	14	10	7	0	486		
	- Cost (mill.US\$)	0	2.85	1.88	0.07	0.05	0.02	0	4.87		
	(mill.K£)	0	3.6	2.37	0.09	0.07	0.03	0	6.14		
	Sub-total									35.4	64.6
	- Quantity (m3/d)	136,885	77,737	74,677	8,601	1,949	2,145	2,273	304,267		
	- No. of Facilities	0	2,715	12,640	250	267	284	0	16,156		
	- Cost (mill.US\$)	0	297.29	62.82	7.42	5.6	4.53	0	377.61		
	(mill.K£)	0	374.86	79.2	9.34	7.05	5.72	0	476.15		
	Western Province										
910	Bungoma									45.6	54.4
	- Quantity (m3/d)	8,921	167	409	425	0	0	0	9,922		
	- No. of Facilities	0	9	84	19	0	0	0	112		
	- Cost (mill.US\$)	0	0.57	0.4	0.22	0	0	0	1.19		
	(mill.K£)	0	0.72	0.5	0.28	0	0	0	1.5		
920	Busia									49.0	51.0
	- Quantity (m3/d)	3,860	645	1,643	162	5	4	0	6,319		
	- No. of Facilities	0	28	308	16	3	2	0	357		
	- Cost (mill.US\$)	0	2.5	1.53	0.09	0.01	0.01	0	4.14		
	(mill.K£)	0	3.16	1.92	0.11	0.02	0.01	0	5.22		
930	Kakamega									43.1	56.9
	- Quantity (m3/d)	12,226	0	0	365	0	0	0	12,591		
	- No. of Facilities	0	0	0	41	0	0	0	41		
	- Cost (mill.US\$)	0	0	0	0.14	0	0	0	0.14		
	(mill.K£)	0	0	0	0.17	0	0	0	0.17		
	Sub-total									45.5	54.5
	- Quantity (m3/d)	25,007	812	2,052	952	5	4	0	28,832		
	- No. of Facilities	0	37	392	76	3	2	0	510		
	- Cost (mill.US\$)	0	3.07	1.93	0.45	0.01	0.01	0	5.47		
	(mill.K£)	0	3.88	2.42	0.56	0.02	0.01	0	6.89		
	Total									33.9	66.1
	- Quantity (m3/d)	248,489	133,675	151,320	14,404	3,473	4,256	3,114	558,731		
	- No. of Facilities	0	4,582	27,030	688	527	608	0	33,435		
	- Cost (mill.US\$)	0	506.69	132.36	12.03	9.93	8.97	0	669.87		
	(mill.K£)	0	638.87	166.84	15.13	12.53	11.32	0	844.71		

**Table 3.10 Provision of Water Points in Nomadic Pasturage Area
- Proposed Implementation Programme**

District Code	Project	Assumed Nomadic Pasturage Area (km ²)	No. of Watering Points (Nos)	Executing Agency	Cost (million)		Implementation of watering points (No.)	
					US\$	K£	up to 2000	2001-2010
	<u>Nairobi Province</u>							
110	Nairobi	-	-	-	-	-	-	-
	<u>Central Province</u>							
210	Kiambu	-	-	-	-	-	-	-
220	Kirinyaga	-	-	-	-	-	-	-
230	Muranga	-	-	-	-	-	-	-
240	Nyandarua	-	-	-	-	-	-	-
250	Nyeri	-	-	-	-	-	-	-
	<u>Coast Province</u>							
310	Kilifi	7,562	12	MOWD	2.3	2.8	4	8
320	Kwale	5,503	9	MOWD	1.9	2.4	3	6
330	Lamu	3,481	6	MOWD	1.1	1.4	2	4
340	Mombasa	-	-	-	-	-	-	-
350	Taita Taveta	4,889	8	MOWD	1.5	1.9	2	6
360	Tana River	32,277	52	MOWD	8.9	11.2	16	36
	<u>Eastern Province</u>							
410	Embu	-	-	-	-	-	-	-
420	Isiolo	21,423	34	MOWD	4.9	6.2	10	24
430	Kitui	20,889	33	MOWD	5.3	6.7	10	23
440	Machakos/Makue	6,424	10	MOWD	1.7	2.1	3	7
450	Marsabit	20,305	32	MOWD	4.9	6.2	10	22
460	Meru	3,098	5	MOWD	0.8	1.0	2	3
	<u>Northeastern Province</u>							
510	Garissa	39,187	63	MOWD	11.6	14.6	19	44
520	Mandera	23,946	38	MOWD	5.3	6.6	11	27
530	Wajir	53,124	85	MOWD	11.1	14.0	26	59
	<u>Nyanza Province</u>							
610	Kisii/Nyamira	-	-	-	-	-	-	-
620	Kisumu	-	-	-	-	-	-	-
630	Siaya	-	-	-	-	-	-	-
640	South Nyanza	-	-	-	-	-	-	-
	<u>Rift Valley Province</u>							
710	Kajiado	13,830	22	MOWD	3.2	4.0	7	15
720	Kericho	-	-	-	-	-	-	-
730	Laikipia	7,530	12	MOWD	1.9	2.4	4	8
740	Nakuru	-	-	-	-	-	-	-
750	Narok	13,481	22	MOWD	3.2	4.0	7	15
760	Trans Nzoia	-	-	-	-	-	-	-
770	Uasin Gishu	-	-	-	-	-	-	-
810	Baringo	7,087	11	MOWD	1.9	2.4	3	8
820	Elgeyo Marakwet	-	-	-	-	-	-	-
830	Nandi	1,690	3	MOWD	0.5	0.6	1	2
840	Samburu	13,563	22	MOWD	2.4	3.1	7	15
850	Turkana	44,837	72	MOWD	9.1	11.5	22	50
860	West Pokot	4,855	8	MOWD	1.1	1.3	2	6
	<u>Western Province</u>							
910	Bungoma	-	-	-	-	-	-	-
920	Busia	-	-	-	-	-	-	-
930	Kakamega/Vihiga	-	-	-	-	-	-	-
	Total		559		85	107	171	388

Note : Normadic pasturage area assumed to be bushland and grassland in ASAL area after deleting area for managed pasture. (see Table F1.9)
30 % of schedule quantity to be implemented towards year 2000

Table 3.11 Hydropower Development - Proposed Implementation Programme

District Code	Project	Description	Executing Agency	Cost (million)		Implementation Schedule															
				US\$	K£	93	95	2000	2	4	6	8	10								
620	Sonde/Miriu	Hydropower 60MW (No.1 P/S) Sonde river -detailed design completed in 1991 -Irrigation included	KPLC/ LBDA	133	168	●	●	●	●	●											
		Hydropower 20.6MW (No.2 P/S) -Feasibility study completed in 1991 -Cost of detail design included in No.1 P/S	KPLC	36	45	★	★	●	●	●	●										
460	Low Grand Falls	Hydropower 120MW (Tana river) -Multipurpose development to be assessed	KPC/ TARDA	291	367	☆	☆	★	★	●	●	●	●								
750	Oldorko	Hydropower 72MW (Ewaso Ngino South river) -Irrigation included	KPC	71	89	☆	☆	★	★	●	●	●	●								
610	Magwagwa	Hydropower 120MW (Sonde river) -Irrigation included -Feasibility study completed in 1991	KPC/ LBDA	329	415			★	★	●	●	●	●								
410	Gitaru #3 Extension	Hydropower 72.5MW (Tana river) -Extension of existing Gitaru P/S	KPC/ TRDC	25	32		☆	★	★	●	●	●	●								
460	Mutonga	Hydropower 60MW (Tana river) -Multipurpose development to be assessed	KPC/ TARDA	149	188			☆	☆	★	★	●	●	●	●						
	Total			1,034	1,304																

Note: ☆ Study
★ Design
● Construction
No hydropower schemes envisaged for period of 2005 - 2010.

