N. AGRICULTURE AND RURAL INFRASTRUCTURES

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N.1 Agricultural Infrastructure

Main agricultural infrastructure in the study area can be considered as irrigation facilities. These facilities need improvement because some irrigation scheme has no permanent irrigation facility shown in Figure N.1-1, N.1-2 and N.1-3. Figure N.1-1 and Figure N.1-2 shows irrigation schemes in Loboi Location and it has no permanent facility. Figure N.1-3 shows Sandai Irrigation scheme and it has weir, intake gate and division boxes. The former water loss is higher than the latter, so gradual improvement for irrigation facility is recommended.

N.2 Rural Infrastructure

1) Water Supply

Table N.1-1 shows pan and dam condition in the study area, and rehabilitation work to remove siltation is important for pan reservoir.

2) Road

Road map in the study area is shown in Figure N.1-4 and its condition is shown in Table N.1-2. For traffic transportation, fare of Mataru is shown in Table N.1-3 and N.1-4.

3) Electricity

Electric distribution diagram by KPLC is shown in Figure N.1-5 and still 1MVA can be supplied for new customer in the study area.

4) Machine Rental

Machine rental price in the study area is shown in Table N.1-5, and bulldozer, excavator and farm tractor are available.

Table N.1-1 Pan and Dam Reservoir Condition in the Study Area

Division	Location	Sub-Location	Ser. No.	Name of Pan	User Populatio (number)	Initial Capacity	Present Capacity (%)	Catchment Area	Donor
Marigat	Marigat	Yatoi	1	Kaptim	1,000	8,482	60%	3.0	
		Yatoi	2	Sirinyo	500	13,500	25%	4.0	
		Endao	3	Chemeron Dam	3,500	4,600,000	25%	100.0	GoK
	Kimalel	Kimalel	4	Ketikibiet	3,000	10,000	40%	4.4	GoK
		Kimalel	5	Kimalel	700	12,000	40%	2.0	GoK
		Koriema	6	Kimao Dam	3,000	288,000	99%	10.0	KVDA
		Sabor	7	Kapkun	1,000	10,500	30%	6.0	GoK
		Sabor	8	kapngetuny	3,000	9,000	50%	4.0	GoK
	Loboi	Chelaba	9	Chepkoimet	600	5,000	30%	4.0	GoK
		Chelaba	10	Chelaba	200	6,000	20%	2.0	GoK
	Kapkuikui	Kaptombes	11	Kaptombes	1,000	12,000	40%	6.0	GoK
		Kantombes	12	Kipchebii	200	10,000	**100%**	4.0	GoK
		Kapkuikui	13	Chaule	200	6,000	**100%**	2.0	GoK
	Ngambo	Ngambo	14	Lamalok	60	8,000	60%	4.0	
		Ngambo	15	sintuan	3,000	5,000	10%	4.0	
		Salabani	16	Eldebe	200	314	25%	2.0	
Mukutani	Mukutani	Mukutani	17	Losokoni	500	3,421	60%	1.0	
		Mukutani	18	Akure	200	1,134	60%	0.5	
		Mukutani	19	Karau-A	400	4,680	25%	1.5	Gok
		Mukutani	20	Karau-B	400	6,510	20%	0.7	GoK
		Rugus	21	Lekiricha	120	4,529	30%	1.0	
		Rugus	22	Rugus	300	480	20%	1.0	
	Kiserian	Kiserian	23	Sirata	500	1,018	20%	2.0	
		Kiserian	24	Lorrok	200	5,448	30%	2.0	
		Kiserian	25	Lorok	250	3,840	25%	1.0	
		Logumgun	26	Enkutoto	500	2,250	25%	5.0	
		Logumgun	27	Lotiyeki	200	3,421	30%	1.0	
	Arabal	Arabal	28	Ramacha	100	1,257	25%	0.3	GoK
		Arabal	29	Tikaluk	100		0%	1.0	GoK/ com.
		Arabal	**30**	Arusin	2,000	7,697	**80%**	0.5	

Donor: 1. Bsaap (1979-1993)
2. ALDEV (Agricultual Livestock Development)
3. Care Kenya (NGO)
4. World Food Programee (FAO)

Note: Initial Capacity and User Population were reserched in August 1992
Ref.No. 12, 13 are rehabilitated by World Vision + Community in 1999
Ref.No. 29 is rehabilitated by in 1998

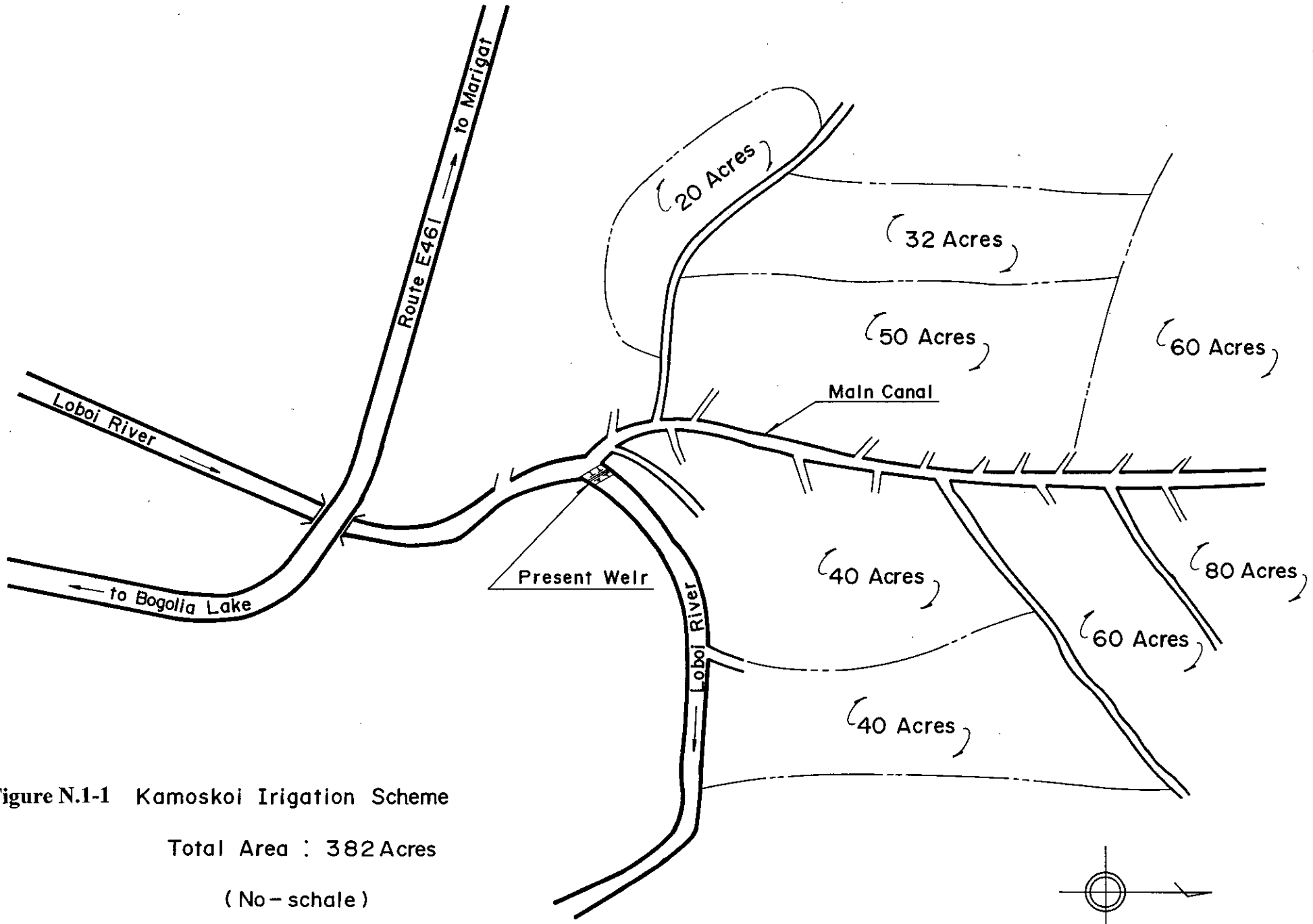

Figure N.1-1 Kamoskoi Irrigation Scheme

Total Area : 382 Acres

(No - schale)

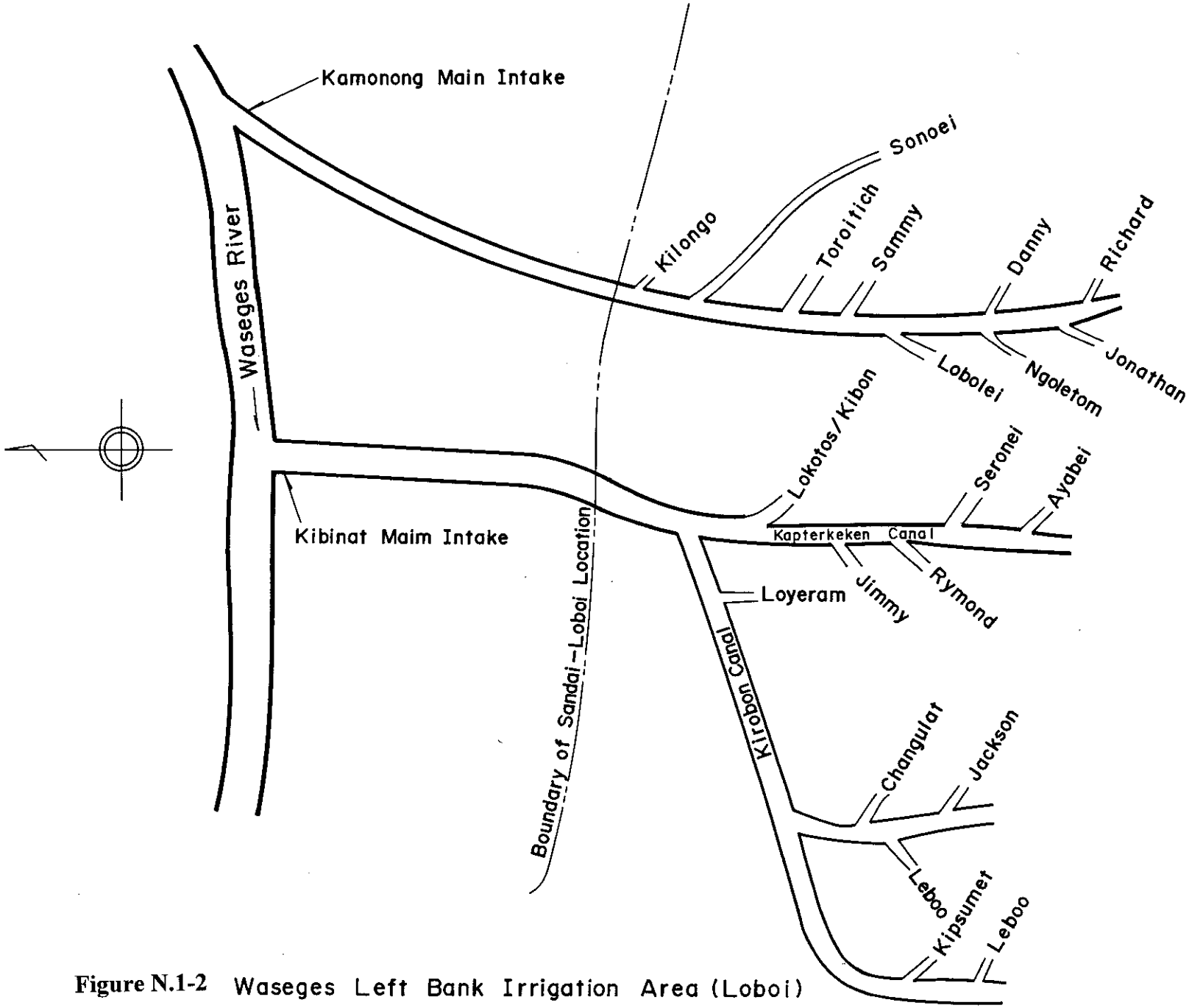

Figure N.1-2 Waseges Left Bank Irrigation Area (Loboi)

