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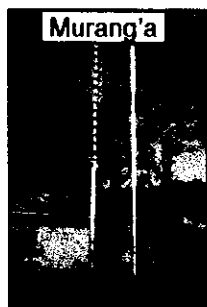
REPUBLIC OF KENYA



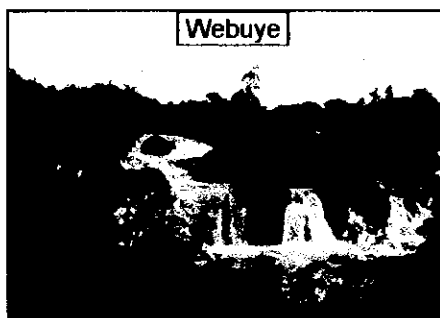
MINISTRY OF ENVIRONMENT AND
NATURAL RESOURCES

THE STUDY ON INSTITUTIONAL IMPROVEMENT AND REHABILITATION OF WATER SUPPLY SYSTEMS FOR 10 LOCAL TOWNS IN THE REPUBLIC OF KENYA

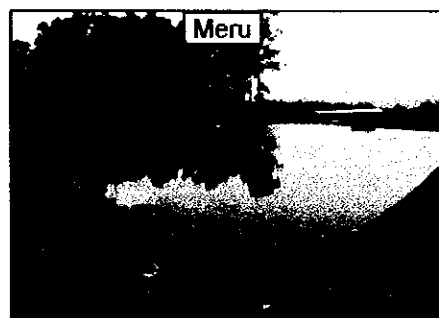
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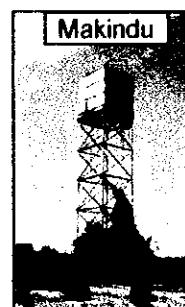
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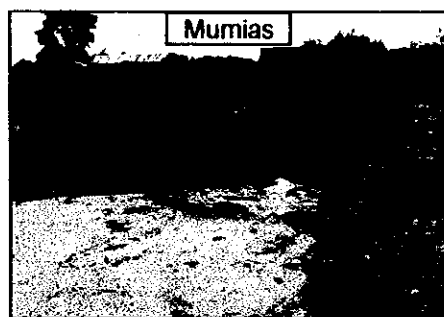
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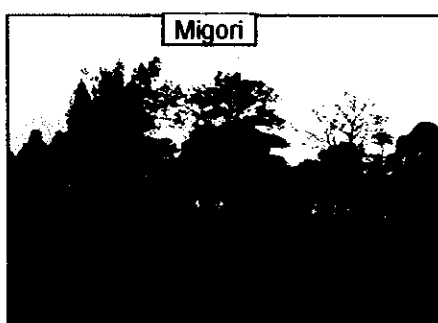
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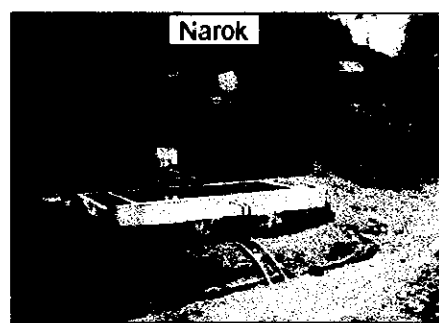
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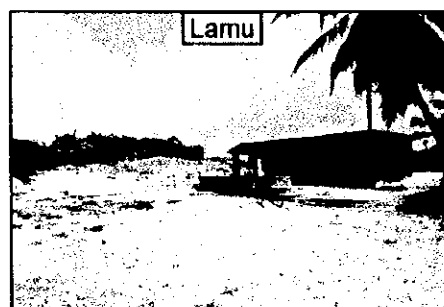
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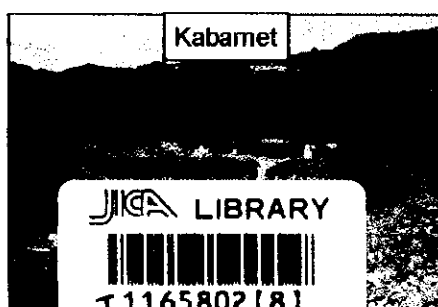
Migori



Narok



Lamu



Kabarnet



Wundanyi

FINAL REPORT

Volume 1 : Executive Summary

FEBRUARY 2001



Development Impact Consulting



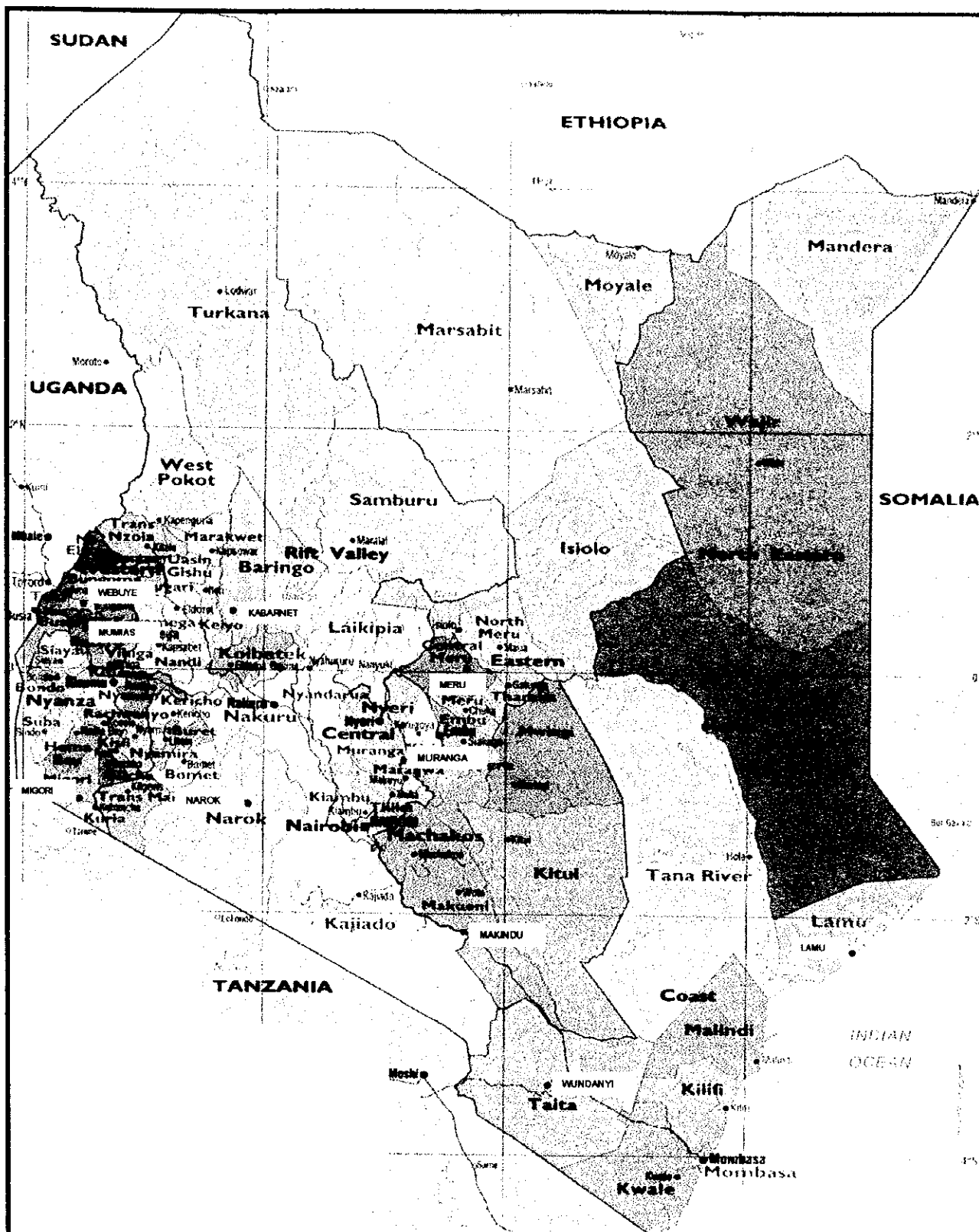
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TEN TOWNS WATER & SANITATION STUDY