Table 3.12 Major Flood Control Projects - Proposed Implementation Programme

District Code	Project	Description	Executing Agency	Cost (million)		Implementation Schedule														
				US\$	K£	93	95	2000			2	4	6	8	10					
620	Kano Plain (Nyando river)	- Heightening of existing dykes (2 km) - Construction of new dykes (69 km)	MOWD/LBDA	20.7	26.1	☆	☆	☆	●	●	●									
110	Nairobi City (Nairobi river, etc)	- Enlargment of existing channels/culverts (13 sites) - Channel improvement (11 sites)	MOLG	10.8	13.6		☆	☆	☆	●	●	●								
630	Yala Swamp (Yala/Nzoia river)	- Rehabilitation of existing dykes (25 km) - Construction of new dykes (16 km)	MOWD/LBDA	17.7	22.3				☆	☆	☆	●	●	●						
640	Kuja Rivermouth (Kuja river)	- Construction of new dykes (10 km)	MOWD/LBDA	5.0	6.3								☆	☆	☆	●	●	●		
350	Lumi Rivermouth (Lumi river)	- Construction of new dykes (11 km)	MOWD	8.3	10.5									☆	☆	☆	●	●	●	
	Total			62.5	78.8															
Note:		☆ Study/Design ● Construction																		

**Table 3.13 Urban Drainage and River Improvement Projects
- Proposed Implementation Programme (2/2)**

District Code	Project	Description	Executing Agency	Cost (million)		Implementation Schedule																	
				US\$	K£	93	95	2000				2	4	6	8	10							
All	<u>Minor Ad-hoc River Improvement Works</u> Various rivers	To be taken up as the need is identified	MOWD	90	113.4	☆	☆	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
360	<u>Long-term Improvement of Lower Tana River</u> Lower Tana improvement	Experimental work for rectifying river meanders and bank protection	MOWD/ TARDA	40	50.4	●	●	●	●	●	●	●	●										
	Sub-total			130	163.8																		
	TOTAL			1004	1265.0																		
Note:		☆ Study/Design ● Construction																					

Table 3.14 Summary of Development Cost
(Basic Case : Full Development Meeting Whole Demands)

Development Sector	Budget Appropriated for	Financial Requirement (Million)					
		1993 - 2000		2001 - 2010		Total	
		US\$	K£	US\$	K£	US\$	K£
1. D&I Water Supply		3,470	4,372	4,106	5,174	7,576	9,546
(1) Urban water supply	MOWD *1						
– Source development (Dam)		366	461	211	266	577	727
– Water supply system		2,614	3,294	1,758	2,215	4,372	5,509
Sub-total		2,980	3,755	1,969	2,481	4,949	6,236
(2) Rural water supply	MOWD *2						
– Source development		490	617	924	1,165	1,414	1,782
– Water supply system		-	-	1,213	1,528	1,213	1,528
Sub-total		490	617	2,137	2,693	2,627	3,310
2. Sewerage Development	MOLG *3	420	529	285	359	705	888
3. Irrigation Development		201	253	772	973	973	1,226
(1) Major irrigation projects	MORD *4	196	247	767	966	963	1,213
(2) Small irrigation schemes	MOA *5	5	6	5	7	10	13
4. Livestock Water Development		252	318	503	633	755	951
(1) Source development	MOLD *6	227	286	443	558	670	844
(2) Water points in nomadic pasturage land	MOLD *6	25	32	60	75	85	107
5. Hydropower Development	MOE *7	542	683	492	621	1,034	1,304
6. River and Flood Works		624	785	443	558	1,067	1,343
(1) Major flood control projects	MOWD *8	32	40	31	39	63	79
(2) Urban drainage works	MOLG *3	525	661	349	440	874	1,101
(3) Minor river improvement	MOWD *8	27	34	63	79	90	113
(4) Improvement of Lower Tana	MOWD *9	40	50	-	-	40	50
Total		5,509	6,940	6,601	8,318	12,110	15,258

- Notes: Executing agencies will be;
- *1 : MOWD, NWPC, Municipalities (NCC, etc)
 - *2 : MOWD, NWPC, County councils, NGO, etc
 - *3 : Municipal and urban councils under technical assistance by MOWD
 - *4 : NIA, LBDA, TARDA, KVDA and other basin development authorities
 - *5 : MOA and some agencies listed for *4
 - *6 : Implementation to be entrusted to MOWD and/or basin development authorities
 - *7 : KPC, KPLC and basin development authorities
 - *8 : MOWD or to be entrusted to basin development authorities and municipal/urban councils
 - *9 : To be entrusted to TARDA
- Irrigation development cost represents the cost disbursed during 1993-2010 and is therefore different from total project cost

Table 3.15 Annual Budgetary Schedule (Basic Case : Full Development Meeting Whole Demands)

(Unit : million US\$)

Development Sector	Year										Total								
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002		2003	2004	2005	2006	2007	2008	2009	2010
1 D&I Water Supply	509.7	509.7	497.1	497.1	388.8	388.8	339.6	339.6	385.7	385.7	428.0	428.0	441.3	441.3	398.6	398.6	399.4	399.4	7,576
(1) Urban water supply																			
Source development (dam)	77.9	77.9	36.3	36.3	29.9	29.9	39.0	39.0	25.0	25.0	56.8	56.8	23.8	23.8	0.0	0.0	0.0	0.0	577
Water supply system	370.5	370.5	399.5	399.5	297.6	297.6	239.3	239.3	147.0	147.0	157.5	157.5	203.8	203.8	185.0	185.0	185.8	185.8	4,372
Sub-total	448.4	448.4	435.8	435.8	327.5	327.5	278.3	278.3	172.0	172.0	214.3	214.3	227.6	227.6	185.0	185.0	185.8	185.8	4,949
(2) Rural water supply																			
Source development	61.3	61.3	61.3	61.3	61.3	61.3	61.3	61.3	92.4	92.4	92.4	92.4	92.4	92.4	92.3	92.3	92.3	92.3	1,414
Water supply system	61.3	61.3	61.3	61.3	61.3	61.3	61.3	61.3	121.3	121.3	121.3	121.3	121.3	121.3	121.3	121.3	121.3	121.3	1,213
Sub-total	122.6	122.6	122.6	122.6	122.6	122.6	122.6	122.6	213.7	213.7	213.7	213.7	213.7	213.7	213.6	213.6	213.6	213.6	2,627
2 Sewerage Development (for 158 urban centres)	80.6	80.6	80.4	80.4	22.6	22.6	26.3	26.3	22.7	22.7	22.9	22.9	37.0	37.0	33.0	33.0	27.2	27.2	705
3 Irrigation Development	32.7	33.9	9.9	15.4	44.4	22.8	16.3	24.9	34.6	36.3	49.8	54.1	124.7	140.7	133.5	103.6	79.9	15.8	973
(1) Major irrigation projects	32.1	33.3	9.3	14.8	43.8	22.2	15.7	24.3	34.0	35.7	49.2	53.5	124.1	140.1	132.9	103.0	79.3	15.2	963
(2) Small irrigation schemes	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	10
4 Livestock Water Development	31.5	31.5	31.5	31.5	31.5	31.5	31.6	31.6	50.3	50.3	50.3	50.3	50.3	50.3	50.3	50.3	50.3	50.3	755
(1) Source development	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	44.3	44.3	44.3	44.3	44.3	44.3	44.3	44.3	44.3	44.3	670
(2) Water points in nomadic pasturage land	3.1	3.1	3.1	3.1	3.1	3.1	3.2	3.2	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	85
5 Hydropower Development	20.0	27.0	52.0	45.0	63.0	93.0	113.0	129.0	129.0	159.0	121.0	56.0	27.0						1,094
6 River and Flood Works	5.0	5.0	99.5	104.7	139.9	162.5	73.4	33.1	31.4	50.6	66.4	46.5	22.1	22.3	38.2	71.2	55.3	39.4	1,067
(1) Major flood control projects				5.2	5.2	8.8	8.8	3.6	4.4	4.4	4.4	4.4	0.0	1.7	1.7	4.4	2.8	2.8	63
(2) Urban drainage works			90.0	90.0	125.2	144.2	55.1	20.0	20.7	39.9	55.7	35.8	15.8	14.3	30.2	60.5	46.2	30.3	874
(3) Minor river improvement			4.5	4.5	4.5	4.5	4.5	4.5	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	90
(4) Improvement of Lower Tana			5.0	5.0	5.0	5.0	5.0	5.0											40
Total (US\$)	679.5	687.7	770.4	774.1	690.2	721.2	600.2	584.5	653.7	704.6	738.4	657.8	702.4	691.6	653.6	656.7	612.1	532.1	12,110
Total (K\$)	856.1	866.5	970.7	975.3	869.6	908.7	756.2	736.4	823.6	887.8	930.3	828.8	884.9	871.3	823.5	827.3	771.1	670.3	15,258