Total Area : 360 Acres

Irrigated Aere at Present : 120 Acres

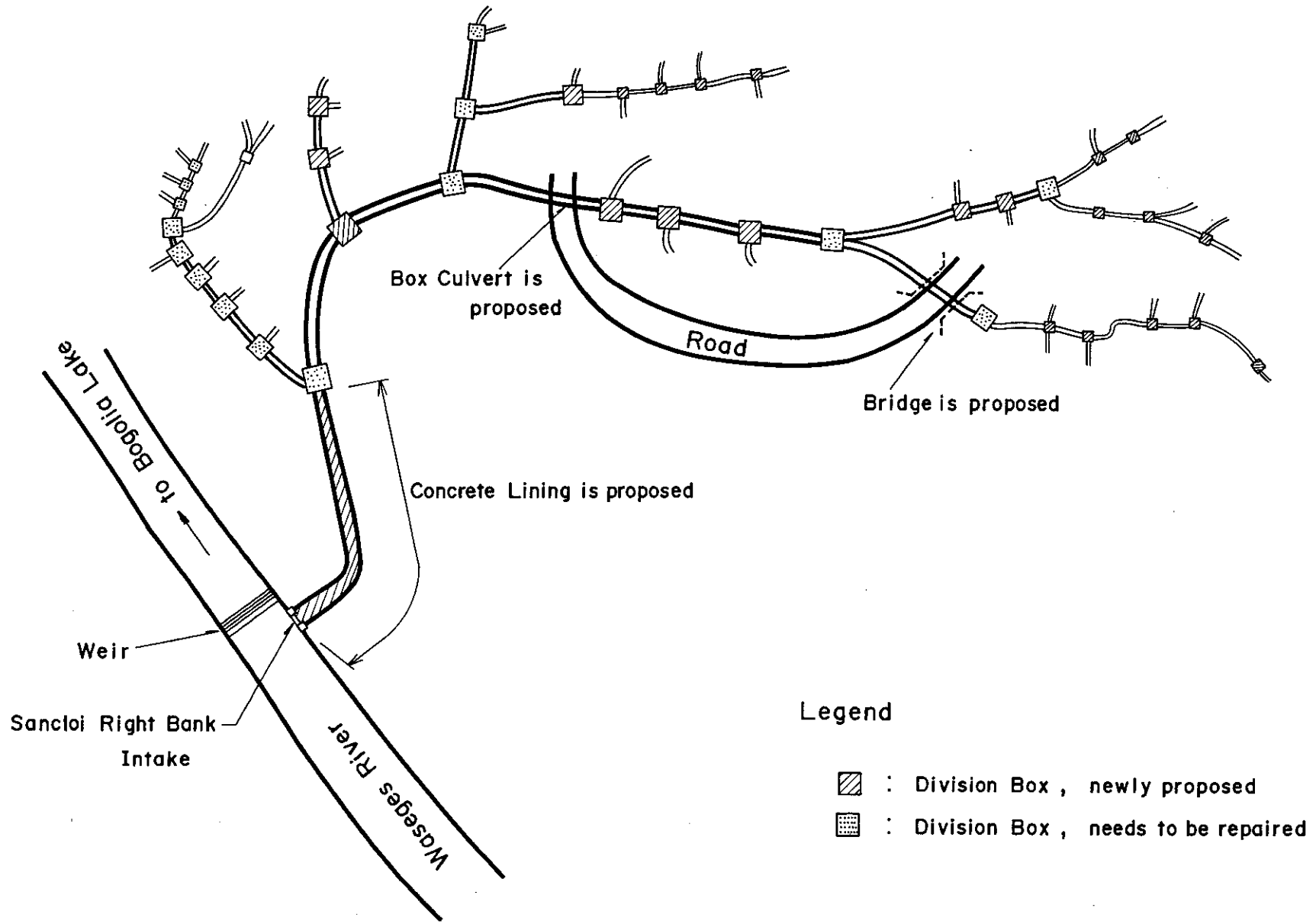

Figure N.1-3 Sandai (Right Bank) Irrigation Scheme

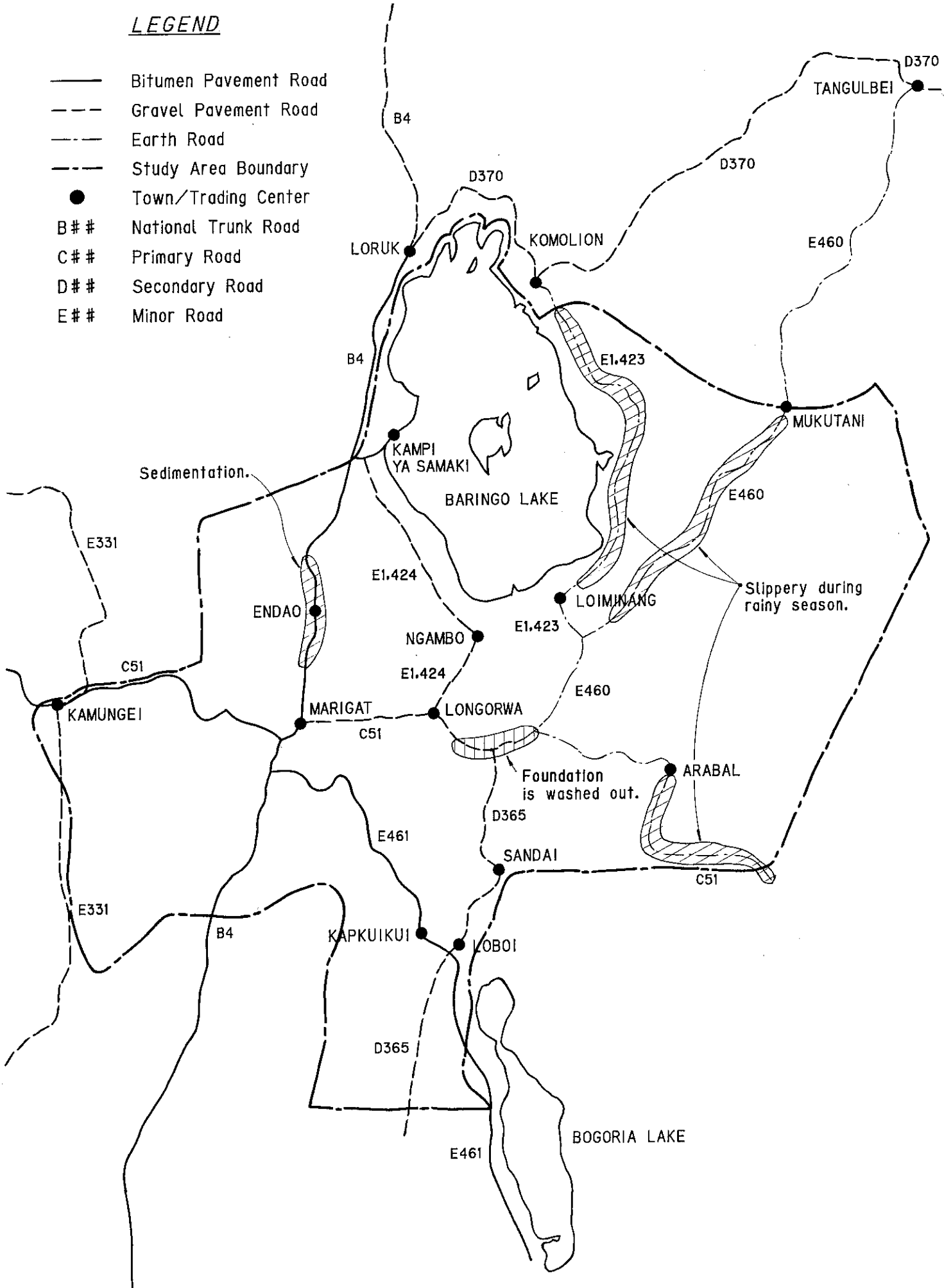

Figure N.1-4 Road condition in the Study Area

Table N.1-2 Road Condition in the Study Area

Class	Road Name	Type of Pavement			Total	Year of Const.	Donor	Present Condition	for Improve. (*1,000 Ksh)	Remarks
		Bitumen (Km)	Gravel (Km)	Earth (Km)	(Km)					
B4	Maoi – Loruk	40.0			40.0	1978	GoK	Motorable	300	Bush cleaning, Pot-hole patching
C51	Koriema – Kapendasim	19.0	10.0	17.0	46.0	1996	GoK	Motorable	60,000	Routine Maintenace is required
D365	Logumgum – Loboi-DB		25.0		25.0	1986/87	GoK	Motorable	125,000	Re-gravering is required
E331	Sabor – Kipcherere		18.0	20.0	38.0	1997	GoK	Motorable	68,000	Bridge at Kibingor is required
E460	Logumgum – Mukutani			31.0	31.0	1960'	GoK	Motorable with difficulty	155,000	Re-construction and gravel pavement is required
E461	Marigat – Lake Bogoria	31.8			31.8	1996/97	GoK	Motorable	100	Routine Maintenace is required
E1423	Kiserian – Komolion			48.2	48.2	1960'S	GoK / Col.G.	Partially Motorable with difficulty	120,500	Re-construction is required
E1424	Marigt-Sandai-Kampi ya Samaki	2.0		24.0	26.0	1982	GoK	Partially Passable	60,000	Deep gulley erosion has made some sections be impassable
	Endao – Chemeron			7.0	7.0	1984/85	GoK	Motorable	17,500	Routine Maintenace is required
	Kimarel – Kapkun			10.0	10.0	1970	GoK / Public	Partially Motorable	25,000	Routine Maintenace is required
	Eldume – Kailer P. S.			8.0	8.0	1980	GoK / Public	Partially Motorable	20,000	Rehabilitation is required
Off E460	Quarry – Kapendasim (C51)			20.0	20.0	1950'S	Colonial G	Impasable	80,000	Re-construction is required
Off C51	Imbechot Pri. – Sandai (D365)			12.0	12.0	1950	Colonial G	Impasable	48,000	Re-construction is required

Note : Capital letter of alphabet shows classification of the road, and following numbr means route number
B: National trunk road, links between Provinces
C: Primary road, links from Provicial road to Distric Head Quarter
D: Secondary road, feeder road from primary road
E: Minnor road, feeder road in the Location

Table N.1-3 Avairable Traffic for Customers in the Study Area (Trip from/to Marigat)

Destination/Starting Place		Frequency		Fare	Type of Car, and Others
Location	Sub-Locatio	Usual Trip	Extra Trip		
Marigat	Endao	Many, Daily	◎	10 - 20 ksh	Mini bus, Pick up, Van
	Yanoi	Many, Daily	◎	10 - 20 ksh	Mini bus, Pick up, Van
	Perkera	Many, Daily	◎	10 - 20 ksh	Mini bus, Pick up, Van
Kimarel	Koriema	Many, Daily	◎	40 ksh	Mini bus, Pick up
	Kimalel	Many, Daily	◎	30 ksh	Mini bus, Pick up
	Sabor	3 trips/week	△	60 ksh	Mini bus, Pick up
Salabani	Meisori	1 trip/day	○	40 ksh	Mini bus, Pick up
	Salabani	1 trip/day	○	40 ksh	Mini bus, Pick up
Ngambo	Ngarua	1 trip/day	△	40 ksh	Pick up
	Ngambo	1 trip/day	△	100 ksh	Pick up
Eldume	Eldume	1 trip/day	○	20 ksh	Mini bus, Pick up
Kapkuikui	Kaptombes	1 trip/day	○	40 ksh	Mini bus, Pick up
	Kapkuikui	1 trip/day	○	50 ksh	Mini bus, Pick up
Sandai	Sandai	1 trip/day	○	60 ksh	Pick up
	Mebcho	1 trip/day	○	60 ksh	Pick up
Loboi	Chelaba	1 trip/day	○	50 ksh	Mini bus, Pick up
	Majindege	1 trip/day	○	50 ksh	Mini bus, Pick up
Kiserian	Logumgum	1 trip/day	■	60 ksh	Pick up, on Sunday No-Service, 7-8:00am leave Rugus, 16:00pm arrive
	Lominang	2 trip/day	■	70 ksh	Pick up, Same as above
Mukutani	Mukutani	2 trips/week	■	150 ksh	Pick up
	Rugus	-	■	- ksh	No-Service, must go to Kiserian on foot or by bicycle
Arabal	Arabal	3 trips/week	■	100 - 150 ksh	Pick up, on Monday, Wednesday, Friday
	Ngelesha	3 trips/week	■	400 - 480 ksh	No-Service, must go to Muchongoi and get Pick up from Arabal to Marigat

Legend
◎: Much Number of Extra Traffic Services
○: Fair number of Extra Traffic Services
△: A few number of Extra Traffic Services
■: Few Number of Extra Traffic Services

Note Fare in the table shows only for person, does not include baggage fee

Table N.1-4 Avairable Traffic for Public Customers in the Study Area (Trip from/to Main Township)