TOWNS LOCATION MAP



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EXECUTIVE SUMMARY – JICA TEN TOWNS STUDY

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LIST OF ABBREVIATIONS

AC	Asbestos Cement (Pipe)
AFW	Accounted for water
AG	Attorney General
AIDS	Acquired Immune Deficiency Syndrome
AIE	Authority to Incur Expenditure
AMREF	African Medical Research Foundation
ASK	Agricultural Society of Kenya
ATP	Ability to Pay
bgl	Below ground level
BH	Borehole
BOT	Board of Trustees
BPT	Break Pressure Tank
CBD	Central Business District
CBR	Cost Benefit Ratio
CIM	Centre for International Migration
CMT	Core Management Team
CTB	Central Tender Board
CV	Contingent Valuation
CWS	Community Water Supplies
DAF	Daily Average Flow
DCO	District Commissioner's Office
DDC	District Development Committee

DWD	Department of Water Development
Dia	Diameter
DTO	District Treasury Office
DWE	District Water Engineer
DWF	Dry Weather Flow
DWO	District Water Office(r)
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
ENEP	El-Nino Emergency Project
FIRR	Financial Internal Rate of Return
FY	Financial Year
GAA	German Agro Action
GI	Galvanized Iron
GoK	Government of Kenya
Gph	Gallons per hour
GPS	Global Positioning System
GTZ	German Technical Assistance
H	Head
Ha	Hectares
HO	Head Office
HQ	Headquarters
IEE	Initial Environmental Examination
ITCZ	Inter-tropical Convergence Zone

JICA	Japan International Cooperation Agency
KEFINCO	Kenya-Finland Co-operation
KEWI	Kenya Water Institute
Km	Kilometer
Km ²	Square Kilometers
KP&LC	Kenya Power and Lighting Company
KR	Kenya Railways
Kshs	Kenya Shillings
L	litre
LA's	Local Authorities
L/c/d	Litres per capita per day
LPO	Local Purchasing Order
L/sec	Litres per second
M ³ /day	Cubic meters per day
M ³ /hr	Cubic meters per hour
MENR	Ministry of Environment and Natural Resources
MoLG	Ministry of Local Government
MTB	Ministerial Tender Board
MW	Mega-watts
NAWARD	National Water Resources Database
NEAP	National Environment Action Plan
NEMA	National Environmental Management Authority
NGO	Non-Governmental Organisation

NPV	Net Present Value
NTU	Nephelometric Turbidity Units
NWC&PC	National Water Conservation and Pipeline Corporation
NWMP	National Water Master Plan
ODA	Official Development Assistance
O&M	Operation and Maintenance
PE	Polyethylene Pipe
PSP	Private Sector Participation
PVC	Polyvinyl Chloride
PWO	Provincial Water Office(r)
Q	Discharge
RDF	Rural Development Fund
RER	Revenue Expenditure Ratio
RGS	River Gauging Station
RHS	Random Households Survey
SIDA	Swedish International Development Agency
SS	Subordinate Staff
STD	Subscriber Trunk Dialing
STW	Sewage Treatment Works
TDS	Total Dissolved Solids
ToT	Training of Trainers
T-Works	Treatment Works
UFW	Unaccounted for water

UNICEF	United Nations Children's Fund
WHO	World Health Organization
WMS	Welfare Monitoring Survey
WRAP	Water Resources Assessment Project
WS	Water System
WSS	Water Supply System
WTP	Water Treatment Plant

CHAPTER 1 INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Kenya's water and sanitation sector is in critically poor condition. Like in many developing countries, the sector is plagued by a series of problems. These problems have arisen because of lack of technically sound operation and maintenance practices resulting in a backlog in rehabilitation, and above all, poor utility management. The existing institutional framework and organizational procedures result in bottlenecks and failure to create required authority and responsibility capacity at the most beneficial levels. Lack of autonomy for the managers of water utilities at all levels is one of the key causes for sustained inferior performance.

The tremendous pressure occasioned by population increase, rural-urban migration and unplanned settlements have strained the water and sewerage schemes beyond the original design capacities.

Periodic technical and financial reviews of water services in Kenya and the Aftercare Study on Kenya's National Water Master Plan have revealed that there is need for serious re-evaluation of management of water and sanitation utilities to meet the targets of effective service delivery in support of the integrated development plans. Decentralization of decision making and management to the local levels and transferring to the private sector activities that can be carried out without compromising social, health or vital economic requirements of the population are of cardinal importance.

Against this background, the Government of Kenya recently approved the National Water Policy paving the way for legislative changes in the Laws of Kenya that touch on water activities. The changes aim at rationalizing management, decentralizing operations to the local level, creating the necessary regulatory framework and activating private sector participation in the sector, in order to obtain a more responsive management system that ensures efficient service delivery and project sustainability at the most economical cost.

JICA, one of Kenya's leading development partners, would like to help create a sustainable environment for water and sanitation service delivery systems, by supporting formulation and development of workable management arrangements in the water sector.

The Study on Institutional Improvement and Rehabilitation of Water Supply Systems for Ten Local Towns is being undertaken in order to provide Kenya with feasible, viable and implementable options that are sensitive to local conditions, especially social, environmental, economic and political.

The findings, recommendations and work plans derived from this study may then be used to develop a more comprehensive framework for rehabilitation and extension of water services to meet development objectives as enshrined in the National Poverty Eradication Plan for the rest of the nation.

The use of local initiatives such as Kitale and Nakuru to investigate the potential and/or constraints for commercialization of water services within local authority setting will be a useful barometer for the future of the National Water Policy, which envisions decentralization of water activities to local authorities in urban areas. Malindi, which is under a partnership between the National Water Conservation and Pipeline Corporation and Gauff Utility Services, will provide another alternative for comparison of performance and benchmarking.