Table 4.1 Trend of Projected Public Expenditure for Development up to 2010

(Unit : K.Pound Million)

Item	1989 Provisional	1990 1990/91	1995 1995/96	2000 2000/01	2005 2005/06	2010 2010/11
1. GDP at 1989 Constant Prices *1 (at Factor Cost)	7,330.5	7,762.8	10,351.5	13,832.1	16,805.0	20,435.8
2. Total Expend. by National Government	3,522.7	3,700.4	4,742.8	6,100.0	7,411.0	9,012.2
1) Recurrent Expenditure	2,516.2	2,653.8	3,463.4	4,520.1	5,491.6	6,678.0
2) Development Expenditure	1,006.5	1,046.5	1,279.4	1,579.9	1,919.5	2,334.2
a) Appropriations-in-Aid	548.9	560.2	620.5	687.3	835.0	1,015.4
b) Net Expenditure	457.7	486.3	658.9	892.6	1,084.5	1,318.8
3. Capital Expenditure	665.9	678.3	743.6	815.2	990.4	1,204.4
a) Gross Fixed Capital Formation	603.4	613.5	666.3	723.6	879.1	1,069.0
4. Expenditure for Projects Related to Water Development	225.4	232.8	273.7	322.3	391.6	476.2
a) Expenditure by MOWD	75.2	78.5	96.9	119.6	145.3	176.7
b) Expend. by Agencies Concerned	150.1	154.3	176.9	202.7	246.3	299.5
5. Accumulation of Expenditure for Projects Related to Water Development after 1992	-	-	1,284.0	2,795.0	4,608.9	6,813.9
a) Expenditure by MOWD	-	-	446.0	996.5	1,669.5	2,487.6
b) Expend. by Agencies Concerned	-	-	838.0	1,798.5	2,939.4	4,326.4
Equivalent in US\$ (US\$ Million) *2						
Total Expenditure Accumulation	-	-	1,188.8	2,587.8	4,267.3	6,308.9
1) Expenditure by Ministry						
a) Expenditure by MOWD	-	-	412.9	922.7	1,545.8	2,303.2
b) Expend. by Agencies Concerned	-	-	775.9	1,665.2	2,721.5	4,005.7
2) Expenditure by Sector*3						
a) Water Supply	-	-	489.1	1,064.8	1,755.8	2,595.9
b) Sewerage	-	-	41.6	90.5	149.2	220.5
c) Irrigation	-	-	113.8	247.6	408.4	603.7
d) Livestock	-	-	0.0	0.0	0.0	0.0
e) Hydropower	-	-	541.7	1,179.3	1,944.6	2,874.9
f) Flood Control	-	-	2.6	5.7	9.4	13.8

Source : A.01, A.13 and A.24 (Sectoral Report A)

Remark : *1 Refer to Table A5.1. (Sectoral Report A)

*2 Foreign exchange rate : KShs21.6/US\$ (as of December, 1989)

*3 Distribution(1) in Table A2-48 is applied.

Table 6.1 Estimated Cost of Studies and Design of Individual Projects by Development Sector (1/3)

Description	Executing Agency	Cost (million)		Implementation Schedule																
		US\$	K£	93	95	2000		2	4	6	8	10								
1. D&I Water Supply																				
(1) Urban water supply *1	MOWD	259.41	326.85																	
(2) Rural water supply	MOWD	197.05	248.29																	
Sub-Total of Item 1.		456.46	575.14																	
2. Sewerage Development	MOLG	52.87	66.62																	
3. Irrigation Development																				
(1) Major irrigation projects	MORD																			
- Kano Plain	MORD	11.63	14.65	★	★															
- Bunyala Ext.	MORD	0.93	1.17	☆	☆	★	★													
- Mwea Ext.	MORD	4.78	6.02	☆	★	★	★													
- Kunati	MORD	0.26	0.33	☆	☆	★	★													
- Lower Kuja	MORD	0.42	0.53			☆	★	★												
- Lower Rupigazi	MORD	0.45	0.57			☆	☆	★	★											
- Kanzalu	MORD	2.86	3.60			☆	☆	★	★											
- Kimira	MORD	1.36	1.71			☆	☆	★	★											
- Yala Swamp	MORD	4.88	6.14			☆	★	★	★											
- Arror	MORD	0.47	0.60			☆	☆	☆	☆	★	★									
- Sabaki Ext.	MORD	1.49	1.87			☆	☆	☆	☆	★	★									
- Thanantu	MORD	1.30	1.64			☆	☆	☆	☆	★	★									
- Kibwezi Ext.	MORD	17.04	21.47			☆	☆	☆	☆	★	★	★								
- Upper Nzoia	MORD	6.60	8.32			☆	☆	☆	☆	★	★	★								
- Turkwel	MORD	0.13	0.17					☆	☆	★	★	★								
- Taveta	MORD	0.89	1.13					☆	☆	★	★	★								
- Lower E. Ng'iro	MORD	4.28	5.39					☆	☆	★	★	★	★							
(2) Small irrigation schemes	MOA	0.77	0.97																	
Sub-Total of Item 3.		60.53	76.27																	
4. Livestock Water																				
(1) Source development	MOLD	50.24	63.30																	
(2) Water points in nomadic pasturage land	MOLD	5.48	6.90																	
Sub-Total of Item 4.		55.72	70.20																	

Note: ☆ Study ★ Design ■ Study/Design Continues intermittently
 *1 excluding the cost of groundwater source development schemes

Table 6.1 Estimated Cost of Studies and Design of Individual Projects by Development Sector (2/3)