Starting Place of	Destination	Frequency		Fare	Type of Car, and Others
		Usual Trip	Extra Trip		
Marigat	Kabarnet	Many Daily	◎	100-120 ksh	Mini Bus, Pick-Up, Van
	Nakuru	Many Daily	◎	150-180 ksh	Mini Bus, Pick-Up, Van
	Nairobi	Many Daily	◎	300-400 ksh	Mini Bus, Van, to Nairobi 90Ksh by Bus
Kimarel	Kabarnet	Many Daily	◎	80 ksh	Mini Bus, Van
	Nakuru	Many Daily	◎	130 ksh	Mini Bus, Van
	Nairobi	Many Daily	◎	330 ksh	Mini Bus, Van, No Direct Car to Nairobi
Salabani	Kabarnet	1 trip/day	○	160 ksh	Pick-Up, Mini Bus
	Nakuru	1 trip/day	○	190 ksh	Pick-Up, Mini Bus
	Nairobi	1 trip/day	○	380 ksh	Pick-Up, Mini Bus
Ngambo	Kabarnet		△	120 ksh	Pick-Up, Mini Bus
	Nakuru		△	170-200 ksh	Pick-Up, Mini Bus
	Nairobi		△	320-420 ksh	Pick-Up, Mini Bus
Eldume	Kabarnet		○	130 ksh	Mini Bus
	Nakuru		○	180 ksh	Mini Bus
	Nairobi		○	360 ksh	Mini Bus
Kapkuikui	Kabarnet		○	130 ksh	Mini Bus
	Nakuru		○	150 ksh	Mini Bus
	Nairobi		○	330 ksh	Mini Bus
Sandai	Kabarnet		○	170 ksh	Mini Bus
	Nakuru		○	150 ksh	Mini Bus
	Nairobi		○	330-350 ksh	Mini Bus
Loboi	Kabarnet		○	150 ksh	Mini Bus
	Nakuru		○	150 ksh	Mini Bus
	Nairobi		○	330 ksh	Mini Bus
Kiserian	Kabarnet	1 trip/day	■	150-170 ksh	Pick-Up, Mini Bus, Van
	Nakuru		■	200 ksh	Pick-Up, Mini Bus, Van
	Nairobi		■	380-400 ksh	Pick-Up, Mini Bus, Van
Mukutani	Kabarnet		■	240-270 ksh	Pick-Up, Mini Bus, Van
	Nakuru		-	300-320 ksh	Pick-Up, Mini Bus, Van
	Nairobi		-	330-400 ksh	Pick-Up, Mini Bus
Arabal	Kabarnet		■	240 ksh	Pick-Up, Mini Bus, Van
	Nakuru		■	270 ksh	Pick-Up, Mini Bus, Van
	Nairobi		■	450-500 ksh	Pick-Up, Mini Bus, Van

Legend
◎: Much Number of Extra Traffic Services
○: Fair number of Extra Traffic Services
△: A few number of Extra Traffic Services
■: Few Number of Extra Traffic Services
- : Quite Few Number of Extra Services

Note
Fare in the table shows only for person, does not include baggage fee
In most of these Centers, there are no-direct Cars to Nakuru, to Nairobi

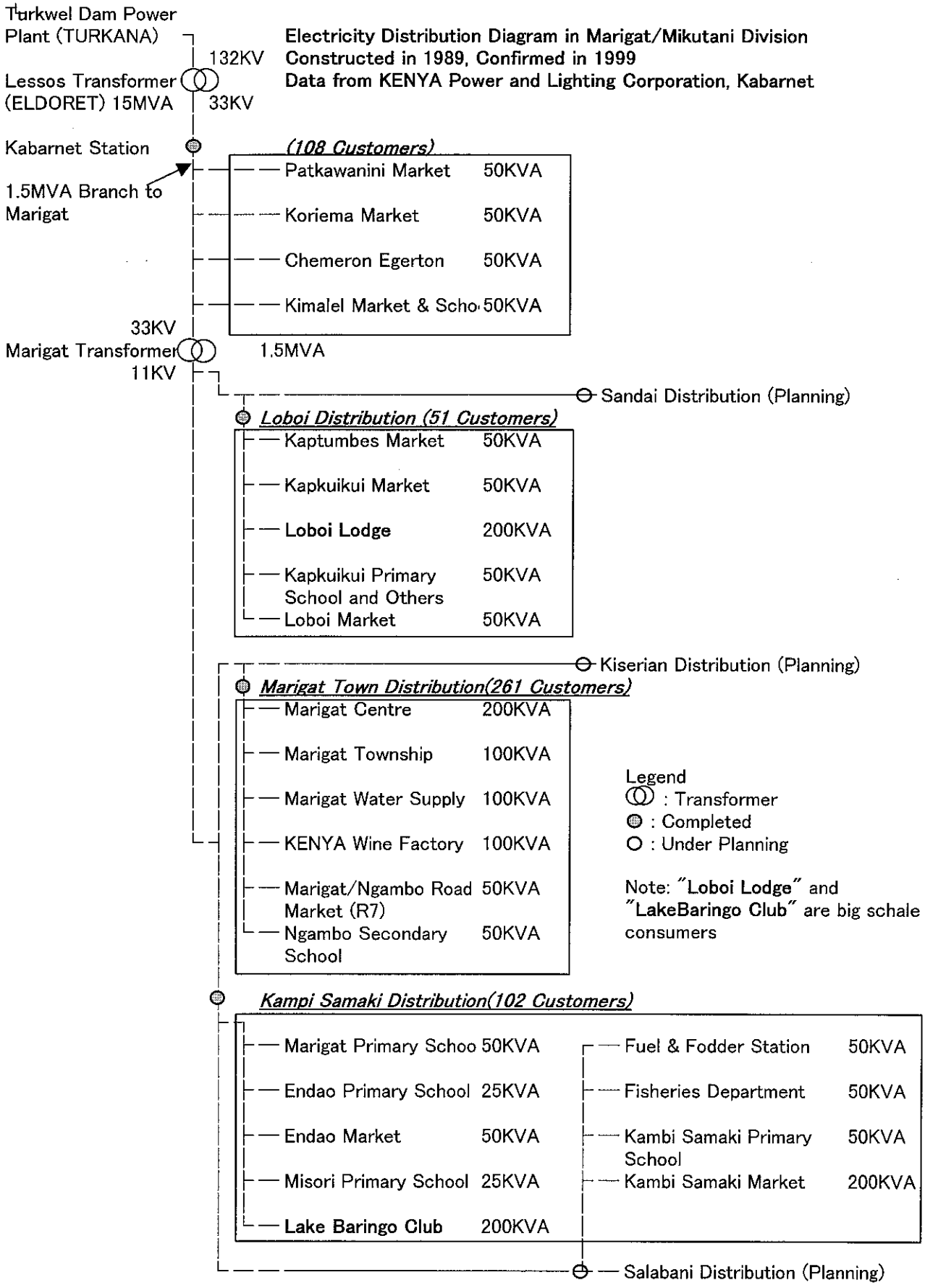

Figure N.1-5 Electric Distribution Diagram in the Study Area

Table N.1-5 Rental Services of the Agriculture/Construction Machine in the Study Area

Organization	Bulldozer		Excavator		Grader		Farm Tractor		Remarks
	Number	Rental fee	Number	Rental fee	Number	Rental fee	Number	Rental fee	
Ministry of Public Works	1	N/A			1	N/A			There is no rental service. Bulldozer class is D-8
Ministry of Agriculture	2	1,700 ksh/hr					2 (9)	1,200 ksh/acre	7 tractors are not functioning. Bulldozer class is D-6 & D-8
National Irrigation Board			1	N/A	0 (1)	N/A	4(12)	1st plow-1,000 ksh/acre 2nd plow- 900 ksh/acre Ridging - 550 ksh/acre	Service is only for Perkera Irrigation Scheme
Marigat Farmers Cooperative Society							1	1,500 ksh/acre	3 trucks (7t, 10t, 10t) can be rental
Kellyo Valley Development			3	1,000 ksh/hr	1	1,000 ksh/hr	1 (2)	1,200 ksh/acre	1 tractor is under repairing
Kituro Catholic Church							1	1,000 ksh/acre	Every farmer can use
World Vision (Kabarnet)							1	1,100 ksh/acre	Service is only in Kellyo Valley
Kenya Agricultural Research Institute							5	Plow - 1,200 Ksh/acre Harrow - 750 Ksh/acre Ridging - 750 Ksh/acre	The price at Mukutani and Arabal is 1.25 times as right side column

Note: Number in the column shows available machine number, after following number in the parenthesis means total machine number and it includes not

N/A : Not Avairable, there is no rental services

O. AGRICULTURAL MARKETING AND POST-HARVEST

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O.1 Agricultural Marketing and Post Harvest

O.1.1 Agricultural Marketing

Most of the agricultural produces are consumed within the Study Area. Strategic marketing activities by the farmers are limited either individually or as a group due to the considerable amount of home consumption (less surplus), bad road condition, poor means for transportation, lack of market information leading to the prior status to the middlemen, and the water shortage constraining to grow cash crops. Nevertheless the farmers seek for cash income and have eyes to look at certain markets such as Nakuru, or Matwiku in Laikipia. There are few farmers who go to Nakuru by public transport, matatsu to sell vegetables.

National Irrigation Board (NIB) in Perkerra Irrigation Scheme is an exceptional marketing body in the Study Area. The produces such as onions, chilies, seed maize are marketed by the NIB with its means. Maize seeds are exclusively sold to Kenya Seeds Company with the announcement of the price ahead the harvest. The other crops are dependent on free market. In the fiscal year 1997/98, NIB sold 230 tons of onions, 224 tons of seed maize, 44 tons of dry chilies and 17 tons of watermelon. Although the risk of fluctuating market prices are taken by the growers (the tenant farmers), they do not have rights to participate in the decision making process of what to grow, where to get inputs, and where to sell.

MOA, Baringo district has formulated a plan of action for agricultural marketing. The objectives are to motivate farmers to attain food self-sufficiency, to collect and disseminate data on marketing and agricultural development and to introduce the farmer to the various players in agriculture such as creditors, manufacturers and marketers. Especially Kenya Agricultural Commodity Exchange (KACE) ltd. (a private firm) is considered as one of the most important stakeholders in marketing. They provide market for sellers and buyers as well as providing market information. The district officers have prepared basic data on marketing information in Baringo district shown on Table O.1-3. However the plan has not been attained due to lack of fund in the government.

O.1.2 Post-Harvest

Activities for post-harvest are also insignificant in the Study Area. NIB only has function of grading onions and maize seeds and drying chilies. NIB was also providing papaya to make wine. There used to be a factory of Kenya Wine Co. in Marigat, but it was closed due to occupation of the market by South African product. Farmers grind maize for consumption by hand mill. There is also a small factory operated by three workers to grind maize in Marigat.