1.2 OBJECTIVES OF THE STUDY

The objectives of the study are:

- (1) To obtain the baseline information regarding the water supply systems for the ten local towns;
- (2) To recommend the institutional arrangement for effective water service delivery and rehabilitation plan of the relevant facilities in the project areas;
- (3) To give advice on the application of the recommendation to the other areas in the Republic of Kenya.

1.3 SCOPE OF THE STUDY

The fundamental philosophy of this study hinges on the fact that without appropriate intervention in the water supply and sanitation sector, no major improvements in service delivery will be realized. This study focuses on ten (10) towns in the Republic of Kenya namely: Meru, Lamu, Kabarnet, Webuye, Mumias, Migori, Narok, Muranga, Makindu, and Wundanyi as a pilot programme of implementing the desirable interventions which will serve as a show case for replication in the rest of the country.

The interventions entail three main components, which must go hand in hand:

- (1) To restore the water supply and sanitation facility to its original technical and functional capacity by undertaking the necessary physical rehabilitation.
- (2) To put in place an appropriate institution to run the water supply and sanitation facility. This institution should be more responsive to the needs of, and directly answerable to the consumers. The institution should have the legal backing and formed in line with the current National Water Policy, which advocates active private sector participation in the water sector for more efficient service delivery.
- (3) To put in place an appropriate technical team of operators, with the necessary skills and equipment and tools to take over the day to day operation and maintenance of the rehabilitated facility. It is envisaged that a team starting with an efficiently functioning facility free of major repairs and replacements, and with a good management backing,

stands a better chance of achieving a self-sustaining facility within a reasonable time span.

In order to achieve the foregoing intervention goals and the overall project objectives, the study entails a two-phase strategy for collecting the relevant data and information: a Preliminary and a Pre-feasibility phase.

The preliminary study covers review of relevant data and information, diagnostic survey of existing water supply and sanitation facilities, water demand projection, revision of water supply facility plan, cost estimation and evaluation, identification of the laws and regulations of environmental impact assessment, legal and regulatory framework on facility performance. It entails basic data collection, field reconnaissance and field inspection of the utilities to assess the current condition and situation of the water supply and sanitation schemes.

The pre-feasibility study phase covers establishing the socio-economic characteristics of the study area, assessment of surface water and groundwater potential, identification of institutional and legal constraints that affect improvement in operations of water facilities and determination of viable financial and commercial plans that ensure long-term sustainability of the facilities.

The pre-feasibility phase includes review of existing data, evaluation of the technical, socio-economic, institutional and financial aspects, formulation of water supply and sanitation facility rehabilitation plans, and formulation of preliminary technical and institutional development plans on which recommendations will be based.

In addition to the ten towns that constitute the pilot programme, operational experiences have been obtained from the towns which have been undergoing the commercialization approach, promoted by GTZ, i.e. Malindi, Kitale and Nakuru, for comparison purposes. The year 2010 has been chosen as a planning horizon.

1.4 COMPOSITION OF THE FINAL REPORT

The final report comprises of a total of two volumes as follows:

- Volume 1: Executive Summary
- Volume 2: Main Report

As indicated by their titles, Volume 1 is a summary of the study while Volume 2 is a presentation of the full town report including supporting and back-up data.

CHAPTER 2 EXISTING PHYSICAL SOCIO ECONOMIC CONDITIONS

2.1 PHYSICAL CONDITIONS

The main physical conditions of the ten towns are summarized in the table 2.1 below.

Table 2.1: Summary of Physical Conditions In the 10 Project Towns

TOWN	CLIMATE	INFRASTRUCTURE	HYDROLOGY	HYDROGEOLOGY
NAROK	Mean Annual Rainfall – 741mm Temperature – Max 24° Min 9° Altitude – -m asl.	Roads – All weather Electricity – National grid Health – District hospital	Main catchments – Engare Narok & Seyabei rivers Water potential – Average	Depth to the main aquifer – 20-180m Discharge range 3 – 10m ³ /hr. Depth to water rest level 45-60m. Water quality – fresh to blackish waters
MERU	Mean Annual Rainfall – 1260mm Temperature – Max 24° Min 13° Altitude – 1600m asl.	Roads – All weather Electricity – National grid Health – District hospital	Main catchments – Kathita & Gatabora rivers Water potential – Very Good	Depth to the main aquifer – 15-100m Discharge range 1.5 – 25m ³ /hr. Depth to water rest level 8-70m. Water quality – generally good, slightly acidic to neutral sodium bicarbonate waters 2 existing boreholes
MURANGA	Mean Annual Rainfall – 1195mm Temperature – Max -° Min -° Altitude – 1200-1460m asl.	Roads – All weather Electricity – National grid Health – District hospital	Main catchments – Mathioya & Kayahwe rivers Water potential – Very Good	Depth to the main aquifer – 50-100m Discharge range 2 – 50m ³ /hr. Depth to water rest level 15-25m. Water quality – generally fresh with silica concentration often high 3 existing boreholes
KABARNET	Mean Annual Rainfall – 1400mm Temperature – Max -° Min -° Altitude – 2120m asl.	Roads – All weather Electricity – National grid Health – District hospital	Main catchments – Kinyo, Beemoi & Kapleel rivers Water potential – Very Good	Depth to the main aquifer – 50-130m Discharge range 10-25m ³ /hr. Depth to water rest level 5-100m. Water quality – generally fresh with silica and iron concentration occasionally high 6 existing boreholes