Description	Executing Agency	Cost (million)		Implementation Schedule																
		US\$	K£	93	95	2000	2	4	6	8	10									
5. Hydropower Development																				
	MOE																			
- Low Grand Falls	KPC/ TARDA	21.83	27.50	☆	☆	★	★													
- Oldorko	KPC	5.33	6.71		☆	☆	★	★												
- Magwagwa	KPC/ LBDA	17.00	21.42				★	★												
- Gitaru #3 Extension	KPC/ TRDC	-	-				☆	★	★											
- Mutonga	KPC/ TARDA	11.18	14.08				☆	☆	★	★										
Sub-Total of Item 5.		55.33	69.71																	
6. River and Flood Works																				
(1) Major flood control projects																				
	MOWD																			
- Kano Plain (Nyando river)	MOWD/ LBDA	1.55	1.96	☆	★	★														
- Nairobi City (Nairobi river, etc)	MOLG	0.81	1.02		☆	★	★													
- Yala Swamp (Yala/Nzoia river)	MOWD/ LBDA	1.33	1.67				☆	★	★											
- Kuja Rivermouth (Kuja river)	MOWD/ LBDA	0.38	0.47								☆	★	★							
- Lumi Rivermouth (Lumi river)	MOWD	0.62	0.78										☆	★	★					
(2) Urban drainage works																				
	MOLG																			
- Nairobi	MOLG	18.00	22.68	★	★															
- Kiambu	MOLG	0.97	1.22										☆	★	★					
- Thika	MOLG	1.11	1.40										☆	★	★					
- Kerugoya	MOLG	0.58	0.73										☆	★	★					
- Muranga	MOLG	2.36	2.98									☆	★	★						
- Olkalou	MOLG	0.45	0.57										☆	★	★					
- Nyeri	MOLG	0.98	1.24					☆	★	★										
- Kilifi	MOLG	0.37	0.47										☆	★	★					
- Malindi	MOLG	0.57	0.72										☆	★	★					
- Kwale	MOLG	0.54	0.68										☆	★	★					
- Lamu	MOLG	0.53	0.66									☆	★	★						
- Mombasa	MOLG	3.49	4.40	☆	★	★														
- Voi	MOLG	0.69	0.87										☆	★	★					
- Wundanyi	MOLG	0.17	0.21										☆	★	★					
- Hola	MOLG	0.56	0.70										☆	★	★					
- Embu	MOLG	0.57	0.72					☆	★	★										
- Isiolo	MOLG	0.27	0.34									☆	★	★						
- Kitui	MOLG	0.27	0.34										☆	★	★					
- Mchakos	MOLG	1.66	2.09		☆	★	★													
- Mitaboni	MOLG	0.12	0.15		☆	★	★													
- Marsabit	MOLG	0.06	0.08									☆	★	★						
- Meru	MOLG	0.20	0.26			☆	★	★												

Note: ☆ Study ★ Design [Pattern] Study/Design Continues intermittently
 *1 excluding the cost of groundwater source development schemes

Table 6.1 Estimated Cost of Studies and Design of Individual Projects by Development Sector (3/3)

Description	Executing Agency	Cost (million)		Implementation Schedule																
		US\$	K£	93	95		2000	2	4	6	8	10								
- Garissa	MOLG	0.48	0.60						☆	★	★									
- Mandera	MOLG	0.04	0.05									☆	★	★						
- Wajir	MOLG	0.12	0.15									☆	★	★						
- Kisii	MOLG	1.58	1.99						☆	★	★									
- Kisumu	MOLG	2.51	3.16		☆	★	★													
- Siaya	MOLG	0.07	0.09										☆	★	★	★				
- Homa Bay	MOLG	0.69	0.87									☆	★	★	★					
- Kajiado	MOLG	0.69	0.87									☆	★	★	★					
- Kericho	MOLG	0.70	0.88						☆	★	★									
- Nanyuki	MOLG	1.17	1.48						☆	★	★	★								
- Naivasha	MOLG	0.54	0.68	☆	★	★														
- Nakuru	MOLG	3.89	4.90	☆	★	★														
- Narok	MOLG	0.48	0.61										☆	★	★					
- Kitale	MOLG	1.89	2.38						☆	★	★									
- Eldoret	MOLG	2.57	3.24						☆	★	★									
- Kabarnet	MOLG	0.10	0.12										☆	★	★	★				
- Kapsabet/Baraton	MOLG	0.20	0.25										☆	★	★	★				
- Iten	MOLG	0.98	1.24										☆	★	★	★	★			
- Maralal	MOLG	0.42	0.53										☆	★	★	★	★			
- Lodwar	MOLG	0.13	0.17										☆	★	★	★	★			
- Kapenguria/Makutano	MOLG	0.21	0.26										☆	★	★	★	★			
- Bungoma	MOLG	1.12	1.41										☆	★	★	★				
- Webuye	MOLG	0.14	0.17										☆	★	★	★				
- Busia	MOLG	0.07	0.09										☆	★	★	★				
- Kakamega	MOLG	1.24	1.56						☆	★	★									
(3) Minor river improvement																				
- Various rivers	MOWD	6.75	8.51																	
(4) Improvement of Lower Tana																				
- Lower Tana improvement	MOWD/ TARDA	3.00	3.78																	
Sub-Total of Item 6.		70.99	89.44																	
Total		751.89	947.38																	

Note : ☆ Study ★ Design [shaded box] Study/Design Continues intermittently
 *1 excluding the cost of groundwater source development schemes

Table 6.2 River Basin Development Study - Proposed Study Programme

District Code	Description	Executing Agency	Cost (million)		Implementation Schedule																		
			US\$	K£	93	95	2000			2	4	6	8	10									
<u>Lake Victoria Drainage Area</u>																							
910 920	1. Sio/Malaba River Basin Study	LBDA	2.0	2.5				☆	☆	☆													
630, 910, 930 760, 770, 830	2. Nzoia/Yala River Basin Study	LBDA	3.0	3.8		☆	☆	☆															
620 720	3. Nyando River Basin Study	LBDA	2.5	3.2	☆	☆	☆																
<u>Rift Valley Drainage Area</u>																							
810, 820 850, 860	4. Kerio River Basin Study (Update)	KUDA	2.0	2.5					☆	☆	☆												
740 240	5. Nakuru and Environs Integrated Water Use Study	NWCPC	3.0	3.8	☆	☆	☆																
710 750	6. Ewaso Ngiro South River Basin Study	ENSRDA	2.5	3.2				☆	☆	☆													
<u>Athi River Drainage Area</u>																							
110, 210, 440 710, 350, 310	7. Athi River Basin Study (Update)	TARDA	4.0	5.0		☆	☆	☆	☆	☆													
<u>Tana River Drainage Area</u>																							
220, 230, 250 410, 460, 420 430, 360, 510	8. Tana River Basin Study (Update)	TARDA	4.0	5.0					☆	☆	☆	☆	☆										
730, 240, 840 420, 450, 510	9. Ewaso Ngiro North River Basin Study	ENNRDA	2.5	3.2	☆	☆	☆																
	Total		25.5	32.1																			
Note:		☆ Study																					

Table 6.3 List of Urban Water Supply Schemes to be Served by Groundwater

Urban centre	Location	Water demand*1 (m3/day)	Number of boreholes	Number of shallow wells	Outer radius of development (km)
Msambweni	Msambweni	2,671	50	54	32
Isiolo	Isiolo	9,343	167	187	58
Garbatula	Garbatula	1,417	22	28	22
North Horr	North Horr	1,218	29	23	24
Korr	Korr	3,366	76	68	39
Kargi	Kargi	3,241	90	61	42
Marsabit	Mountain	8,971	214	0	65
Sololo	Sololo	2,787	99	56	44
Moyale	Moyale	5,885	78	589	39
Mudo Gashe	Madogashe	1,121	27	22	23
Ijara	Ijara	584	13	11	16
Kotile	Kotile	534	26	11	23
Elwak	Elwak	4,170	100	84	45
Wajir	Wajir Town	6,148	188	224	61
Buna	Buna	3,047	162	61	57
Bute	Bute	989	24	20	22
Nyabikaye	Bugembe	1,370	32	28	25
Wamba	Wamba	2,604	124	51	50
Barogoi	Elbarta	2,252	205	45	64
Lodwar	Lodwar	7,792	179	155	60
Nyahururu*2	Nyahururu	4,282	172	10	60
Rumuruti*2	Rumuruti	780	32	16	23

Note : *1 For year 2010

*2 Tentatively listed in view of scarcity of surface water resources, but the main supply source to be developed first for these two centres should be surface water (eg. Nyahururu Dam, Rumuruti Dam).