Table O.1-1 NIB Marketing (Onions)

Year	Month	Onions		
		Sold Amount (ton)	Price (Ksh/kg) Grade I	Grade II
96	July	105.2	8.5	4.4
	Augst	34.2	10.7	7.3
	September	0	0	0
	October	0	0	0
	November	0	0	0
	December	0	0	0
97	January	0	12.6	11
	February	106.2	14.1	10.3
	March	20.5	15.5	11.6
	April	62.2	19.3	14.5
	May	13.3	26	21.5
	June	94.3	23.4	16.9
Total Year 96/97		330.7		
	July	0	0	0
	August	0	0	0
	September	0	0	0
	October	0	0	0
	November	0	0	0
	December	8	26.9	24.9
98	January	19.34	34.9	31.3
	February	17.56	40.7	36.5
	March	67.68	49.9	44.2
	April	53.91	58.9	51.3
	May	45.09	58.6	50.9
	June	18.53	41.8	35.6
Total Year 97/98		230.11		

Source: NIB Perkerra Irrigation Scheme Annual Report

Table O.1-2 Average Commodity Price from All the Markets in Baringo District in 1998

(Unit: Ksh)

Commodity	Unit	Qt1	Qt2	Qt3	Qt4	Average
Maize	1kg Tin	15	15	13	10	13
Bean	1kg Tin	70	60	25	25	45
Finger Millet	1kg Tin	35	35	30	30	33
Sorghum	1kg Tin	-	40	-	35	19
Greengrams	1kg	120	120	50	40	83
Groundnuts	1kg	50	60	60	50	55
I/potato	1kg	17	20	18	15	18
Cassava	1kg	30	20	20	20	23
Kales	1kg	25	25	20	20	23
Cabbage	1kg-head	20	25	25	25	24
Tomato	1kg	30	30	20	20	25
Onion	1kg	60	60	64	64	62
Carrot	1kg	-	30	25	25	20
Banana-green	Med bunch	160	200	250	150	190
Banana-ripe	1kg	25	30	30	30	29
Orange	1kg	20	28	25	28	25
Paw paw	1kg	20	20	20	20	20
Avocado	1kg	35	35	40	40	38
Green maize	1kg	40	40	25	25	33
Sweet Potato	1kg	20	20	20	20	20
Cow pea	1kg	100	100	60	60	80
Lemon	80kg sack	280	280	300	300	290

Source: MOA Annual Report 1998, Baringo District

Table O.1-3 Marketing Directory Data in Baringo District in 1998

Crop		Production				Utilization							Marketing Problem	
Name	General Classification	Proper-gation	Major Growing Areas	Average Acreage (ha)	Quantity (ton)	Processing	Main Product	Sellers	Buyers	Peak Market Period	Unit of Measure	Price Range (Ksh)	Main Market	Marketing Problem
MAIZE	FOOD/CASH	SEED	KBO,KIP, MOCH,MAR, KBT	10,052.0	11,870.0	GRIND	FLOUR	FARMERS	RETAILER NCPB	JAN FEB	90.0 KG	1080-2160	KBT KBO	NONE
F/MILLET	FOOD/CASH	SEED	KIP,KBT, KBO	2,277.0	930.1	〃	FLOUR	FARMERS	RETAILER	JAN FEB	90.0 KG	2700-4050	KBT KBO	NONE
SORGHUM	FOOD/CASH	SEED	TGS,KIP, KBO	432.0	202.7	〃	FLOUR	FARMERS	RETAILER NCPB	NOV DEC	90.0 KG	1800-2000	KBT MOGORWA	NONE
BEANS	FOOD/CASH	SEED	KBO,KIP, MOCH,KBT	5,644.0	1,527.5	-	-	FARMERS	RETAILER	JAN FEB	90.0 KG	3600-8100	KBT	NONE
COWPEAS	FOOD/CASH	SEED	TGS,KIP, KBT,BAR	122.5	40.9	-	-	FARMERS	RETAILER	OCT NOV	90.0 KG	3600-7200	BAR	NONE
G/NUT	FOOD/CASH	SEED	TGS,KBT, BAR,SCO	504.0	243.3	GRIND	FLOUR	FARMERS	RETAIL MDLEMEN	SEPT DEC	100 KG	3600-4950	NKU KBT	TPT FROM AREA GROWN
G/GRAMS	FOOD/CASH	SEED	KBO,KIP, BAR	62.3	15.3	-	-	FARMERS	RETAILER	OCT NOV	90.0 KG	5400-7200	KBT	NONE
I/POTATO	FOOD/CASH	TUBER	KBT,KBO, KIP	54.9	602.5	-	-	FARMERS	RETAILER	ALL ROUND	1 KG	15.00-18.00	KBT MOG	LACK OF PLANTING MATERIALS
S/POTATO	FOOD/CASH	VINES	KBT,KIP	76.0	642.0	-	-	FARMERS	RETAILER	ALL ROUND	1 KG	15.00-20.00	KBT	NONE
CASSAVA	FOOD/CASH	CUTTINGS	BAR,KIP, KBT,KBO	190.0	2,180.0	-	-	FARMERS	RETAILER	DEC JAN	1 KG	20.00-30.00	KBT	NONE
S/FLOWER	CASH	SEED	KBT	3.20	1.32	-	-	-	-	SEPT OCT	-	-	-	MOST FED TO POULTRY
COFFEE	CASH	SEEDLING	KBO,KBT	540.7	95.0	PULP.		FARMERS	C.B.K	ALL ROUND THE YEAR	1 KG	15.00-180.00 AS PER THE QUALITY	-TUGEN HILL -KAPKAWA -ISSAS -TALAI -KITURO -TENGES -MOINGE -AIVEBO -KILINGOT	NEED FOR ENHANCING GEN MGMT TO IMPROVE THE GRADE
PYRETH-RUM	CASH	SPLITS	KBO/KIP KBT/SGO	89.1	4.086	-	-	FARMERS	P.B.K	〃	1 KG	42.00-84.00 AS PER % PITHN	P.B.K COLLECT FROM FARMER	LACK OF PLANTING MATERIALS
SOYA BEANS	CASH/FOOD	SEED	KBT,KBO	3.50	1.75	-	-	FARMERS	-LOCALLY CONSUMED	SEPT OCT	1 KG	-	-	-NO LOCAL MARKET -LACK OF KNOWLEDGE BY FARMERS
COTTON	CASH	SEEDCOT.	BAR,MAR, KIP,KBT	432.0	284.6	GINNIN	YARN	FARMERS	SALAWA GINNERY	NOV DEC	1 KG	20.00	GINNERY	POOR PRICE

Crop		Production				Utilization							Marketing Problem	
Name	General Classification	Proper-gation	Major Growing Areas	Average Acreage (ha)	Quantity (ton)	Processing	Main Product	Sellers	Buyers	Peak Market Period	Unit of Measure	Price Range (Ksh)	Main Market	Marketing Problem
KALE	FOOD/CASH	SEEDLING	KBO,KBT, MAR,KIP, BAR	74.4	744.0	-	-	FARMERS	RETAILER	AUG SEPT	1 KG	5.00-15.00	KBT MOGORWA	NONE
CABBAGES	FOOD/CASH	SEEDLING	KBO,KBT, MOCH,KIP	35.8	429.6	-	-	FARMERS	RETAILER	AUG NOV	1 KG	10.00-25.00	KBT	NONE
TOMATOES	FOOD/CASH	SEEDLING	KBO,KIP, KBT,MAR, MOCH,SAL	45.1	541.2	-	-	FARMERS	RETAILER	JAN MAR	1 KG	20.00-25.00	KBT	NONE
ONIONS	FOOD/CASH	SEEDLING	MAR	93.8	1,313.2	-	-	FARMERS	RETAILER N.I.B TENDERS	FEB JULY	1 KG	30.00-50.00	MAR KBT	NONE
CARROTS	FOOD/CASH	SEEDLING	KBT,KIP, KBO	10.4	199.6	-	-	FARMERS	RETAILER	NOV DEC	1 KG	20.00-35.00	KBT	NONE
CHILLIES	FOOD/CASH	SEEDLING	MAR	53.0	79.5	-	-	FARMERS	N.I.B TENDERS RETAILER	SEPT DEC	1 KG	25.25	MAR	NONE
GREENPEAS	FOOD	SEED	KBO,KBT, SCO,MOCH	5.2	26.0	-	-	FARMERS	RETAILER	AUG OCT	1 KG	75.00-100.00	KBT	NONE
BANANA	FOOD/CASH	SUCKERS	KIP,KBO, KBT,MAR, BAR,TGS	247.8	4956	-	-	FARMERS	RETAILER	ALL ROUND THE YEAR	13.5 KG	140.00 160.00	KBT	TPT FROM REMOTE AREAS
CITRUS	FOOD/CASH	SEEDLING	KBO,KIP, KBT,TGS, SCO,MAR, BAR	155	3,332.5	-	-	FARMERS	RETAILER MDELEMEN	SEPT NOV	1 KG	10.00-25.00	KBT	LACK OF PROPER MKT
PAWPAW	FOOD/CASH	SEEDLING	MAR,SAL	101	3,434.0	-	WINE	FARMERS	RETAILER K.W.A.L	JAN-MAR JUL-SEPT	1 KG	15.00-30.00	MAR	NONE
AVOCADOS	FOOD/CASH	SEEDLING	KBO,KBT	15.4	231.0	-	-	FARMERS	RETAILER	ALL THROUG	1 KG	35.00-45.00	KBT	NONE
P.FRUIT	FOOD/CASH	SEEDLING	KBO,KBT SCO	8.1	64.8	BLENDING	JUICE (SCO)	FARMERS	RETAILER	MOST MONTHS	1 KG	10.00-15.00	KBT	NONE
PINEAPPLE	FOOD/CASH	SEEDLING	SCO	2.6	39.0	-	-	FARMERS	RETAILER	SEPT DEC	1 KG	30.00-40.00	LOCAL KBT	NONE
TREE TOMATOES	FOOD/CASH	SEEDLING	TGS,KBTS, CO,KBO, KIP	14.2	113.60	-	-	FARMERS	RETAILER	OCT FEB	1 KG	8.00-15.00	KBT LOCAL	NONE
MANGOES	FOOD/CASH	SEEDLING	BAR,KIP	16.6	249.0	-	-	FARMERS	RETAILER	OCT FEB	1 KG	40.00-60.00	KBT	NONE
CUSTARD APPLE	FOOD/CASH	SEEDLING	ALL ALONG TUGEN HILL	2.7	27.0	-	-	FARMERS	RETAILER	AUG NOV	1 KG	30.00	KBT LOCAL	NONE
LORQUART	FOOD/CASH	SEEDLING	〃	4.2	33.6	-	-	FARMERS	RETAILER	AUG NOV	1 KG	5.00 10.00	KBT LOCAL	NONE
APPLES	FOOD	SEEDLING	〃	1.0	5.0	-	-	FARMERS	RETAILER	-	-	-	LOCAL	NONE
PEACHES	FOOD	SEEDLING	〃	4.2	21.0	-	-	FARMERS	RETAILER	-	-	-	LOCAL	NONE
PLUM	FOOD	SEEDLING	〃	2.1	10.5	-	-	FARMERS	RETAILER	-	-	-	LOCAL	NONE
PEARS	FOOD/CASH	SEEDLING	〃	1.1	5.5	-	-	FARMERS	RETAILER	-	-	-	LOCAL	NONE

Crop		Production				Utilization							Marketing Problem	
Name	General Classification	Proper-gation	Major Growing Areas	Average Acreage (ha)	Quantity (ton)	Processing	Main Product	Sellers	Buyers	Peak Market Period	Unit of Measure	Price Range (Ksh)	Main Market	Marketing Problem
GUAVAS	FOOD/CASH	SEEDLING	MOST DIVISION	2.5	12.5	-	-	FARMERS	RETAILER	-	-	-	LOCAL KBT	NONE
WATER MELON	FOOD/CASH	SEEDLING	MARIGAT	18.0	360.0	-	-	FARMERS	RETAILER MIDLEMEN	ALL ROUND THE YEAR	1 KG	1.00-15.00	MAR NKU	POOR PRICES
MACADAMIA	CASH	SEEDLING	ALLONG TUGEN HILLS	6.4	64.0	-	-	FARMERS	KENYA NUT CO.	〃	1 KG	25.00	THIKA	KNC NOT RELIABLE
CUT FLOWER	CASH	CUTTINGS	MARIGAT	2.0	-	-	-	-	-	-	-	-	EXPORT	NONE

Source: District Agricultural Office, Baringo District

NB.
KBT-KABARNET
KBO-KABARTONJO
KIP-KIPSARAMAN
BAR-BARWESSA
SCO-SACHO
TGS-TENGES
MAR-MARIGAT
MOCH-MOCHONGOT
C.B.K-COFFEE BOARD OF KENYA
P.B.K-PYRETHRUM BOARD OF KENYA
K.N.C-KENYA NUT COMPANY
MKT-MARKET
TPT.-TRANSPORT
MGMT-MANAGEMENT

O.2 Livestock Marketing and pricing

Livestock trade in the Study Area is mostly through public auction yards either at farm gate or through middlemen. Sale of live cattle is done by public auction yards either through farm gate through middlemen. Sheep and goats are always negotiation basis and sales transaction are made through price bargaining according to external appearance only, and not with regards to the weight of the animals.

The lack of quality control has made producers fail to pay attention to quality of the animals. Main livestock marketing channels is shown in Figure O.2-1. The prices of beef cattle, meat goats and meats are listed in Table O.2-1 and Table O.2-2.

Table O.2-1: Main Livestock Prices in the Study Area.

	Cattle		Goats		Date
	Highest	Lowest	Highest	Lowest	
Marigat	18,000 Ksh	4,000 ksh	1,200 Ksh	600 Ksh	Aug. 31
Arabal	14,000 Ksh	6,000 Ksh	1,000 Ksh	800 Ksh	Sep. 22
Loruk	-	-	1,200 Ksh	800 Ksh	Sep. 29

Source: JICA Study Team.