TOWN	CLIMATE	INFRASTRUCTURE	HYDROLOGY	HYDROGEOLOGY
MAKINDU	<p>Mean Annual Rainfall – 612mm</p> <p>Temperature – Max 28.6 ° Min 16.6 °</p> <p>Altitude – 1010m asl.</p>	<p>Roads – All weather</p> <p>Electricity – National grid</p> <p>Health – Sub-District hospital</p>	<p>Main catchments – springs from Chyulu Hills</p> <p>Water potential – Poor</p>	<p>Depth to the main aquifer – 50-100m; 20m for unconfined</p> <p>Discharge range 3-15m³/hr.</p> <p>Depth to water rest level 2-20m.</p> <p>Water quality – fresh, slightly acidic to neutral sodium bicarbonate for unconfined aquifers and slightly blackish from confined aquifers</p> <p>5 existing boreholes</p>
WUNDANYI	<p>Mean Annual Rainfall – 1326mm</p> <p>Temperature – Max ° Min °</p> <p>Altitude – 1400-1440m asl.</p>	<p>Roads – All weather</p> <p>Electricity – National grid</p> <p>Health – District hospital & health center</p>	<p>Main catchments – Wasiwi & Sungululu rivers</p> <p>Water potential – Average</p>	<p>Depth to the main aquifer – 6-30 for unconfined</p> <p>Discharge range 2-10m³/hr.</p> <p>Depth to water rest level 0.3-6m.</p> <p>Water quality – fresh, iron and manganese concentration may be high</p> <p>3 existing boreholes</p>
MIGORI	<p>Mean Annual Rainfall – 1400mm</p> <p>Temperature – Max ° Min °</p> <p>Altitude – 1350-1463m asl.</p>	<p>Roads – All weather</p> <p>Electricity – National grid</p> <p>Health – Mission hospital</p>	<p>Main catchments – Migori river</p> <p>Water potential – surface good but of poor quality</p>	<p>Depth to the main aquifer – 50-100m</p> <p>Discharge range 0.5 – 20m³/hr.</p> <p>Depth to water rest level 5-10m for confined aquifers and 2.5-30 for unconfined.</p> <p>Water quality – generally fresh, slightly alkaline sodium bicarbonate waters, silica concentration may be high</p> <p>9 existing boreholes</p>
LAMU	<p>Mean Annual Rainfall – 1100mm at the coast to 550m inland</p> <p>Temperature – Max 36.4 ° Min 19.5 °</p> <p>Altitude – At sea level.</p>	<p>Roads – Mainly pedestrian town</p> <p>Electricity – Generators</p> <p>Health – District hospital</p>	<p>Main catchments – Ground water</p> <p>Water potential – poor to good</p>	<p>Depth to the main aquifer – 2-20m</p> <p>Discharge range 1-60m³/hr.</p> <p>Depth to water rest level 5-20m for unconfined aquifers.</p> <p>Water quality – fresh to blackish</p> <p>30 existing boreholes</p>
WEBUYE	<p>Mean Annual Rainfall – 1400mm</p> <p>Temperature – Max ° Min °</p> <p>Altitude – 1450-1590 asl.</p>	<p>Roads – All weather</p> <p>Electricity – National Grid</p> <p>Health – District hospital</p>	<p>Main catchments – Nzoia river</p> <p>Water potential – good</p>	<p>Depth to the main aquifer – 30-70m</p> <p>Discharge range 3-10m³/hr.</p> <p>Depth to water rest level 6-10m for confined aquifers.</p> <p>Water quality – fresh (not confirmed)</p> <p>2 existing boreholes</p>

TOWN	CLIMATE	INFRASTRUCTURE	HYDROLOGY	HYDROGEOLOGY
MUMIAS	Mean Annual Rainfall – 1900mm Temperature – Max -° Min -° Altitude – 1260-1330 asl.	Roads – All weather Electricity – National Grid Health – Mission hospital	Main catchments – Lusumu river Water potential – very good	Depth to the main aquifer – Discharge range - Depth to water rest level - Water quality – - existing boreholes

2.2 ADMINISTRATION

The ten local towns covered spread over ten districts in six provinces of Kenya. Other than Makindu, Webuye and Mumias, which double up as divisional headquarters, the remaining study towns serve as district administrative headquarters and house offices of the central government departmental heads, municipal, county council as well as offices of parastatals and non-governmental organizations. For most of the towns, the delineation of boundaries were taken as defined by the Ministry of Local Government and include areas that are not necessarily of urban character. The study also considered service areas based on the existing local urban water supply network. A major observation was that all the towns are of prime commercial, industrial and institutional potential and serve as economic convergence centres for the hinterland. The developments in each town are defined by the DDC's or sub-DDC's in conjunction with the local authorities, business community and individual residents.

2.3 POPULATION

Definition of the target population was based on the service area of the existing water utility using the 1999 housing and population census. An inter censal growth rate ranging from 2.8 to 5.0 was used to project the urban population over a ten year period. In general, urban areas recorded higher population growth and densities than peri-urban areas due to increased job and business opportunities. A summary of the population distribution for the ten towns is shown in the table below:

Table 2.2: Population distribution and projections to the year 2010

Town	1999 Population	1989-99 Inter-censal growth Rate (%)	Projected Population to 2010	1999 Population in service area
Kabarnet	16931	3.6	25000	9808
Murang'a	58,007	3.5	84700	24460
Meru	126,427	2.9	173100	58532
Narok	41,162	4.5	66800	20773
Mumias	105,466	4.7	174800	33440
Migori	95,446	4.5	154900	14875
Makindu	6,226	2.8	8400	5608
Lamu	12959	1.08	14600	8752
Wundanyi	6,930	4.0	10700	3960
Webuye	70,137	4.05	108500	40882

Source: District Statistical Office, Various towns and central Bureau of Statistics, 2001

2.4 SOCIO ECONOMIC CONDITIONS

The rapid development of the towns is based on commercial and industrial sector supported by the hinterland activities. The hinterland population supplies basic food items for the urban population as well as raw materials for industrial processing. Other than Webuye and Mumias towns whose development is directly related to existence of large industries, the development of other towns is based on their entrepreneurial capacity especially the small and medium scale enterprises. The mushrooming of commercial enterprises is also linked to the development of social infrastructural facilities and other support services such as schools, hospitals and colleges.

2.5 INCOME LEVELS AND WILLINGNESS/ABILITY TO PAY

This assessment is based on individual rights and standards as stipulated in the charter for social integration {see the National Poverty Eradication Plan 1999-2015 and the Poverty Reduction Strategy Paper (PRSP)}. The charter states that access to sufficient food and clean water to maintain life and well being is a basic right for all citizens and a key to public health especially for the low income groups. This includes women, children, the youth, the disabled and the elderly. Determination of income levels was based on both the Welfare Monitoring Surveys (WMS) and the Random Households Survey (RHS). Willingness and ability to pay was assessed using the contingent valuation methodology and analyzed using the differential impacts of water and sanitation programmes at the household level i.e. access to safe and clean piped drinking water weighed against accessibility costs. In a nutshell, simulations to establish the threshold tariff beyond which people would not be willing to pay revealed that even with increment of up to 30% in the tariff, people would still be willing to pay

2.6 HEALTH AND SANITATION CONDITIONS

The general health and sanitation trends reflect a situation of continued decline in health standards especially increased prevalence of water borne diseases for the lower income groups. The low prevalence of diarrhoeal diseases is related to the poor health seeking behaviour among the urban households due to introduction of cost sharing. Other reasons enumerated were misdiagnosis as well as poor data capture techniques in most public health facilities. Major sanitary facilities used are pit latrines. Waste disposal is mainly through rubbish pits though the local municipal or county councils do collect refuse haphazardly. Community sensitization and mobilization on routine urban environmental sanitation is normally carried out though a reformulation of strategy is recommended.

2.7 TYPES OF SETTLEMENTS

Settlement in all towns follows a uniform pattern based on physical development plans of the individual town. However, permanent residential houses are mainly government quarters and the affluent business community.

The situation in peri urban areas is more pathetic as there are more mud walled/semi permanent houses that can be categorized as informal settlements. All the towns with the exception of Kabarnet town have slum dwellers representing the lower income bracket. Such groups often live in poor sanitary conditions and lack basic social infrastructural facilities.