**Table 6.4 Groundwater Resources Study for Urban Water Supply
- Proposed Study Programme**

District Code	Description	Executing Agency	Cost (million)		Study Schedule															
			US\$	K£	93	95	2000	2	4	6	8	10								
320	1. Msambweni	MOWD / NWPC	1.6	2.0		☆														
420	2. Isiolo	MOWD / NWPC	3.6	4.5		☆	☆													
420	3. Garbatula	MOWD / NWPC	1.6	2.0		☆														
450	4. North Horr	MOWD / NWPC	1.6	2.0		☆														
450	5. Korr	MOWD / NWPC	1.6	2.0			☆													
450	6. Kargi	MOWD / NWPC	1.6	2.0		☆														
450	7. Marsabit	MOWD / NWPC	3.6	4.5	☆	☆														
450	8. Sololo	MOWD / NWPC	1.6	2.0		☆														
450	9. Moyale	MOWD / NWPC	1.6	2.0			☆													
510	10. Mudo Gashe	MOWD / NWPC	1.6	2.0		☆														
510	11. Ijara	MOWD / NWPC	1.6	2.0		☆														
510	12. Kotile	MOWD / NWPC	1.6	2.0		☆														
520	13. Elwak	MOWD / NWPC	1.6	2.0		☆														
530	14. Wajir	MOWD / NWPC	5.4	6.8	☆	☆	☆													
530	15. Buna	MOWD / NWPC	3.6	4.5	☆	☆														
530	16. Bute	MOWD / NWPC	1.6	2.0		☆														
640	17. Nyabikaye	MOWD / NWPC	1.6	2.0		☆														
730	18. Rumuruti	MOWD / NWPC	1.6	2.0		☆														
730	19. Nyahururu	MOWD / NWPC	3.6	4.5			☆	☆												
840	20. Wamba	MOWD / NWPC	1.6	2.0		☆														
840	21. Barogoi	MOWD / NWPC	3.6	4.5	☆	☆														
850	22. Lodwar	MOWD / NWPC	3.6	4.5		☆	☆													
	TOTAL		51.0	64.3																

Note : ☆ Study

**Table 6.5 District Water Resources Study
- Proposed Study Programme (1/2)**

District Code	Description	(Basin Study proposed)	Executing Agency	Cost (million)		Implementation Schedule																		
				US\$	K£	93	95	2000		2	4	6	8	10										
	<u>Nairobi Province</u>																							
110	Nairobi	(Athi)	NCC	-	-	(To be covered by separate studies)																		
	<u>Central Province</u>																							
210	Kaimbu	(Athi)	MOWD	2.0	2.5	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o			
220	Kirinyaga	(Tana)	"	2.0	2.5																			
230	Muranga	(Tana)	"	2.0	2.5																			
240	Nyandarua	(Nakuru)	"	2.0	2.5	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o			
250	Nyeri	(Tana)	"	2.0	2.5																			
	<u>Coast Province</u>																							
310	Kilifi		MOWD	2.5	3.2	☆	☆	☆	(WRAP underway for two divisions)															
320	Kwale		"	3.0	3.8	☆	☆	☆																
330	Samu		"	-	-	☆	☆	☆	(WRAP proposed)															
340	Mombasa		"	2.5	3.2	☆	☆	☆																
350	Taiota Taveta		"	2.5	3.2				☆	☆	☆													
360	Tana River	(Tana)	"	-	-	☆	☆	(WRAP proposed)																
	<u>Eastern Province</u>																							
410	Embu	(Tana)	MOWD	2.5	3.2				o	o	o	o	o	o	o	o	o	o	o	o	o			
420	Isiolo	(Ewaso Ngiro N.)	"	-	-	(WRAP proposed)																		
430	Kitui	(Tana)	"	2.5	3.2				o	o	o	o	o	o	o	o	o	o	o	o	o			
440	Machakos/Maku	(Athi)	"	-	-	☆	☆	☆	(WRAP proposed)															
450	Marsabit	(Ewaso Ngiro N.)	"	-	-	☆	☆	(WRAP proposed)																
460	Meru	(Tana)	"	-	-	(WRAP completed)																		
	<u>North Eastern Province</u>																							
510	Garissa		MOWD	-	-	☆	☆	(WRAP proposed)																
520	Mandera		"	3.0	3.8	☆	☆	☆																
530	Wajir		"	-	-	☆	☆	(WRAP proposed)																
Note:		☆ Study o River Basin Study (proposed under separate programme)																						

**Table 6.5 District Water Resources Study
- Proposed Study Programme (2/2)**

District Code	Description	(Basin Study proposed)	Executing Agency																				
				US\$	K£	93	95	2000		2	4	6	8	10									
<u>Nyanza Province</u>																							
610	Kisii/Nyamira		MOWD	2.0	2.52			☆	☆	☆													
620	Kisumu	(Nyando)	"	2.5	3.2	○	○	○	☆	☆													
630	Siaya	(Yala)	"	2.0	2.5	○	○	○	☆	☆													
640	South Nyanza		"	2.0	2.5			☆	☆	☆													
<u>Rift Valley Province</u>																							
710	Kajiado	(Athi)	MOWD	-	-	☆	☆	(WRAP underway)															
720	Kericho		"	2.5	3.2			☆	☆	☆													
730	Laikipia	(Ewaso Ngiro N.)	"	-	-	(WRAP completed)																	
740	Nakuru	(Nakuru)	"	2.0	2.5	○	○	○	☆	☆													
750	Narok	(Ewaso Ngiro N.)	"	2.5	3.2			○	○	○	☆	☆											
760	Trans Nzoia	(Nzoia)	"	2.0	2.5	○	○	○	☆	☆													
770	Uasin Gishu	(Nzoia)	"	2.0	2.5	○	○	○	☆	☆													
810	Baringo		MOWD	-	-	(WRAP completed)																	
820	Elgeyo Marakwet	(Kerio)	"	-	-	(WRAP completed)																	
830	Nandi	(Yala)	"	2.0	2.5	○	○	○	☆	☆													
840	Samburu	(Ewaso Ngiro N.)	"	-	-	(WRAP completed)																	
850	Turkana		"	3.0	3.8	☆	☆	☆															
860	West Pokot		"	-	-	(WRAP completed)																	
<u>Western Province</u>																							
910	Bungoma	(Nzoia)	MOWD	2.0	2.5	○	○	○	☆	☆													
920	Busia	(Sio)	"	2.0	2.5			○	○	○	☆	☆											
930	Kakamega/Vihig	(Nzoia)	"	2.0	2.5	○	○	○	☆	☆													
	Total			59.0	74.3																		
Note: ☆ District Study ○ River Basin Study (proposed under separate programme)																							

Table 6.6 Programmes for Data Collection and Water Management (1/2)

District Code	Description	Executing Agency	Cost (million)		Implementation Schedule															
			US\$	K£	93	95	2000			2	4	6	8	10						
	1. <u>Surface Water Management</u>																			
	(1) Hydrological data management																			
	(a) Reinstatement of river water level gauging stations	MOWD	1.6	2.0	★	★	★	★	★	★	★									
	(b) Reinforcement of MOWD database system	MOWD	0.2	0.3			★	★												
	(c) Reinforcement of regional offices' activities	MOWD	2.0	2.5	★	★	★	★												
	(2) Water abstraction permit data - review and upgrading, including water use survey for Upper Athi and Upper Tana basins	MOWD	2.5	3.2	★	★	★													
	(3) Assessment of river maintenance discharge	MOWD	Included in (2) above			★	★	★												
	(4) Reinforcement of water use monitoring/control activities	MOWD	2.0	2.5	★	★	★	★												
	Sub-total		8.3	10.5																
	2. <u>Groundwater Resources Management</u>																			
	(1) Groundwater data management	MOWD	0.1	0.1			★	★												
	(2) Assessment of groundwater potential	MOWD	-	-	★	★	★	★	★	★	★	★								
	Sub-total		0.1	0.1																
	3. <u>Water Quality and Pollution Control</u>																			
	(1) Water quality monitoring programme																			
	(a) Surface water quality monitoring programme	MOWD	2.5	3.2	★	★														
	(b) Groundwater quality monitoring programme	MOWD	3.0	3.8		★	★	★												
	(2) Establishment of water quality standards	MOWD	1.5	1.9					★	★	★									
	(3) Enforcement of water pollution control	MOWD	6.5	8.2	★	★	★	★	★	★	★									
	Sub-total		13.5	17.0																
Note:		★ Study																		