Table O.2-2: Main Livestock Retail Prices (Sep.-Oct. 1999)

	Beef(kg) (Ksh)	Mutton(kg) (Goats meat)	Milk (Litre) Fresh milk	Local Chicken Egg
Marigat	120	140	28-30 Ksh	6 Ksh (ea)
Kabarnet	120	140	20-22 Ksh	7 Ksh (ea)
Eldolet	140	160		6 Ksh (ea)
Nakuru	120	150		8 Ksh (ea)

Source: JICA Study Team

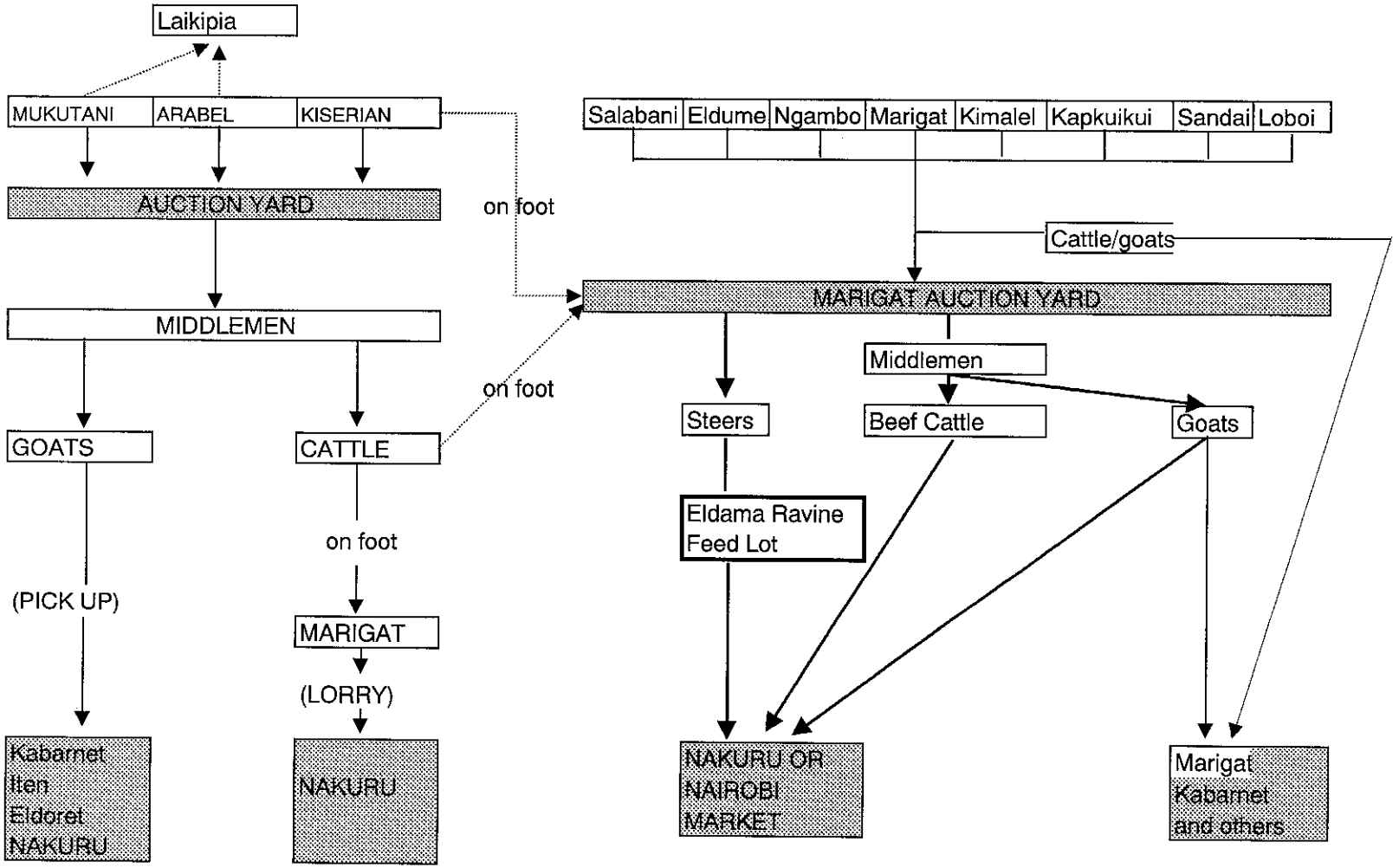

Figure O.2-1: Livestock Marketing Channels in the Study Area

Source: JICA Study Team

P. SMALL-SCALE RURAL INDUSTRY

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P-1 Small-Scale Industry

The importance of small-scale industry was felt in the Study Area where resources for major livelihood activities are limited, due to the difficult environmental conditions that resulted from scant and erratic rainfall and limited pasture land. The condition is getting worse year by year because of population and livestock pressure. Under such circumstances, it is required to diversify people's way of living to survive in the area, and promotion of small-scale industry could be one of the options for it.

Besides livestock keeping and farming, income generating activities seen in the area are; bee keeping, fishing and its processing, trading, handicraft making, kiosk or other shops management, tourism, skin and hides processing, ballast making, aloe extraction and other small-scale businesses. However, these activities are not fully developed yet.

According to the PRA survey conducted in 1999, participants of four communities indicated that low income and lack of alternative sources of livelihood are the major problems. During the course of PCM workshop held in the same year, participants expressed the problems of their products with low prices resulted from low quality and difficulty of market obtainment. It was recognized that the people in the Study Area have felt the importance and needs of improvement of small-scale industry. Followings are the information utilized for the formulation of the development plan.

P-2 Bee Keeping

According to the officer of National Beekeeping Station under the Ministry of Agriculture and Rural Development in Nairobi, Kenya has the honey potential of one hundred times as compared with the present level of production. Though domestic demand for honey is very high, production has not reached to that level and some are imported from outside. Many kinds of imported bottled honey can be found at supermarkets in big town. Problems of honey marketing in Kenya are 1) rampant of non-pure honey, 2) monopolization by small number of private company and traders, 3) lack of quality control and 4) high price compared to the honey from other countries.

The districts under Rift Valley Province with high production of honey are U/Gishu, Nakuru, Laikipia, Bomet, Samburu, Keiyo and Koibatek, and it is still low in Baringo. Trees, shrubs, plants and crops that the bees actively forage on are acacia, croton, eucalyptus, caliandra catothyrsus, gravillea species, beans, maize, peas, citrus fruits, etc. Followings are the beehive population, production and distribution and honey production in Rift Valley province.

Table P-1 Hive Population and Production in Rift Valley Province

District	KTBH	Log Hives	Others	Honey (kg)	Price/kg (ksh)	Wax (kg)	Price/kg (ksh)
Nandi	2,291	45,291	0	70,526	65-80	0	
Baringo	**5,645**	**38,238**	**0**	**60,731**	**100-150**	**0**	
Marakwet	87	16,900	0	80,000	90-100	0	
T/Nozia	2,026	501	0	29,800	200	118	120
U/Gishu	8,153	10,664	46	319,341	100-200	31,934	
Nakuru	6,005	10,457	50	146,000	100-200	44,000	
Laikipia	11,100	27,000	5,076	280,000	50-200	0	
Narok	2,354	20,980	0	99,820	120-200	0	
T/Mara	779	6,200	11	74,960	200	7,496	150
Turukana	7	728	0	920		0	
Kericho	1,767	4,017	0	11,228	120-150	0	
Kajiado	2,567	1,846	135	13,528	200-250	42	175
W/Pokot	794	14,067	2	45,377	80-150	0	
Bomet	1,282	9,507	0	102,003	250	0	
Samburu	16,850	980	0	142,940	100-150	0	
Keiyo	1,257	5,803	0	175,886	125-200	0	
Koibatek	3,142	15,998	2,229	142,380	150	0	
Buret	0	0	0	0	0	0	
Total	66,106	229,177	7,549	1,795,440		83,590	

Source: Rift Valley Province, Livestock Production Department Annual Report 1998

Table P-2 Hive Distribution in Rift Valley Province

District	KTBH			Log Hives		
	1996	1997	1998	1996	1997	1998
Nandi	2,306	2,301	2,291	5,045	4,896	4,291
Baringo	**5,383**	**5,575**	**5,645**	**30,368**	**34,488**	**38,238**
Marakwet	68	72	87	15,330	16,137	16,900
T/Nozia	1,864	2,000	2,026	450	450	501
U/Gishu	7,450	7,765	8,153	10,403	10,610	10,664
Nakuru	4,910	5,834	6,005	7,281	9,047	10,457
Laikipia	6,920	7,230	11,100	43,960	44,280	27,000
Narok	0	1,497	2,354	0	10,552	20,960
T/Mara	600	650	779	6,800	7,000	6,200
Turukana	7	7	7	720	720	728
Kericho	2,611	1,752	1,767	3,857	2,928	4,017
Kajiado	2,447	2,567	2,567	1,870	1,981	1,846
W/Pokot	680	794	794	11,966	14,067	14,067
Bomet	1,153	1,282	1,355	7,458	9,507	9,810
Samburu	748	980	1,165	16,700	16,850	17,200
Keiyo	948	1,257	1,257	3,791	5,803	5,803
Koibatek	3,122	3,142	3,142	15,915	15,998	15,998
Buret	0	0	0	0	0	0
Total	41,217	44,705	50,494	181,914	205,314	204,680

Source: Rift Valley Province, Livestock Production Department Annual Report 1998

Even though the high potential of honey in Baringo district thanks to the acacia species seen many in the area, production is still low due to poorly managed beehives and harsh climate. The distribution of hives in Baringo district has been increasing, while production of honey is not stable as seen in Table P-3.

Table P-3 Hive Distribution in Baringo

	1996	1997	1998	1999	2000
KTBH	5,383	5,575	5,645	6,845	6,830
Log Hive	30,368	34,488	38,238	40,200	43,943

Source: Rift Valley Province, Livestock Production Department Annual Report 1998 and Livestock Development & Marketing

Table P-4 Honey and Wax Distribution in Rift Valley Province

District	Honey (kg)			Bees Wax (kg)		
	1996	1997	1998	1996	1997	1998
Nandi	96,570	77,340	70,526	965	773	705
Baringo	**92,391**	**42,070**	**63,774**	**0**	**0**	**0**
Marakwet	7,300	75,064	80,000	3,800	3,702	
T/Nozia	18,500	18,900	29,800	20	25	118
U/Gishu	215,880	255,390	319,341	21,588	25,539	31,934
Nakuru	491,000	154,000	146,000	55,000	31,000	44,000
Laikipia	454,500	485,260	280,000	0	0	0
Narok	0	75,770	99,820	0	0	0
T/Mara	10,368	2,800	74,960	2,073	300	7,496
Turukana	0	822	920	0	0	0
Kericho	22,760	7,384	11,228	0	0	0
Kajiado	38,805	12,298	13,528	100	38	42
W/Pokot	0	45,377	45,377	0	0	0
Bomet	73,500	83,490	81,400	0	0	0
Samburu	0	142,940	142,940	0	0	0
Keiyo	47,390	70,776	175,886	0	0	0
Koibatek	136,500	129,436	142,380	86	115	0
Buret	0	0	0	0	0	0
Total	1,705,464	1,679,117	1,777,880	83,632	61,492	84,295

Source: Rift Valley Province, Livestock Production Department Annual Report 1998

As for the Study Area, same tendency is observed, increment of beehives while fluctuation of honey production.

Table P-5 Number of Bee-hives in Marigat and Mukutani: 1994-2000

	1994	1995	1996	1997	1998	1999	2000
KTBH	n.a.	250	265	200	246	386	386
Log Hive	8,000	8,000	8,060	8,000	8,270	8,390	7,220
Total	8,000+	8,250	8,325	8,200	8,516	8,776	7,606

Source: Ministry of Agriculture, Livestock Development & Marketing

Table P-6 Honey Production of Marigat and Mukutani Division (kg)

Year	1997	1998	1999	2000
Production	13,000	15,000	14,000	9,734

Though beekeeping is not stable income source, it is still an important for the people in the Study Area. It is one of the survival strategy to diversify their activities and corporate with harsh environment condition. It requires a low cost investment and less time consuming to produce honey. Table P-7 shows that the number of log hives in each location, which is dominant hives in the Study Area. Beekeeping is active especially in Arabal, Loboi and Kimalel location, as seen in the table below.