Table 2.3: Distribution of the population based on broad income categories

TOWN	LEVEL OF INCOME AND PERCENTAGE			TOTAL
	High	Middle	Low	
Narok	6997	15641	18524	41162
	17	38	45	100
Meru	20229	83441	22757	126427
	16	66	18	100
Murang'a	7540	25523	24944	58007
	13	44	43	100
Kabarnet	4063	7788	5080	16931
	24	46	30	100
Migori	17360	33756	45330	96446
	18	35	47	100
Makindu	871	2801	2554	6226
	14	45	41	100
Wundanyi	1110	2772	3048	6930
	16	40	44	100
Lamu	592	7690	3549	11831
	5	65	30	100
Webuye	9117	26652	34368	70137
	13	38	51	100
Mumias	20034	33762	51670	105466
	19	32	49	100

2.8 SITUATION OF WOMEN IN SOCIETY

Most households rely on women to collect water for domestic use only forms one of their major social roles among many other economic activities within the household. Considering that women are particularly vulnerable to many factors that create and perpetuate poverty, collecting water is a circumstance they (women) find themselves in and which does not necessarily define them. The burden of carrying water is energy sapping and causes considerable stress especially to pregnant women leading to multiple complications at childbirth. Improved water supply conditions would change all these and ease the burden on women, releasing time and energy for other development activities necessary in nation building.

2.9 PUBLIC HEALTH AWARENESS AND MOBILIZATION

The epidemiology of water borne diseases in all the towns is quite complex and is a function of the existing water and sanitation conditions that cut across major socio economic groups. The most common problems observed in all the towns relate to urban environmental sanitation and include excreta disposal, water supply, solid waste management, liquid waste and drainage and sewerage treatment. The need to mount routine public health awareness

and mobilization programmes was found to be quite critical in the water rehabilitation programme.

In view of the above, the study proposes that there will be need to develop a basis and framework for mobilization and training of the community with a strong focus on the status of the woman in society. The training should be in the form of a manual to be developed by the consultants entailing among other things;

- a) Training of facilitators
- b) Training of trainers or catalytic/contact groups
- c) Preparation of training materials (including visual aids) to be used in community training

CHAPTER 3: EXISTING WATER SUPPLY CONDITIONS

Table 3.1 below provides a summary of the designed capacity current water production and the demand in the 10 towns of study. In most of the towns it will be observed that while design capacity is high this capacity is not matched by actual production because of limitations of transmission capacity. The transmission capacity has therefore been adopted as the actual production capacity. In the case of Kabarnet town, lack of distribution capacity limits utilization of installed treatment and transmission capacity.

It is also noted that in all cases except Kabarnet and Wundanyi the current demand far outstrips production. While rehabilitation may improve the production to actual design capacities, the current demand will still not be met in a majority of towns, hence some level of expansion should be seriously considered in addition to rehabilitation. Demand growth over the period of study 2000 – 2010 is presented in Table 3.2.

Table 3.1 Summary of Current Demand, Design and Water Production Capacities

TOWN	Design Treatment Capacity	Production Capacity	Current Water Demand
	M ³ /d	M ³ /d	M ³ /d
Narok	2,500	2,500	5,790
Meru	6,000	5,000	20,276
Muranga	7,600	3,240	8,084
Kabarnet	12,800	1,371	2,746
Makindu	480	400	980
Wundanyi	1,536	1,536	1,082
Migori	180	180	12,898
Lamu	3,500	1,600	1,764
Webuye	3,200	1,968	9,167
Mumias	1,670	1,470	14,234

Table 3.2 Population Projections and Water Demand (2000-2010)

TOWN		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
NAROK	Population	43,000	44,900	47,000	49,100	51,300	53,600	56,000	58,500	61,200	63,900	66,800
	<i>Water Demand m³/d</i>	6,030	6,283	6,563	6,843	7,136	7,442	7,762	8,095	8,455	8,815	9,201
MERU	Population	130,100	133,900	137,700	141,700	145,900	150,100	154,400	158,900	163,500	168,300	173,100
	<i>Water Demand m³/d</i>	20,840	21,420	21,999	22,609	23,250	23,890	24,546	25,232	25,934	26,666	27,398
MURANG'A	Population	60,000	62,100	64,300	66,600	68,900	71,300	73,800	76,400	79,100	81,800	84,700
	<i>Water Demand m³/d</i>	8,345	8,620	8,906	9,208	9,509	9,822	10,149	10,489	10,842	11,195	11,575
KABARNET	Population	17,500	18,200	18,800	19,500	20,200	20,900	21,700	22,500	23,300	24,100	25,000
	<i>Water Demand m³/d</i>	2,838	2,951	3,049	3,162	3,275	3,389	3,519	3,648	3,777	3,907	4,053
MAKINDU	Population	6,400	6,600	6,800	7,000	7,100	7,300	7,600	7,800	8,000	8,200	8,400
	<i>Water Demand m³/d</i>	1,003	1,029	1,056	1,083	1,096	1,123	1,163	1,189	1,216	1,243	1,269
WUNDANYI	Population	7,200	7,500	7,800	8,100	8,400	8,800	9,100	9,500	9,900	10,300	10,700
	<i>Water Demand m³/d</i>	1,118	1,158	1,197	1,237	1,277	1,330	1,370	1,424	1,477	1,530	1,583
MIGORI	Population	99,700	104,200	108,900	113,800	118,900	124,300	129,900	135,700	141,800	148,200	154,900
	<i>Water Demand m³/d</i>	13,473	14,082	14,716	15,379	16,068	16,798	17,554	18,338	19,163	20,028	20,933
LAMU	Population	12,000	12,100	12,200	12,400	12,500	12,600	12,800	12,900	13,000	13,200	13,300
	<i>Water Demand m³/d</i>	1,790	1,803	1,817	1,843	1,856	1,870	1,896	1,909	1,923	1,949	1,962
WEBUYE	Population	73,000	76,000	79,000	82,200	85,500	89,000	92,600	96,400	100,300	104,300	108,500
	<i>Water Demand m³/d</i>	9,541	9,933	10,325	10,743	11,175	11,632	12,103	12,599	13,109	13,632	14,181
MUMIAS	Population	110,400	115,600	121,000	126,700	132,700	138,900	145,500	152,300	159,500	166,900	174,800
	<i>Water Demand m³/d</i>	14,895	15,592	16,315	17,078	17,882	18,712	19,594	20,505	21,468	22,458	23,514

Table 3.3 summaries the general condition of the water supply schemes in the ten towns. From the table it is noted that all the schemes suffer from problems of under capacity components, broken down units, dilapidated facilities and general reduction in operational competence. In the case of Migori the source works is a major limitation in production of water even for the current demands. For Wundanyi, the current sources are diminishing and may not support future demands unless new source works are developed.