Table 6.6 Programmes for Data Collection and Water Management (2/2)

District Code	Description	Executing Agency	Cost (million)		Implementation Schedule															
			US\$	K£	93	95	2000	2	4	6	8	10								
	4. <u>Domestic/Industrial Water Supply</u>																			
	(1) Inventory list of water supply facilities	MOWD	-	-	☆	☆														
	(2) Measurement of water supply	MOWD	20	25.2	☆	☆	☆	☆	☆	☆	☆									
	Sub-total		20	25.2																
	5. <u>Irrigation Inventory/Water Use Record</u>																			
	(1) Inventory list of irrigation schemes	MOA	-	-	☆	☆														
	(2) Irrigation water use record	MOA	-	-	☆	☆	☆	☆	☆	☆	☆									
	6. <u>Livestock and Wildlife Water Facilities Inventory</u>																			
	(1) Inventory survey	MOLD MOTW	-	-	☆	☆	☆													
	(2) Livestock/wildlife population survey	DRSRS	2.0	2.5		☆				☆										
	Sub-total		2.0	2.5																
	7. <u>Hydropower Resources Survey</u>																			
	Update of National Power Development Plan	MOE	3.0	3.8			☆			☆										
	8. <u>River/Flood Control Works</u>																			
	(1) Inventory survey of rivers and river facilities	MOWD	-	-	☆	☆														
	(2) Formulation of river improvement works	MOWD	-	-	☆	☆	☆													
	(3) Urban drainage hydrological studies - Installation of hourly rainfall gauges	KMD	0.1	0.1	☆	☆	☆	☆	☆											
	Sub-total		0.1	0.1																
	Total		47.0	59.2																

Note: ☆ Study

Table 6.7 Environmental Studies - Proposed Study Programme

District Code	Description	Executing Agency	Cost (million)		Implementation Schedule															
			US\$	K£	93	95	2000	2	4	6	8	10								
	<u>Regional Environmental Study</u>																			
750	1. Mara river environmental study	NES	1.5	1.9		☆	☆	○	○	○	○	○	○	○	○	○	○	○	○	○
350	2. Lake Jipe environmental study	NES	1.5	1.9				☆	☆	○	○	○	○	○	○	○	○	○	○	○
850	3. Lake Turkana environmental study	NES	2.0	2.5					☆	☆	○	○	○	○	○	○	○	○	○	○
	<u>Environmental Impact Assessment and Management Guidelines</u>																			
-	4. Preparation of environmental guidelines	NES	2.5	3.2	Δ	Δ	Δ	Δ	☆	☆	☆	☆								
	Total		7.5	9.5																
<p>Note: ☆ Study Δ Data and information accumulation ○ Monitoring</p>																				

Table 6.8 Further Study Programme - Annual Budgetary Schedule

(Unit: thousand US\$)

Development Sector	Development Project	Year												Total						
		1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004		2005	2006	2007	2008	2009	2010
A	Development Project																			
	1 D&I Water Supply	24,119	24,119	24,119	24,119	24,119	24,119	24,119	24,119	24,119	24,119	24,119	24,119	26,351	26,351	26,350	26,350	26,350	26,351	456,459
	(1) Urban water supply	19,525	19,525	19,525	19,525	19,525	19,525	19,525	19,525	19,525	19,525	19,525	19,525	10,321	10,321	10,320	10,320	10,320	10,320	259,406
	(2) Rural water supply	4,594	4,594	4,594	4,594	4,594	4,594	4,594	4,594	4,594	4,594	4,594	4,594	16,030	16,030	16,030	16,030	16,030	16,031	197,053
	2 Sewerage Development	3,937	3,937	3,937	3,937	3,937	3,937	3,937	3,937	3,937	3,937	3,937	2,137	2,137	2,138	2,138	2,138	2,138	2,138	52,872
	3 Irrigation Development	7,604	7,648	1,990	655	2,673	2,296	5,610	6,861	1,770	1,992	9,722	7,967	385	1,766	1,466	42	42	42	60,531
	(1) Major irrigation projects	7,561	7,605	1,947	612	2,630	2,253	5,567	6,818	1,727	1,949	9,679	7,924	342	1,723	1,424	0	0	0	59,761
	(2) Small irrigation schemes	43	43	43	43	43	43	43	43	43	43	43	43	43	43	42	42	42	42	770
	4 Livestock Water Development	2,334	2,334	2,334	2,334	2,334	2,334	2,334	2,334	2,334	2,334	2,334	3,705	3,705	3,705	3,704	3,703	3,703	3,703	55,715
	(1) Source development	2,128	2,128	2,128	2,128	2,128	2,128	2,128	2,128	2,128	2,128	2,128	3,322	3,322	3,322	3,321	3,321	3,321	3,321	50,240
	(2) Water points in nomadic pasturage land	206	206	206	206	206	206	206	206	206	206	206	383	383	383	383	382	382	382	5,475
	5 Hydropower Development	3,638	4,525	8,163	7,275	12,138	12,138	0	3,724	3,724	0	0	0	0	0	0	0	0	0	55,325
	6 River and Flood Works	5,510	5,510	5,780	5,262	5,262	5,435	5,435	5,435	2,636	2,636	2,761	2,761	2,969	2,844	2,844	2,637	2,637	2,637	70,987
	(1) Major flood control projects	518	518	788	270	270	443	443	443	0	0	125	124	332	207	207	0	0	0	4,688
	(2) Urban drainage works	4,242	4,242	4,242	4,242	4,242	4,242	4,242	4,242	2,261	2,261	2,261	2,261	2,261	2,261	2,261	2,262	2,262	2,262	56,549
	(3) Minor river improvement	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	6,750
	(4) Improvement of Lower Tana	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	3,000
	Sub-total of Item A	47,142	48,073	46,323	43,582	50,463	50,259	41,435	46,410	40,323	36,821	44,676	42,921	35,548	36,804	36,502	34,870	34,870	34,871	751,889
	B. River Basin Study	1,833	4,467	5,300	4,267	3,767	2,933	2,133	800	0	0	0	0	0	0	0	0	0	0	25,500
	C. Groundwater Resources Study	6,400	27,200	5,000	8,800	1,600	2,000													51,000
	D. District Water Sources Study	6,556	6,556	6,556	6,556	6,556	6,555	6,555	6,555	6,555										59,000
	E. Data Collection/Water Management	213	6,693	7,693	8,193	6,693	5,018	4,998	7,499	0	0	0	0	0	0	0	0	0	0	47,000
	F. Environmental Study	313	313	406	406	513	513	680	680	368	368	368	368	368	368	367	367	367	367	7,500
	Sub-total Items A to F	62,457	93,302	71,278	71,804	69,592	67,278	55,801	61,944	47,246	37,189	45,044	43,289	35,916	37,172	36,869	35,237	35,237	35,238	941,889
	G. Additional Study	18,737	27,990	21,383	21,541	20,878	20,183	16,740	18,583	14,174	11,157	13,513	12,987	10,775	11,151	11,061	10,571	10,571	10,571	282,567
	GRAND TOTAL	81,193	121,292	92,661	93,345	90,470	87,461	72,541	80,527	61,420	48,346	58,557	56,276	46,690	48,323	47,929	45,808	45,808	45,809	1,224,455

Table 7.1 Estimated Manpower Requirement (1/3)

(unit : person)