Table P-7 Number of Log Hive by Location in 1998

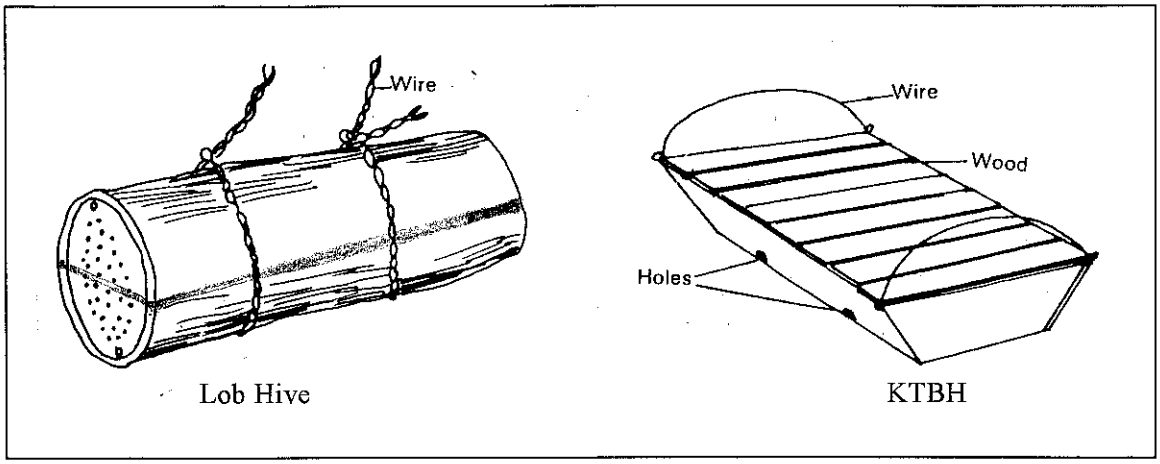
Division	Location	Number of Log Hives
Mukutani	Mukutani	200
	Arabal	3,000
	Kiserian	50
Marigat	Marigat	500
	Eldume	100
	Ngumbo	20
	Salabani	100
	Loboi	1,000
	Sandai	800
	Kapkuikui	500
	Kimalel	2,000
Total		8,270

Source: Livestock Department, Ministry of Agriculture, Livestock Development & Marketing

Livestock Department under Ministry of Agriculture and Rural Development is in charge of bee keeping. In order to increase productivity, modern KTBH was introduced in 1989 and has been promoted by extension officers since 1) log hives are easily destroyed by wild animals such as honey badger, 2) crude honey production from one KTBH is 20-30kg if it is hung under the shade while Log Hive can produce only 15-20kg, 3) price of one hive is 720Ksh for KTBH and 1,000-1,500Ksh for log hive (according to the Household Economy Survey conducted by Study Team, most of log hives are made by owners) and 4)

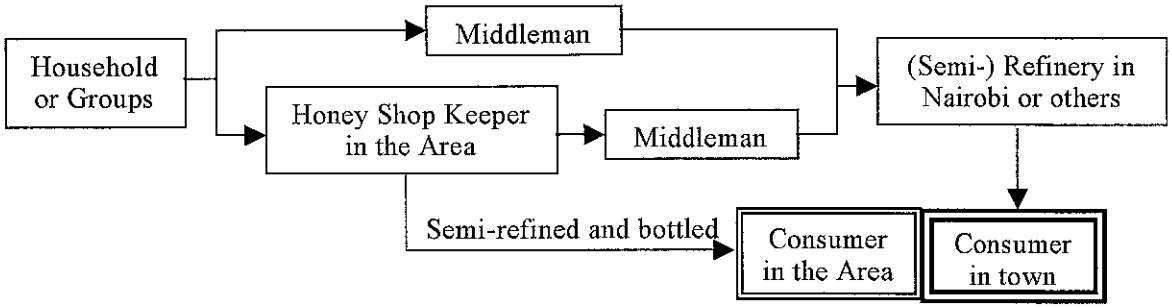
it is more safe to harvest honey from KTBH which is hung only one (1) m above from the ground.

However, its promotion was not succeeded as shown in Table P-3. The reasons why people prefer traditional log hive are; 1) KTBH holds heat because of the iron partition and bees leave when it becomes high temperature and 2) people are more accustomed to traditional log hive. However, considering the availability of hives and weather condition, traditional log hives seem more appropriate in the Study Area. Introduction of KTBH could be considered when improved type, which does not contain heat, becomes available.



In 2000, about 24,450kg of crude, 6,340kg of semi-refined and 1,230kg of refined honey was produced in the Study Area. This amount fluctuates year by year because of the rainfall and flowering, however, honey is still a reliable income source for farmers and livestock keepers especially in the year of drought.

About 30% of honey produced in the area is consumed domestically and rest for sale, out of which, about 5% is sold locally and rest is marketed outside. For local market, people from honey shops seen in Marigat, Kimarel and Kapkuikui locations collect crude honey from beekeepers. They semi-refine using simple method (leave crude honey for a few hours and scoop top wax) and bottle the honey into empty whisky bottles, which are available in Nakuru or Marigat with 5-10 Ksh. On the other hand, most of the crude honey collected from household or via honey shops are going outside market handled by middlemen. It is brought to the honey refinery or other factory in Nakuru, Machakosu, Baraka, Eldret and Nairobi. Following is the honey flow.



Price of crude honey is generally stable in recent years, but it differs depending on the seasons. It becomes expensive in January and February with no harvest of crude honey and cheaper in August and September or November and December with harvest season. Average price of crude honey at each level is as follows.

Price of Crude Honey per liter at each Level

Household	→	Honey shop	→	Middleman	→	Honey refinery
90Ksh		100Ksh		130Ksh		

Many households have between 5 to 20 or sometimes more than 100 beehives individually or in a group of age and gender. Their exist one (1) Youth Groups and six (6) Women's Groups doing bee keeping together in the area. Following tables are the list of active women's group and youth group.

The area used to have a refinery in Kibingor, Kabarnet division, operated by the Mogoswok Beekeepers Co-operative Society during the year of 1969-1992. The refinery basically opened by the society members with the assistance of BSAAP and CIDA provided office building and solar systems, respectively. The society had more than 1,000 members from Marigat, Mukutani, Kabarnet and Kabartonjo divisions, but closed because; 1) most of the committee members were illiterate and could not manage the society properly, 2) No trust within group due to misused money by committee members, and 3) suffered severe drought in 1984. As a result, the society and factory was closed in 1992. After that, new committee members were elected to restart honey business again and they tried to refine, bottle and market to Nairobi once more. However, their products were bitter with certain kind of flower and were not accepted.

Besides honey, beeswax is a profitable byproduct of beekeeping. It can be used to make candle, which is quite popular at church and souvenir shops. At present, nobody is making candle out of beeswax for commercial use in the Study Area, but beeswax are either brought to big cities especially Nairobi by middlemen or threw away.

Followings are the supply center of beekeeping equipment and demonstration apiaries. Improved KTBH (iron part is covered to avoid heat), which has been studied by World Vision is introduced for the farmers to purchase more bee hives. After some years, it is desirable to produce improved KTBH in the Study Area.

Table P-8 Bee Supplies Centers (Equipment Workshops) in Rift Valley Province

Name of Center	Date of Establishment	Types/equip and Number made	Prices	Remarks
Tenwek Community	1995	KTBH	700	
Baraka W/Shop		KTBH	720	
Molo	1974	Protective	2000	

Name of Center	Date of Establishment	Types/equip and Number made	Prices	Remarks
		KIT		
Kapsabet Intermediate Technical Centre	1997	KTBH	920	
Cartubox Industries (Nakuru) E. A. LTD.	1997	KTBH	750	
Church of Christ (Eldoret)	1993	KTBH	850	Readily Available
Lamaywet (Eldoret)	1997	KTBH	650	
Kapsabet	1997	KTBH	650	
Citc Kapsabet		KTBH H/KIT		Operations Suspended
Kilgoris Sec. School	1995	KTBH	720	Poor Management
Manor House Agric. Institute T/Nzoia	1997	KTBH H/KIT	1200	
Wekesa W/shop (T.Nzoia)	1995	KTBH	1000	
Catholic Mission (Ngarua)		KTBH	750	
		C/Box	325	
		C/Alls	1240	
		Veils	390	
		Gloves	290	
		Smokers	365	
		F/Boxes	175	
		H/tools		
Bee Honey (Laikipia)		KTBH	750	
		C/Box	450	
		C/Alls	1360	
		Veils	480	
		Gloves	480	
		Smokers	480	
		F/Boxes	150	
		H/tools	200	
		Wax Pres	550	

Source: Rift Valley Province, Livestock Production Department Annual Report 1998

Table P-9 Demonstration Apiaries in Rift Valley Province

List of Apiaries	Ownership	Stocking done	Colony Strengths	Equipment
Kabianga FTC	GOK	-	Average	Old
Kericho TTC	Private	-	-	-
Tenwek Community	NGO	4KTBH	Strong	Modern
Lugumek Pri.	Public	2KTBH	Strong	Modern
BDDI Baringo	BDDI	NAT. OCC.	Strong	KTBH
Baraka Agric. College	Private	-	Strong	KTBH
Molo-Moto Pri. School	Private	-	Strong	-
Naivasha (GK Prison)	GOK	Nil	Weak	KTBH
Chebororwa FTC (Marakwet)	GOK gave to Chemaluk W/G	Nil	Weak	KTBH
Kajiado Apiary	GOK	4 out of 14	Strong	KTBH
Sultan Hamud (Kajiado)	Women Group	7 out of 14	-	-
Cheboin Group (U/Gishu)	W/G	Hives Occupied	Strong	KTBH
Okilge (U/Gishu)	W/G	Hives Occupied	Strong	KTBH
Kaimosi (Kapsabet)	GOK	7 Hives	Medium	-
Kemeloi	School	8	Medium	-
Kiboikok (Nandi)	School	9	Medium	-
Kamariny (Keiyo)	GOK	2	Fair	-
Kabulwo (keiyo)	ASAL	10	Good	-
Anin (Keiyo)	PMC	-	-	-
Chepsirer	W/G	-	-	-
Samburu Lerrata Pri. School	Private	2	Strong	KTBH
Wamba Boys Catholic Mission	Private	4	Strong	KTBH
Maralal	Private	8	Strong	KTBH
Kari Lolgorien (T/Mara)	GOK	-	Strong	KTBH
Kilgoris (T.Mara)	GOK	-	Weak	KTBH
Baringo FTC	GOK	None	-	-
Bomet FTC	Private	None	Strong	-
Narok FTC	GOK	1	Weak	KTBH
Ensenda (Narok)	Private	3	Strong	KTBH (protective kit)
Nasukuta (W/Pokot)	GOK	-	Fair	KTBH
Lutheran Church	NGO	-	Good	KTBH
Kiborkok 4K (Kapsabet)	School	5 out of 7 Occ.	Medium	KTBH
Ibanja 4K (Aldai)	School	4/7 Occ.	Medium	KTBH
Simitak 4K (Aldai)	School	3/4 Occ.	Medium	KTBH
Kipkoror 4K (Kilibwoni-Nandi)	School	4/8 Occ.	Medium	KTBH
Lake Kapnorok (Baringo)	Lake Kapnorok	25	-	-
Showground Apiary (Kabarnet)	GOK	2	-	-
Loboi (Baringo)	KVDA	2	-	-

List of Apiaries	Ownership	Stocking done	Colony Strengths	Equipment
Endebess Pri. School (T/Nozia)	4K Club	Nil	Average	-
Dorikiringet Pr. School (T/Nozia)	4K Club	Nil	-	-
Ireu W/G (U/Gishu)	Private	Hives Occupied	Strong	KTBH 10
Lamaiywet Youth Group (U/Gishu)	Private	Hives Occupied	-	KTBH 15
Koibeiyot Youth Group (U/Gishu)	Private	Hives Occupied	Fairy Strong	5
Chepsirya Beekeepers (U/Gishu)	Private	Hives Occupied	Fairy Strong	10
Kerio Youth Group	Private	Hives Occupied	Strong	2
Okilgei W/G	Private	Hives Occupied	Strong	2
Eld. ASK Show-ground	GOK	Hives Occupied	Strong	3
Mt. Eleza resource B.A.C. & Training Center (Lare Divison)	-	-	-	KTBH

Source: Rift Valley Province, Livestock Production Department Annual Report 1998

P-3 Tourism

There are two major tourist sites in the Study Area, namely Lake Baringo and Lake Bogolia. Visitors are from both inside and outside of Kenya, and even during the drought year certain number of tourists could be expected, as seen in the figure below.