Table 3.3: Condition of Water Supply Schemes in the Ten Towns

TOWN	TYPE OF WATER SUPPLY	CONDITION OF SYSTEM
NAROK	<ol style="list-style-type: none"> 1. River intake and raw water pumping to a conventional treatment works 2. Treated water pumped into storage and distribution 	<ol style="list-style-type: none"> 1. Screens for raw water missing 2. Flow control valves not functional 3. Chemical dosing equipment has broken down 4. Pumps are leaking copiously from seals and packing 5. Pump house in state of disrepair 6. Treated water rising mains are undersize and in poor state of repair. 7. Distribution pipes are undersize 8. Storage capacity provided is grossly inadequate.
MERU	<ol style="list-style-type: none"> 1. River intake from Kathita and Gatabora stream and gravity flow to Milimani conventional treatment works 0.. 2. Gatabora spring intake and gravity flow to Milimani waterworks for disinfection before distribution 	<ol style="list-style-type: none"> 1. All the intakes rehabilitated under El Nino programme 2. Water treatment works undergoing rehabilitation and expansion under El Nino programme 3. Chemical dosers not operational 4. There is no raw water inlet control resulting in an overflow of 4000m³/d to waste. 5. Distribution pipes are old and undersize 6. Current storage is inadequate
MURANG'A	<ol style="list-style-type: none"> 1. Intake from Mathioya dam pumping to Kiharu conventional water treatment works. Treated water by gravity to distribution. 2. Intake from Kayahwe River by gravity into Kayahwe water treatment works. Treated water pumped into distribution. 	<ol style="list-style-type: none"> 1. Kiharu waterworks are old and production capacity has reduced to only 840 m³/d from original design capacity of 1374 m³/d. 2. Intake structure and raw water main at Kayahwe were destroyed by floods and are scheduled for construction under El Nino programme. 3. Design capacity of works is 4410m³/d but production limited by pumping and rising main capacity to 2400m³/d. 4. The condition of the older AC pipes is generally poor as evidenced by frequent bursts.
KABARNET	<ol style="list-style-type: none"> 1. Raw water intake from Kirandich Dam and gravity flow into conventional treatment works below the dam 2. Treated water pumped to a 6000m³ storage tank in town 3. Borehole intakes with pumping to 	<ol style="list-style-type: none"> 1. Treatment works at the dam, rising main and storage tank are new and in good condition 2. Distribution is by very small GS pipes which are grossly inadequate 3. Treatment works can only operate twice a week because the limited distribution

	storage tanks for disinfection before distribution.	capacity.
TOWN	TYPE OF WATER SUPPLY	CONDITION OF SYSTEM
MAKINDU	<ol style="list-style-type: none"> 1. Raw water intake from Kiumbi river, which originates from a spring 2. Intake housing the pumps is located beside a natural pool 3. No treatment works except chlorinator. 4. Chlorinated water is pumped into storage and distribution. 	<ol style="list-style-type: none"> 1. Pump house floods and is in poor state of repair 2. Chlorinator has been in-operational for some time without plans for repair 3. Water source is polluted due access by animals and requires full treatment to render it safe 4. Access to intake site difficult 5. Rising main is throttled by a 75mm section 6. Storage is grossly inadequate and the pressed steel tank at the railway station is not serviceable 7. Distribution pipes are generally old and undersize.
WUNDANYI	<ol style="list-style-type: none"> 1. Raw water intake from Wesu springs and gravity flow to Wesu conventional treatment works 2. Treated water gravitates to storage and into distribution 3. Second raw water intake from Wasinyi stream and pumped to Wundanyi treatment works; treated water is pumped to service reservoirs 2 and 3 	<ol style="list-style-type: none"> 1. Source at Wesu springs is diminishing so very low flows are experienced at the works 2. Mechanical dosers at both waterworks have broken down 3. Intake and pump house at Wasinyi intake prone to flooding due its location 4. Bulk meters un-operational 5. Wundanyi treatment works buildings in poor state of repair 6. Backwash tank and pump in poor state.
MIGORI	<ol style="list-style-type: none"> 1. Raw water intake from 8No. boreholes for the MENR scheme; and pumping to storage tanks for chlorination and distribution 2. Nyasare community water scheme intake from a spring. 	<ol style="list-style-type: none"> 1. Only 2No. boreholes are in operation others are either blocked or pumping gear has broken down 2. Water production is very low (only 180m³/d)
LAMU	<ol style="list-style-type: none"> 1. Raw water intake from a well-field of 30No. wells located in the sand dunes of Shela Beach 2. Low lift pumping to the collector station where disinfection is done before high lift pumping to main reservoir in town 	<ol style="list-style-type: none"> 1. Installed transformer is inadequate to supply enough power to the pumping station so only 1600 to 2000m³/d can be pumped to the storage tank 2. Pipes in the distribution are old and mostly corroded 3. Storage is inadequate.

TOWN	TYPE OF WATER SUPPLY	CONDITION OF SYSTEM
WEBUYE	<ol style="list-style-type: none"> 1. Raw water intake from Nzoia River and gravity flow to treatment works located 300m away. 2. Treatment works consist of a conventional stream and a "Struja" package treatment unit. 3. Treated water pumped to a high-level storage tank before distribution. 	<ol style="list-style-type: none"> 1. Filter units at the treatment plant were not functioning at time of visit but rehabilitation work is on-going under the El Nino programme 2. Chemical dosers and mixers not operational 3. The plant laboratory does not have even the basic equipment. 3. Bulk meter at outlet to treatment works not operational.
MUMIAS	<ol style="list-style-type: none"> 1. Raw water intake from Lusumu River and flows by gravity to the conventional treatment plant 1km away 2. Treated water is pumped by 3No. high lift pumps installed in 1990 in to a service reservoir 2650m away 3. Water distribution is mainly through uPVC pipes of 75 to 150mm diameters 	<ol style="list-style-type: none"> 1. Treatment chemicals mixed by hand because mechanical mixers are not operational 2. At time of visit only 1No. pump was operational; one had a burnt out motor while the third had been removed from the plant. 3. The laboratory has no equipment so chemical dosages are set by past experience.

CHAPTER 4 PROPOSED STRATEGY FOR WATER SUPPLY REHABILITATION

Table 4.1 summarizes the proposed strategies for rehabilitation of the various components of the water supply schemes. Such rehabilitation will restore the works to their design water production capacity and to ensure that the water produced is delivered to the consumers. The rehabilitation will also ensure the water produced and delivered to the consumer can be metered and billed accordingly.

Table 4.1 Summary of Proposed Strategies for Rehabilitation of Water Supply Schemes

TOWN	STRATEGY FOR IMPROVEMENT
NAROK	<ul style="list-style-type: none"> - Provide trash racks at inlet and repair pump house - Improve treatment works by replacing filter media and underdrains, install chemical dosing equipment - Replace pumping main with 200mm pipe, provide additional storage and pipework in the distribution - Provide logistical facilities and equipment necessary for proper utility management
MERU	<ul style="list-style-type: none"> - Provide additional storage of 1000m³, provide new pipework in the distribution network, and install bulk and consumer meters - Provide logistical facilities and equipment necessary for proper utility management
MURANG'A	<ul style="list-style-type: none"> - Provide new pumping set at Kiharu intake and expand the pump house, rehabilitate treatment works at both Kayahwe and Kiharu, rehabilitate distribution system by providing additional pipework of 100 – 150mm sizes, provide zonal bulk and consumer meters and a meter testing bench - Provide logistical facilities and equipment necessary for proper utility management
KABARNET	<ul style="list-style-type: none"> - Improve distribution by laying new pipework of different sizes, providing break pressure tanks and installing new bulk and consumer meters - Provide logistical facilities and equipment necessary for proper utility management.