Work	Relevant Agency	Manpower Addition			
		Engineer/Officer		Technical Assistant	
		2000	2010	2000	2010
Implementation of Projects					
1. Domestic/Industrial Water Supply					
(a) Urban water supply	MOWD/ MWPCP/ MOLG	39	39	118	118
(b) Rural water supply	MOWD	12	43	29	128
2. Sewerage Development	MOLG/ MOWD	6	6	17	17
3. Irrigation Development					
(a) Major irrigation schemes	MOA/ NIB/ RBDA	20	60	50	190
(b) Small scale irrigation schemes	MOA	2	2	3	3
4. Livestock Water Supply					
(a) Livestock water development	MOLD/ MOWD	6	9	17	27
(b) Watering points in nomadic pasturage area	MOLD/ MOWD	1	1	2	3
5. Hydropower Development	MOE	9	9	26	26
6. River and Flood Control Works					
(a) Major flood control projects	MOWD	2	2	2	2
(b) Urban drainage works	MOLG/ MOWD	7	7	21	21
(c) Minor river improvement	MOWD	8	16	8	16
(b) Long-term improvement of Lower Tana river	TARDA/ MOWD	5	10	5	10

Note: See last page of table

Table 7.1 Estimated Manpower Requirement (2/3)

(unit : person)

Work	Relevant Agency	Manpower Addition			
		Engineer/Officer		Technical Assistant	
		2000	2010	2000	2010
Further Study Programme					
1. Studies and Design of Individual Projects					
(a) Water Supply	MOWD, etc.	36	40	72	79
(b) Sewerage	MOLG, etc.	3	3	6	6
(c) Irrigation	MOA, etc.	4	4	8	8
(d) Livestock	MOLD, etc.	3	6	7	11
(e) Hydropower	MOE, etc.	4	4	8	8
(f) River and flood control works	MOWD	5	5	10	10
2. River Basin Studies	RBDA	4	-	10	-
3. Groundwater Resources Study for Urban Water Supply	MOWD	10	-	19	-
4. District Water Resources Study	MOWD	9	-	18	-
5. Data Collection and Water Management					
(a) Surface water management	MOWD				
- Hydrological data management		2	4	3	6
- Water abstraction permit data management		4	8	6	12
- Water use monitoring and control		10	45	20	90
(b) Groundwater resources data management	MOWD	3	6	4	8
(c) Water quality and pollution control	MOWD				
- Water quality monitoring programme		5	45	10	60
- Water quality standards		2	2	2	2
- Water pollution control		10	45	20	90

Note: See last page of table

Table 7.1 Estimated Manpower Requirement (3/3)

(unit : person)

Work	Relevant Agency	Manpower Addition			
		Engineer/Officer		Technical Assistant	
		2000	2010	2000	2010
(d) Domestic/industrial water supply facilities inventory	MOWD	-	-	-	-
(e) Irrigation inventory/water use	MOA	-	-	-	-
(f) Livestock and wildlife water facilities inventory	MOLD MOTW	-	-	-	-
(g) Hydropower resources study	MOE	-	-	-	-
(h) River and flood control	MOWD	-	-	-	-
(i) Environmental studies	NES	1	2	1	3
- Regional environmental studies					
- Environmental guidelines		2	2	2	2
Total		234	424	525	956

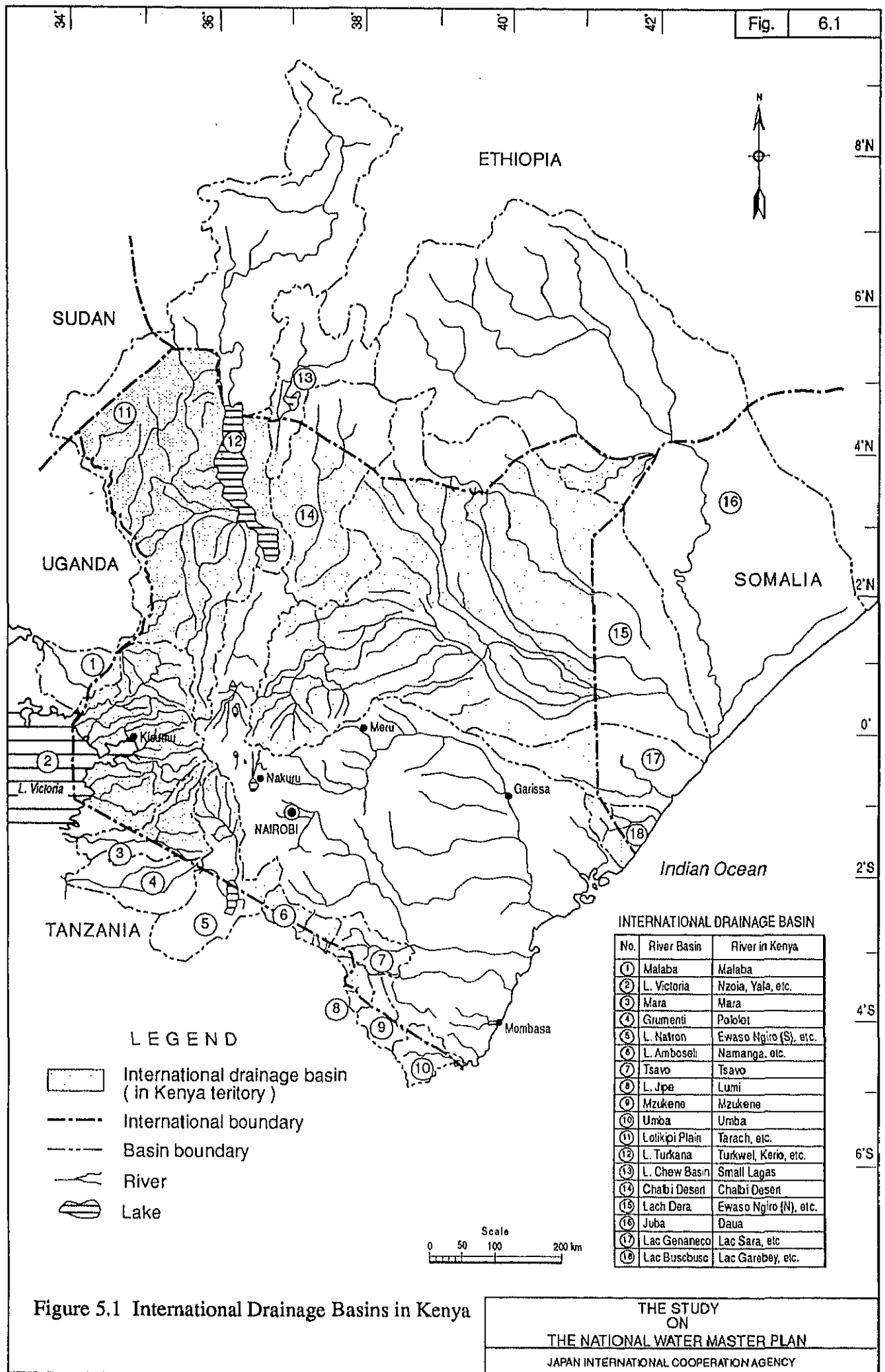
Notes: [1] RBDA : River basin development authorities

[2] The above estimate is based on an assumption that the following number of supervisory/management staff would be required per implementation of the annual works/duties amounting US\$ 1 million:

	<u>Implementation</u>	<u>Studies</u>
Engineer/Officer	0.2	1.5
Technical assistants	0.6	3.0

However, separate estimates were made for those items not falling in the above two categories.