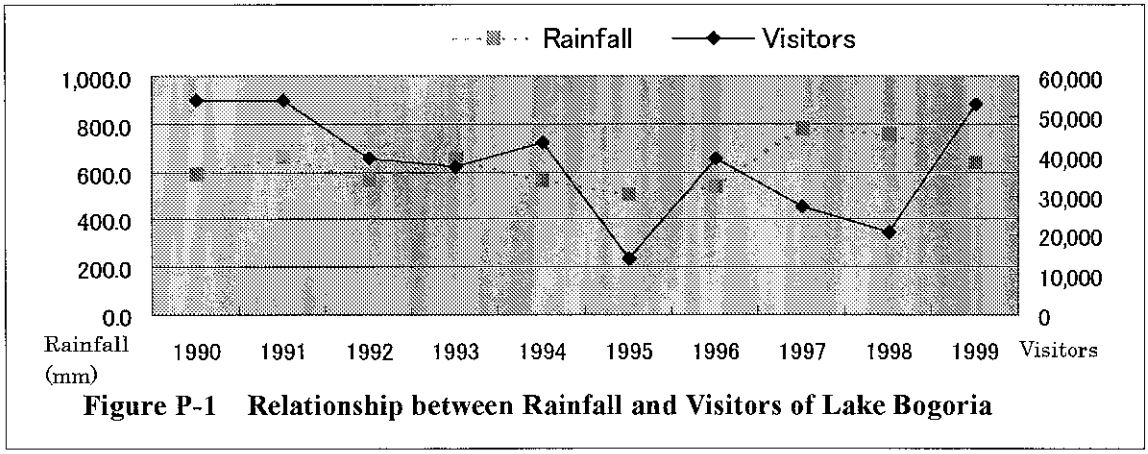


Figure P-1 Relationship between Rainfall and Visitors of Lake Bogoria

Table P-10 Visitors to Lake Bogoria (1990-1999)

Year	1990	1991	1992	1993	1994
Visitors	53,828	53,817	39,437	37,152	43,270
Year	1995	1996	1997	1998	1999
Visitors	14,200	39,300	26,978	20,587	53,023

Lake Baringo receives about 30,000 visitors per year. They visit the area to enjoy more than 350 species of birds, hippopotamus, crocodile, or lifestyle of local people from different ethnic groups such as Il Chums, Turkana, Tugen, Luo and Pokot.

Numbers of visitors are available since when County Council started the admission system in March 1996 (refer to APPENDIX-V). They constructed a gate and every visitor has to pay 200Ksh to pass the gate. High season is between July and October.

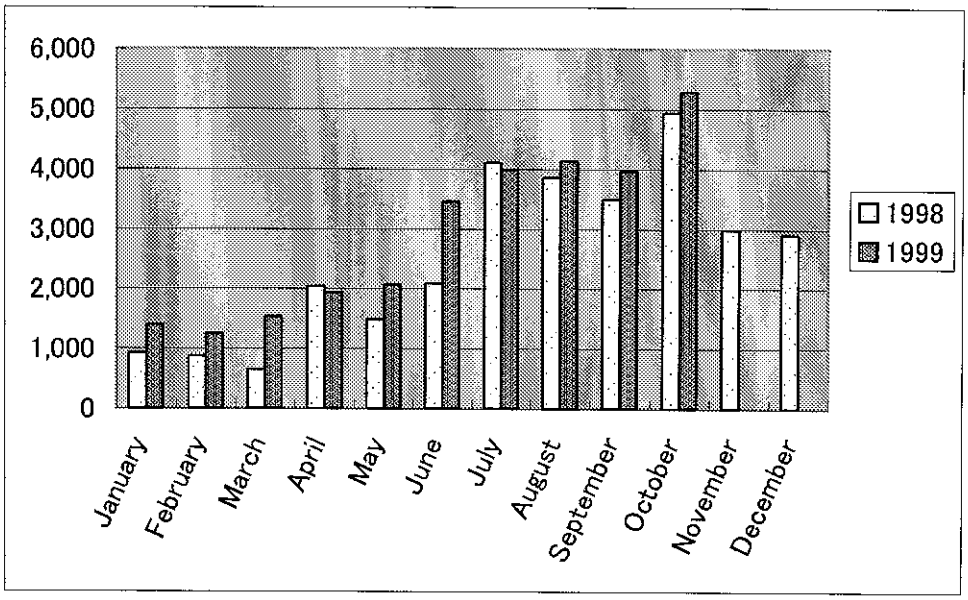


Figure P-2 Visitors to Lake Baringo

P-3 Handicraft

There are many women groups making handicrafts in the Study Area. They are producing basket, mattress, bags, ropes, bangles, belts, and other things using sisal, beads, leather, etc. Some materials are found locally but they also have to purchase them from Kapedo, Nakuru, or even from Nairobi. Even though there exists some areas with many visitors such as Lake Baringo, Lake Bogoria and Marigat town, demand for their product is not high. They are having difficulties to sell their products.

According to the PRA survey, women in Salabani location indicated that available skills in handicrafts would be the opportunities for development in the area. They already have skills to some extent, but their problems are 1) no opportunities to market their

products, 2) high price due to the materials purchased from outside, and 3) design and color of some products do not match with the taste of buyers.

There is one organization named Product Design & Development Center (PDDC) in Nairobi, which have intensive training course in Kitui. They have designers from European countries therefore they can give some idea of the tastes of tourists. Their courses could be one of the alternatives.

P-4 Hides and Skins

Since many livestock are slaughtered every day in the area, skin and hides are also produced daily. In the area, botchers buy livestock from the people around or at auction and slaughter them at slaughter/slab house. Then, skin and hides are brought to "banda" or skin house and they are suspended and dried under roof with ventilation. There exists seven (7) "banda" in the area; three (3) in Marigat and one each in Kimarel, Sandai, Loboi and Kapkuikui location. Two of them in Kimarel and Loboi were built by Livestock Department of MOARD, but the rest belong to the private botchers. On the other hand, about 20% of animals are slaughtered for house consumption, and in such case, skin is dried on the ground under the sun, which makes the leather quality poor.

Botchers in the area just wait for middlemen to come and buy their skins. Skin is classified into five groups namely: Grade I (100 % of the skin can be utilized), Grade II (75 %), Grade III (50 %), Grade IV (25 %) and Rejected (none), and prices depend on the grade. Followings are the production of hides and skins.

Table P-11 Hides and Skins Production Figures (piece) for the Year 2000, Marigat

		I	II	III	IV
Hides	Susp	117	218	243	207
	Gro	209	280	320	410
Goat skins	Susp	3,371	3,391	3,502	2,819
	Gro	3,106	3,091	2,842	2,726
Sheep skins	Susp	2,667	2,598	2,720	2,168
	Gro	2,450	2,198	2,325	1,698

Source: Ministry of Agriculture, Livestock Development & Marketing
Note: Susp; Suspension drying (suspended in a roofed house with ventilation)
Gro; Ground drying (dry in the sun after pegging to the ground)

Prices of skin and hides kept on fluctuating on a downward trend. Main reason for the low prices is the collapse of European market and demand for skin and hides is very low in Kenya at present.

Table P-12 Price of Hides per kg (Ksh) in Marigat

Grade	1991	1995	1996	1997	1998	1999	2000
I	28/40	68	62/20	40	33	32/30	36
II	22/80	55	50/30	35	27	23/20	26
III	17/50	44	33/90	20	20	17	19
IV	14/55	26	20	15	15	10	9

Source: Ministry of Agriculture, Livestock Development & Marketing

Table P-13 Price of Goat skin per Piece (Ksh) in Marigat

Grade	1991	1995	1996	1997	1998	1999	2000
I	27/50	65	65/40	50	40	29	26
II	22/30	52	51/40	40	34	24/50	19
III	17/50	40	36	30	25	11	13
IV	13/30	24	30	20	18	5/70	8

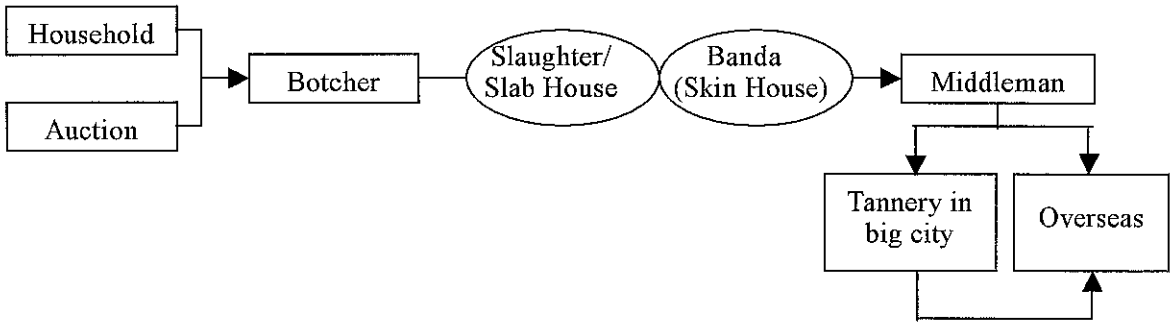
Source: Ministry of Agriculture, Livestock Development & Marketing

Table P-14 Price of Sheep skin per Piece (Ksh) Marigat

Grade	1991	1995	1996	1997	1998	1999	2000
I	12/80	55	56/70	50	40	27/30	31
II	9/70	43	45	40	35	18/20	22
III	7/70	30	28/40	30	20	11	16
IV	6	16	12/30	20	12	6/50	5

Source: Ministry of Agriculture, Livestock Development & Marketing

The middlemen bring skin and hides from the area and sell them to the tannery in Nakuru, Thika, Nairobi or even to overseas market. There is one tannery in Nakuru and they buy goat skin with 40 Ksh/piece.



P-5 Fish Production

Many people living on the shores of Lake Baringo (including Ol-Kokwo Island) make a living from fishing. Most active fishermen are Luo tribe who were moved from

Lake Victoria, and others are Il Chums, Tugen and Pokot. Some of them are doing tour guide whey the Lake has many visitors, and some fish only when they move to the Lakeshore with their livestock. They have to be registered to fish commercially with the registration fee of 100 Ksh per year. Many fishermen are still using traditional boat and fishing gear.

Tilapia (most common species), Protopterus, Barbus, Clarias and Lungfish are the main fish landed from the Lake and they are sold to traders. About 80% of fish are brought to outside of the area (mainly Nakuru, Kisumu, and Nairobi), and another 20% are locally consumed. Those fish are the important source of protein for people in the area. In either way, fish are marketed after smoked for one day, dried for two days or fried by traders. Fuelwood that is getting harder to collect in the area is used to smoke or fry fish with traditional method. According to the officer of Fishery Department, size of fish is getting smaller because of pollution and siltation of the lake. Average price of a tilapia at each level is as follows.

Price of one Tilapia at each Level

Fisherman	→	Middleman (processed)	→	Market	→	Customar
5 Ksh		10 Ksh		20 Ksh		

Their used to have a fish fillet factory in Kampi ya Samaki and processed and canned fish were marketed to Nakuru and Nairobi. Even though some fish were brought from Lake Victoria to supplement, fish production from Lake Baringo was not enough to operate the factory and it was closed in late 80's.

Fish production fluctuates year by year, and especially, it was only 8 ton in 1994 because of severe drought. At that time, lake water was almost dried up, but the rainfall of following year and Elnino rain at the end of 1997 and beginning of 1998 recovered the Lake again. Unless water level of lake does not become too low, fish is still important income source or supplement food to stabilize people's livelihood in the area. When drought comes and people have nothing to eat or sell, they come to fish even for those with no license. The figure below is showing that when rainfall is scarce, fish production becomes high, and the following year fish becomes in short supply due to over catch of previous year.