MAKINDU	<ul style="list-style-type: none"> - Relocate intake and pumping station, provide additional pumps, rehabilitate chlorination facility, replace rising main with 100mm GS pipe, replace undersize pipes in distribution network and install bulk meters, provide a new 500m³ storage tank and improve access to intake site - Provide logistical facilities and equipment necessary for proper utility management
WUNDANYI	<ul style="list-style-type: none"> - Improve Wundanyi treatment works, provide chemical dosers, provide standby diesel pump, repair pumping main and re-equip booster pumping station, rehabilitate distribution by installing additional piping in the gravity reticulation, repair high level storage tanks, and install bulk meters - Provide logistical facilities and equipment necessary for proper utility management
MIGORI	<ul style="list-style-type: none"> - Equip boreholes, provide collector pipe work, new chlorine contact tank and pump station, rehabilitate distribution, install meters - Provide logistical facilities and equipment necessary for proper utility management
LAMU	<ul style="list-style-type: none"> - Construct storage, rehabilitate distribution pipes, replace transformer for pumping station and install stand-by generator - Provide logistical facilities and equipment necessary for proper utility management
WEBUYE	<ul style="list-style-type: none"> - Install new pumps, equip laboratory, replace rising main, construct new storage, rehabilitate distribution - Provide logistical facilities and equipment necessary for proper utility management
MUMIAS	<ul style="list-style-type: none"> - Improve intake weir and access to intake site - Replace pumps and blowers at treatment plant, equip laboratory, replace valves, construct and equip new transfer pump station, install bulk, zonal and consumer meters within distribution - Provide logistical facilities and equipment necessary for proper utility management

CHAPTER 5: EXISTING WASTEWATER DISPOSAL AND SANITATION CONDITIONS

Table 5.1 below summaries the existing situation with respect to wastewater disposal and sanitation in the ten towns. Out of the ten towns studied, only 3No. towns (Meru, Murang'a and Webuye) have municipal sewerage systems with waste stabilization ponds as the treatment option. The sewerage network in each town serves a very small percentage of the population and is invariably confined primarily to the Central Business District. The waste stabilization ponds in Meru and Webuye are in poor state of operation and maintenance, requiring rehabilitation. The ponds in Murang'a are new, with a capacity exceeding the current wastewater flow.

Mumias has a very small sewerage system serving one estate with only 170 connections. The treatment system is a set of temporary ponds, which were not designed for the purpose and therefore poses a serious danger to public health. The rest of the towns have onsite sanitation systems comprising pit latrines, cesspits and septic tanks, which invariably function fairly well at individual household level. The onsite systems were found to perform unsatisfactorily in public places.

The increase in wastewater flow which will result from the proposed rehabilitation project will exert pressure on the operation of the onsite systems, requiring therefore, consideration of installation of waterborne sanitation especially in the CBD's and similar areas of population concentration.

Table 5.1 Summary of Wastewater Disposal and Sanitation Situation in the Ten Towns.

TOWN	TYPE OF SANITATION SYSTEM	CONDITION OF SYSTEM
NAROK	On site systems (Pit latrines, septic tanks and cess pits)	- On site systems in public places like District Hospital, GK Prison, some hotels and schools do not function satisfactorily
MERU	-Sewage stabilization ponds serving the CBD only - On site systems (Pit latrines, septic tanks and cess pits) in the larger part of the town	- The sewage works are overloaded and in poor state of maintenance with ponds overflowing into the roadside ditch and many manholes blocked - Facilities in public places do not function well

TOWN	TYPE OF SANITATION SYSTEM	CONDITION OF SYSTEM
MURANG'A	<ul style="list-style-type: none"> -Sewage stabilization ponds and a sewer network covering about 3.2km² of the town only - On site systems (Pit latrines, septic tanks and cess pits) 	<ul style="list-style-type: none"> - The sewage ponds are new and in fairly good condition - The amount of sewage flow has not been sufficient to flush the sewers so river water is used to augment flow - Facilities in public places do not function well
KABARNET	<ul style="list-style-type: none"> -On site systems (Pit latrines, septic tanks and cess pits) - Sewage stabilization ponds serving the District Hospital 	<ul style="list-style-type: none"> - Ground is rocky so pit latrines are often shallow and do not serve satisfactorily - The ponds do not receive much flow because of limited water supply - Facilities in public places do not function well
MAKINDU	On site systems (Pit latrines, septic tanks and cess pits)	<ul style="list-style-type: none"> - The sandy soil conditions, although providing good absorption for wastewater, presents problems due to instability of pit latrines - Facilities in public places do not function well
WUNDANYI	On site systems (Pit latrines, septic tanks and cess pits)	<ul style="list-style-type: none"> - The systems are working well at individual premises but there are problems of exhaustion when they fill up - Facilities in public places do not function well
MIGORI	<ul style="list-style-type: none"> -On site systems (Pit latrines, septic tanks and cess pits) - Small sewerage system serving St. Joseph's Mission Hospital 	<ul style="list-style-type: none"> - Individual systems work well but exhauster services are not readily available - Facilities in public places do not function well
LAMU	On site systems (Swahili type Pit latrines)	- The systems work fairly well but street sanitation is poor as a result of sullage disposal and droppings

		from donkeys
WEBUYE	<p>Sewage stabilization ponds and a sewer system serving about 7% of the town population through 1100 connections</p> <p>On site systems (Pit latrines, septic tanks and cess pits)</p>	<ul style="list-style-type: none"> - Sewers are in good structural condition but there are very frequent blockages of the smaller size sewers - There is no flow monitoring device at the treatment works - There is accumulation of sludge in the two ponds due to lack of inlet works for removal of screenings and grit - Vehicular access to the ponds is not possible - The ponds don't have scum boards so algae and floating debris are discharged into the receiving stream - Effluent quality is very poor since the detention capacity of the ponds has been reduced considerably by sludge accumulation - Onsite systems do not operate well because of high water table in the town
MUMIAS	<p>Sewerage system serving one estate with 170 connections leading to a set of three temporary ponds</p> <p>On site systems (Pit latrines, septic tanks and cess pits) serving the rest of the town excluding the Mumias Sugar Factory which has an internal sewerage system</p>	<ul style="list-style-type: none"> - Existing ponds were not designed for the flow they receive, they are in very poor state - The overflow from the last pond is diverted into a farmland - The ponds produce nuisance from mosquitos, flies, rodents and foul odour and has potential for spreading of disease - Onsite systems in most areas do not work well because of high water table and concentration of use.