FIGURES

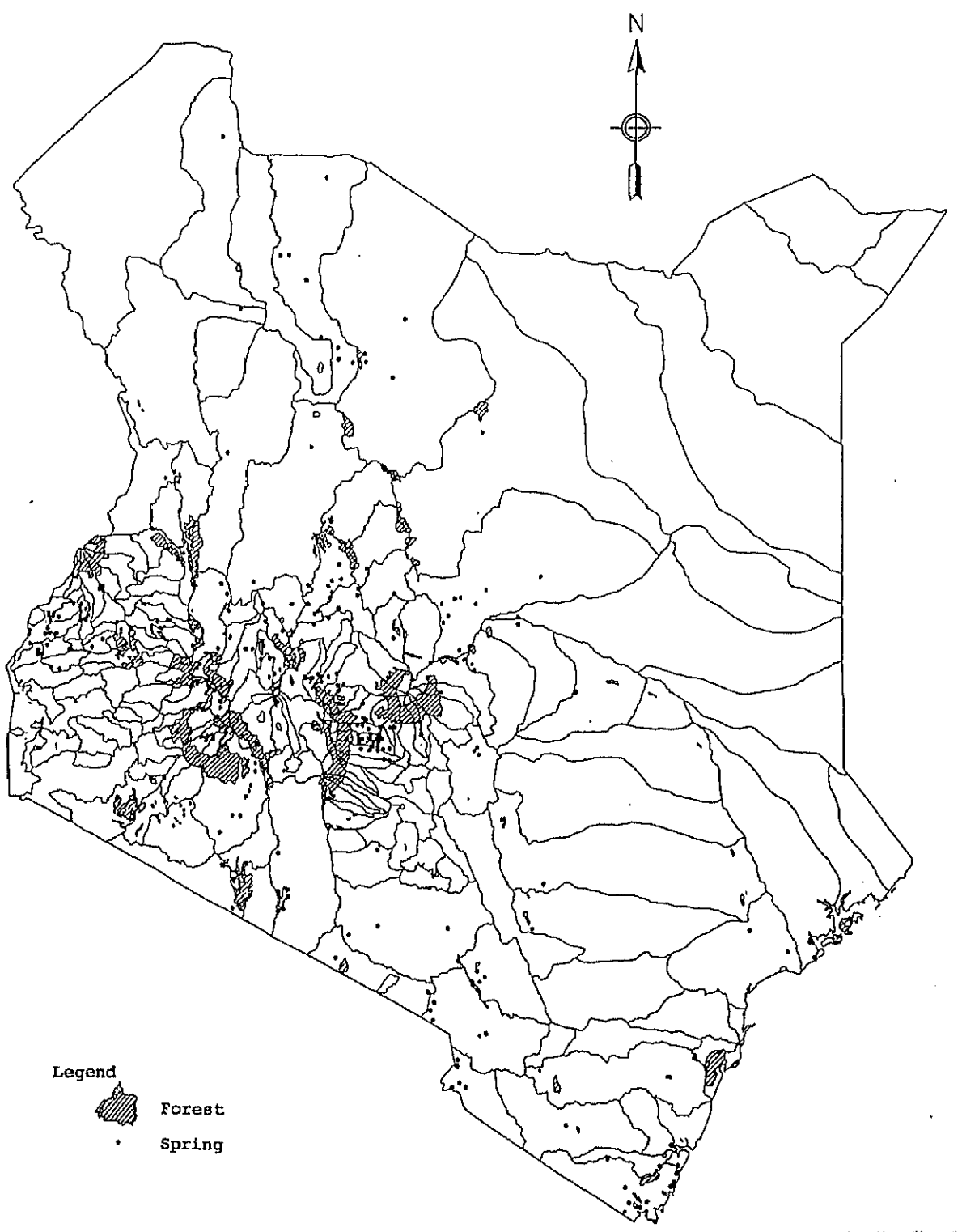


INTERNATIONAL DRAINAGE BASIN

No.	River Basin	River in Kenya
①	Malaba	Malaba
②	L. Victoria	Nzoia, Yala, etc.
③	Mara	Mara
④	Grumentii	Polokot
⑤	L. Natron	Ewaso Ng'iro (S), etc.
⑥	L. Amboseli	Namanga, etc.
⑦	Tsavo	Tsavo
⑧	L. Jipe	Lumi
⑨	Mzukene	Mzukene
⑩	Umba	Umba
⑪	Lolikipi Plain	Tarach, etc.
⑫	L. Turkana	Turkwel, Kerio, etc.
⑬	L. Chew Basin	Small Lagas
⑭	Chabi Desert	Chabi Desert
⑮	Lach Dera	Ewaso Ng'iro (N), etc.
⑯	Juba	Daua
⑰	Lac Genaneco	Lac Sara, etc.
⑱	Lac Busbusc	Lac Garebey, etc.

Figure 5.1 International Drainage Basins in Kenya

THE STUDY
ON
THE NATIONAL WATER MASTER PLAN
JAPAN INTERNATIONAL COOPERATION AGENCY



Legend
Forest
Spring

Note : Springs shown here are only those the information of location (coordinates) is available.

Figure 5.2 Locations of Springs and Major Forest Areas

THE STUDY
ON
THE NATIONAL WATER MASTER PLAN
JAPAN INTERNATIONAL COOPERATION AGENCY

APPENDIXES

APPENDIX 1

ANNUAL BUDGETARY SCHEDULE BY SCHEME

(Basic Case: Full Development meeting Whole Demands)

	Page
Appendix 1.1 Annual Budgetary Schedule by Dam Schedules	A.1-1
Appendix 1.2 Annual Budgetary Schedule by Urban Water Supply Schemes	A.1-2
Appendix 1.3 Annual Budgetary Schedule by Sewerage Development	A.1-4
Appendix 1.4 Annual Budgetary Schedule by Irrigation Projects	A.1-6
Appendix 1.5 Annual Budgetary Schedule by Hydropower Projects.....	A.1-7
Appendix 1.6 Annual Budgetary Schedule by Flood Control Projects	A.1-8
Appendix 1.7 Annual Budgetary Schedule by Urban Drainage and River Improvement Projects.....	A.1-9

Appendix 1.1 Annual Budgetary Schedule by Dam Schemes

City Code	Urban Name	Name of Dam	(1990)										Total (US\$'000)							
			93	94	95	96	97	98	99	00	01	02		03	04	05	06	07	08	09
U- 1	110.0 Nairobi	Ndarugu, Ruiru-A, Chania-B	34,060									48,920	113,527							196,507
U- 2	211.1 Karuri	Kiambaa	3,006																	3,006
U- 3	211.4 Kiambu	Kiambaa	1,702																	1,702
U- 9	216.6 Kikuyu	Kikuyu			8,250															8,250
U- 26	314.4 Malindi	Rare								35,117										35,117
U- 32	340.0 Mombasa	Mwachi, Pemba	97,013								1,100									98,113
U- 48	442.3 Athi River	Upper Athi								6,519										6,519
U- 74	611.2 Manga	Bunyuyu						56												56
U- 75	611.5 Keroka	Bunyuyu						270												270
U- 76	615.0 Kisii	Bunyuyu						3,958												3,958
U- 79	622.3 Kisumu & Kiboswa	Kibos			23,836															23,836
U- 96	727.1 Londiani	Londiani						54,550												54,550
U- 98	733.9 Nyahururu	Nyahururu								2,943										2,943
U- 99	743.2 Gilgil	Malewa													31,910					31,910
U- 100	744.1 Naivasha	Malewa													10,478					10,478
U- 101	746.1 Njoro	Itare							1,195											1,195
U- 102	747.3 El Burgon	Itare							1,633											1,633
U- 103	747.5 Molo	Itare							1,472											1,472
U- 104	749.0 Nakuru	Itare, Malewa							17,125											17,125
U- 105	752.1 Narok	Upper Narok														13,192				13,192
U- 110	772.5 Eldoret	Moiben																		13,779
U- 112	812.5 Kabarnet	Kirandich	20,000																	20,000
U- 114	814.5 Eldama Ravine	Chenususu																		16,607
U- 115	815.1 Mogotio	Chenususu																		3,590
U- 116	822.4 Iten+Tambach	Moiben																		945
U- 132	935.4 Kakamega	Mukulusi																		964
U- 150	733.4 Rumuruti	Rumuruti																		4,310
TOTAL			155,781		72,545			59,798		77,968		50,020	113,527		47,628					577,267