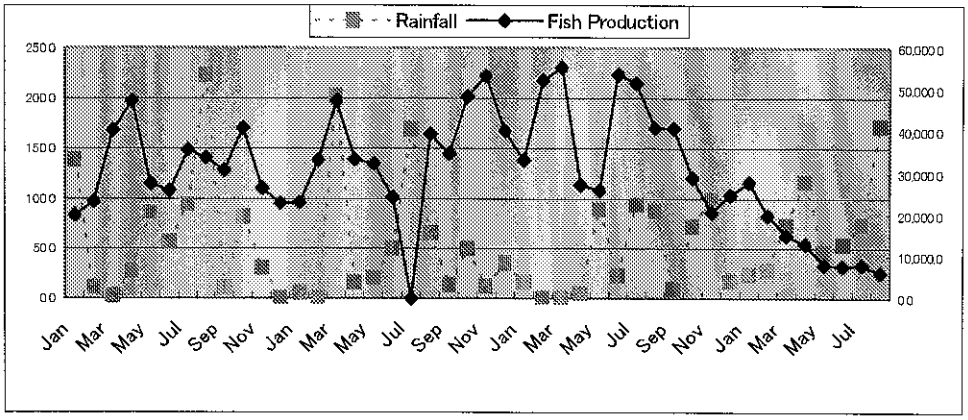


Figure P-3 Relationship between Rainfall and Fish Production (Lake Baringo)

Table P-15 Fish Production from Lake Baringo (1991-2000)

Unit: kg

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1991	14,839.7	12,675.6	9,731.4	7,329.9	9,012.9	12,534.3	11,424.8	19,146.2	3,434.0	1,711.0	-	21,162.1	123,001.9
1994	-	-	555.0	1,440.0	351.6	394.0	531.7	609.8	671.1	771.8	2,028.6	2,400.0	9,753.6
1995	4,438.4	2,329.6	3,126.9	5,062.6	4,723.3	13,243.6	32,945.0	12,195.5	12,217.4	9,703.5	11,727.8	11,165.2	122,878.6
1997	4,459.1	5,748.4	12,584.0	14,447.5	19,668.0	20,813.0	19673.0	26,900.6	21,223.2	22,966.0	20,265.0	21,124.7	209,872.5
1998	20,012.5	23,301.0	40,424.7	47,374.3	27,649.0	25,957.0	35,737.9	33,768.5	30,892.0	40,944.6	26,490.0	22,923.0	375,474.5
1999	23,039.3	33,232.0	47,407.6	33,438.7	32,372.3	24,358.9	Closure	39,587.6	34,820.5	48,437.6	53,376.2	40,133.1	410,203.8
2000	33,351.1	52,314.7	55,351.8	27,297.9	26,006.7	53,667.5	51,729.1	41,007.5	40,787.0	28,933.4	20,633.1	24,895.0	455,974.8

Q. HEALTH AND SANITATION

LIST OF TABLES

Q.1 Health and Sanitation

Q.1.1 Epidemiology

Due to the strong tendency of self-treatment by the general population, and also the difference between administrative boundary and Health Planning Zone, hospital records may not represent well enough the actual health status of the local people. Nevertheless they are important source of information to approach to the real health situation in the area.

The top Five major causes of death and Morbidity statistics obtained from Kabarnet Memorial Hospital (Baringo District Hospital) and Marigat Health Center (Sub-district Hospital) are shown below.

Table Q.1-1 Major Causes of Death in Baringo District, 1997 to 1998

1	Malaria
2	Pneumonia
3	HIV/AIDS
4	Anemia
5	Accidents

Source: Ministry of Health

Table Q.1-2 Top 10 Diseases in Baringo District Hospital, June-98 to June-99

	Jun-98	Jul-98	Aug-98	Sep-98	Oct-98	Nov-98	Dec-98	Jan-99	Feb-99	Mar-99	Apr-99	May-99	Jun-99
Respiratory	5914	5784	5992	6778	8376	4314	3563	5018	5285	5970	3867	7339	8766
Malaria	4516	4456	5032	6692	6363	3782	2913	3713	3399	4316	2982	6515	7224
Skin	997	1274	1105	1491	1351	922	807	947	1094	1184	976	1541	1481
Diarrhea	925	1051	733	810	754	455	501	933	1070	1167	776	1440	1420
Accidents	663	713	530	802	552	484	557	648	796	703	461	1019	988
Intestinal worms	526	622	689	664	763	433	468	493	602	639	567	809	761
eye infection	449	444	448	497	723	300	282	449	436	428	290	796	747
Rheumatism, joint pains	439	439	414	718	585	298	354	500	403	543	450	614	452
Pneumonia	380	380	499	730	584	493	344	334	332	450	389	606	651
Ear infections	370	274	297	295	397	186	226	199	231	304	195	366	353

Source: Kabarnet Memorial Hospital

Table Q.1-3 Top 10 Diseases in Baringo Sub-District Hospital, January-98 to August-99

	Jan -98	Feb -98	Mar -98	Apr -98	May -98	Jun -98	Jul -98	Aug -98	Sep -98	Oct -98	Nov -98	Dec -98	Jan -99	Feb -99	Mar -99	Apr -99	May -99	Jun -99	Jul -99	Aug -99
Malaria	485	452	221	201	590	325	320	302	417	420	302	391	211	202	220	268	530	441	420	277
URTI	220	415	330	156	473	391	200	320	376	320	314	206	347	304	210	260	401	468	430	403
Pneumonia	52	75	25	45	15	13	50	20	21	26	31	40	43	38	65	20	81	70	79	82
GID	124	120	141	335	126	228	226	135	131	30	42	45	144	222	140	121	230	226	130	360
TB	2	13	10	6	8	12	0	0	25	5	5	4	7	6	15	7	10	8	5	6
UTI/STD	67	36	44	43	46	29	35	35	36	23	20	26	58	32	44	29	40	46	43	39
Chicken Pox	0	0	0	0	10	7	3	0	2	6	7	4	0	0	16	7	2	6	9	10
Amoebiasis	39	51	42	40	51	46	50	36	15	17	30	22	31	42	40	36	49	56	66	57
Intestinal worms	27	30	21	27	20	25	36	42	40	16	29	35	26	30	19	20	26	17	5	23
Malnutrition	45	32	28	31	37	40	25	34	31	26	44	39	33	40	29	24	31	23	20	29

Source: Marigat Health Center

URTI: Upper Respiratory Tract Infection
GID: Gastro-Intestinal Diseases
TB: Tuberculosis
UTI: Urinary Tract Infection
STD: Sexually Transmitted Diseases

Through the discussion with local health staffs, it becomes clear that there are some 20 of infectious diseases around the area. Namely;

Amoebiasis	Leishmaniasis	Shigellosis
Anthrax	Malaria	Tetanus
Ascariasis	Meningitis	Trypanosomiasis
Brucellosis	Pneumonia	Tuberculosis
Chickenpox	Rabies	Typhoid Fever
Cholera	Respiratory Disease	Yellow Fever
Hookworm Disease	Scabies	

Among those diseases, Anthrax, Brucellosis, Rabies, Tetanus, Trypanosomiasis and Tuberculosis are defined as 'Cattle association diseases' or 'Zoonosis'. In order to control those diseases, both human and animal health programs should be considered in closely related interventions.

Demographic database is rather weak. Currently no reliable information on population by sex and age group are available. It is hoped that 1999 census data could be available for calculations of some important health indicators such as IMR, MMR, TFR, and Life Expectancy.

Q.1.2 Nutrition

Along with the change of lifestyle, from pastoralism to agriculture, major diet changes are observed among people living in the area. Elder generation prefer to stay in milk and meat diet, while younger generation depend on more crops. There are certain reasons, especially after 1992 heavy draught, livestock as a means of food production seems to be gradually replaced by agricultural farming such as maize. From the food security point of view, it is said that crops are faster in recovering damage from draught than milk producing cows.

Even though, famine hit the people almost regularly since 1992. Significant numbers of malnutrition are reported in the Marigat Health center's record. According to the Community Based Nutrition Programme observation, 'Marasmas' and under weight are common while 'Kwashakor' is rare in the area. Significant preference for milk by not only children but also adults people may be the reason for not having Kwashakor which means almost nil protein. Milk demand is high and so do the price at the local market.

Q.1.3 Health Service Delivery

There are three Health Centers, eight Dispensaries and seven Bamako Initiative Stations in the area. Some of those Dispensaries are run by missionaries such as Africa Inland Church, Full Gospel Church or Catholic Church. Facilities are well maintained because of the Preventive Maintenance activities by MOH with assistance from DANIDA.

Partly due to the under staffing of those health facilities, many of them have closed FP/MCH room in it. It might be some influences from the missionary's policy against Family Planning program.

KEPI seems quite successful. Almost every infant has been covered for all four kind of vaccination.

Q.1.4 Circumcision

Critorodectomy (female circumcision) is common practice around the area. At the male circumcision in Kerio Valley, several young men have died by tetanus recently.

Female circumcision is a most peculiar and detested practice particularly for external donor communities. However it is deeply rooted into the society, and can not be changed in a short period of time. In case of Egypt, until first un-circumcisized girl to get married within her village, it took three years continuous effort by concerned agencies.

Q.1.5 Outbreak

The area has experienced Cholera outbreaks[1] 7 times since 1981. The latest two outbreaks occurred in 1998 and 1999.

- July 1999; started at Kampi ya Samaki on 16th of June, then moved to Loruk. Total 108 patients and 4 died.
- March 1998; started at Eldume. More than 100 patients and 15 died.

Although calendar months are different in both cases, either case started right after heavy rain. The fact implies possible flood made sanitary situation worse.

In the Kampi ya Samaki's outbreak the first lot of Cholera cases has been settled within

[1] July 1999, March 1998, 95?, 90, 88, 83, 81

11 days. After one day of interval, the second outbreak has started at Loruk where several kilometers north of Kampi ya Samaki. Both two towns are located along coastal line of Lake Baringo, which has been the source of water for some inhabitants of those towns.

Its rather short period of the first outbreak, of course it is no doubt for the timely and appropriate intervention made by the local health staffs, with the fact that the epidemic area is rather limited within a certain part of the township, implies the original source could be a single one.

	Date	No. of Patients	Area
1	16-Jun	7	Kampi ya Samaki
2	17-Jun	12	Kampi ya Samaki
3	18-Jun	8	Kampi ya Samaki
4	19-Jun	13	Kampi ya Samaki
5	20-Jun	9	Kampi ya Samaki
6	21-Jun	6	Kampi ya Samaki
7	22-Jun	4	Kampi ya Samaki
8	23-Jun	5	Kampi ya Samaki
9	24-Jun	3	Kampi ya Samaki
10	25-Jun	6	Kampi ya Samaki
11	26-Jun	3	Kampi ya Samaki
12	27-Jun	0	
13	28-Jun	11	Loruk
14	29-Jun	8	Loruk
15	30-Jun	0	Loruk
16	1-Jul	2	Loruk
17	2-Jul	2	Loruk
18	3-Jul	2	Loruk
19	4-Jul	2	Loruk
20	5-Jul	5	Loruk
	Total	108	

In case of 1998 outbreak, people relying on Moro and Perakera rivers are most affected. While the people using Arabal water system seemed less affected than those.

These episodes strongly suggested the importance of epidemiological investigation to the water borne disease outbreaks. For the sake of safer water use and for prevention of future risk of repeated outbreak, it must be investigated that how and when the Vibrio Cholera has got into the community.

For instance; infectious route, lake water contamination, pit latrine overflow, food contamination, movement of foodstuff and people, these issue has to be checked in a scientific and epidemiological manner.

People's conventional wisdom tells them that the water left behind the dried up river beds is not safe to drink. People also avoid to drink the first water flow after dry seasons. When they fetch some water from a river, they dig a shallow hole nearby a stream for a kind of sand filtering instead to use flowing water directly.

People are very much cautious about water safeties. They carefully observe the color, smell, oil, and fish living in a stream. However, bacterial contamination such as Cholera is beyond their capacity to detect.

Q.2 Development Strategy

According to the PRA results, everybody put strong emphasis on water issues, which include both drinking water and water for food production.

Under the current conditions of limited numbers of health facilities, under staffing and difficult transportation, health promotion emphasis should be put on people's empowerment. People living in such an ecological lifestyle have their own accumulated wisdom to survive, or protect their own health. However, the recent changes of environment such as increased population, newly developed materials or industry chemicals make them need to amend their conventional wisdom to cope with those changes. Health specialists should be able to assist in those aspects.

Firstly a laboratory and epidemiologist should analyze and identify the real mechanism for disease infection. There is a laboratory facility and enough number of trained laboratory technicians in Marigat. By strengthen them with appropriate equipment and reagent, especially for bacteriological functions, it will be possible to them investigate past epidemic such as cholera outbreaks.

Secondary the health staffs should communicate with people regularly by using appropriate media. With small but convenient transportation means such as light motorbike, committed health staffs will play more active performance in school health education program and community visits. Using notice board in front of each health facility with regular information notice on such as contamination risk of common water sources or recent epidemic will be a most beneficial for people. Radio or regular bulletin should be also considered.

Regarding nutrition aspect, promotion of milk production should be the center of attention. Introduction and demonstration of Zero or Semi-Zero grazing with appropriate technical package, including new tools will contribute to this objective much.

All those activities should be designed to directly affect their practice change, not merely into the knowledge level.

For the coming verification projects activities, which is limited interventions both in terms of time and scale, local epidemiological statistics would not be an appropriate indicator but changes in practice such as water treatment habit and latrine use could be observed within a defined period of the verification projects. Our first PCM sessions collected some data for baseline for that purposes.