CHAPTER 6 PROPOSED STRATEGY FOR WASTEWATER DISPOSAL AND SANITATION REHABILITATION

The proposed rehabilitation actions for wastewater disposal and sanitation are summarized in Table 6.

Table 6: Position on WasteWater Disposal and Sanitation in the Ten Towns.

TOWN	TYPE OF SANITATION SYSTEM	STRATEGY FOR IMPROVEMENT
Narok	On site systems (Pit latrines, septic tanks and cess pits)	<ul style="list-style-type: none"> - Public awareness campaign to improve onsite facilities - Consider waterborne sanitation in the high density population areas
Meru	Sewage stabilization ponds On site systems (Pit latrines, septic tanks and cess pits)	<ul style="list-style-type: none"> - Rehabilitate ponds and associated drainage system - Consider extension of sewerage to the fast growing high density areas - Public awareness campaign to improve onsite facilities
Muranga	Sewage stabilization ponds On site systems (Pit latrines, septic tanks and cess pits)	<ul style="list-style-type: none"> - Provide sludge drying beds and relocate inlets to primary ponds - Rehabilitate small size sewers by replacement with larger diameter pipes - Public awareness campaign to improve onsite facilities
Kabarnet	On site systems (Pit latrines, septic tanks and cess pits)	<ul style="list-style-type: none"> - Public awareness campaign to improve onsite facilities - Consider sewerage for the CBD
Makindu	On site systems (Pit latrines, septic tanks and cess pits)	<ul style="list-style-type: none"> - Public awareness campaign to improve onsite facilities
Wundanyi	On site systems (Pit latrines, septic tanks and cess pits)	<ul style="list-style-type: none"> - Public awareness campaign to improve onsite facilities

TOWN	TYPE OF SANITATION SYSTEM	STRATEGY FOR IMPROVEMENT
Migori	On site systems (Pit latrines, septic tanks and cess pits)	- Public awareness campaign to improve onsite facilities
Lamu	On site systems (Swahili type Pit latrines)	- Public awareness campaign to improve onsite facilities
Webuye	Sewage stabilization ponds On site systems (Pit latrines, septic tanks and cess pits)	- Rehabilitate ponds - Public awareness campaign to improve onsite facilities
Mumias	Sewerage for one estate with temporary ponds On site systems (Pit latrines, septic tanks and cess pits)	- Provide a 225mm gravity sewer line 1km long and new stabilization pond system - Public awareness campaign to improve onsite facilities

CHAPTER 7 LAWS AND REGULATIONS OF ENVIRONMENTAL IMPACT

7.1 GENERAL

The current Government of Kenya policy requirement stipulates that before any major development project is undertaken in the public or private sector, there is need to carry out Environmental Impact Assessment (EIA) on the project in order to ensure that each component conforms to good environmental management. This study involves mainly the identification of laws and regulations that govern the environmental impact assessment of water supply and sanitation projects.

A large number of Acts and organizations deal with issues of pollution, environmental degradation and conservation. However, effectiveness in enforcement has not been commensurate with the many acts and regulations; in some instances there have been contradictions when an institution has evoked its act at the expense of proper operation of facilities belonging to another institution. The reason for the foregoing situation is that each sector utilizing water, apart from the water authority, has different objectives; their primary focus is not water development. The need to harmonize the application of the various Acts and Regulations, for effective protection of the environment, has been felt and expressed for a long time; hence the birth of the Environmental Management and Co-ordination Act of 1999.

7.2 ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT (1999)

The most significant Act that specifically addresses environmental impact is the newly enacted Environmental Management and Co-ordination Act, 1999. Among the specific issues related to EIA procedures are stipulated in the Act as follows:

- Establishment of Environmental Management Authority (NEMA) to administer the Act.
- Submission of an EIA Report to NEMA by developers before undertaking any new project specified in the Act.
- Issue of an Environmental Impact License by NEMA if it is satisfied with the EIA Report.
- Environmental Impact Assessment to be conducted in accordance with the EIA guidelines and procedures provided in the 4th schedule of the Act.

7.3 LAWS RELATING SPECIFICALLY TO WATER SUPPLY AND SANITATION

Within the Environmental Management and coordination Act, a number of sections dealing specifically with water and sanitation can be identified as follows:

- Part V Section 42 dealing with protection of rivers, lakes and wetlands,
- Part VIII Section 72 dealing with water pollution prohibition,
- Part VIII Section 74 dealing with effluents to be discharged into the sewerage system,
- Part VIII Section 86 dealing with standards for waste,
- Part VIII Section 87 dealing with prohibition against dangerous handling and disposal of wastes,
- Part VIII Sections 88 and 89 dealing with waste licenses and licensing of waste disposal sites,
- Part VIII Sections 91 – 93 dealing with hazardous wastes and their disposal,
- Part XIII dealing with environmental offences and related penalties.

In order to minimize the conflicts in enforcement (due to the many different Acts and Regulations) as mentioned before, the Environmental Management and Coordination Act stipulates that where the provisions of any existing law conflicts with the provisions of this Act, then the provisions of this Act shall prevail. The foregoing proviso, in conjunction with the multi-disciplinary or composition of the Environmental Committees will hopefully enhance the effectiveness of administration and enforcement of the Act.

7.4 INITIAL ENVIRONMENTAL EXAMINATION

7.4.1 Water Quality of Existing Supplies

The programme for monitoring water quality both at source and within the distribution systems is in place at each town, however, implementation is generally poor because of lack of appropriate and adequate laboratory equipment and reagents. Water quality analysis results were not available in most of the stations except pH and residual chlorine. Apart from Migori and Lamu, the rest of the study towns obtain their water from surface sources. The spring source for Makindu Town is heavily polluted because it is accessible to livestock, and a new source is required.

The river sources for Webuye, Mumias, Murang'a and Narok are subject to pollution from agricultural activities upstream of the intakes. The streams are also heavily coloured and laden with sediment. Both the spring and surface sources in Meru are of fairly high quality requiring minimal treatment. Migori and Lamu obtain their water of fairly uniform quality from boreholes and wells respectively. The well field exploited at Lamu is an ecologically sensitive area that should be carefully protected and preserved.

7.4.2 Existing Sanitation Situation

Meru, Webuye and Murang'a have sewerage systems for management of wastewater. It was not found useful to determine the amounts of wastewater generated for Meru because even for the limited area served by the system the sewage works are overflowing and grossly inadequate. In Webuye the sewage treatment works (STW) are not provided with measuring devices. Results of effluent quality analysis reveal poor performance of the works. Murang'a has a new sewerage system, which is grossly under-utilized because the sewer coverage is very small; river water has to be diverted into the trunk sewers to achieve self-cleansing velocities.

Algal blooms in the Murang'a waste stabilization ponds has affected the water quality in the outfall stream and raised an outcry from the public that draw water from the stream. It is suspected that the blooms are resulting from fertilizers carried back into the stream by irrigation water. In summary the sewerage systems in the three towns have contributed to environmental degradation.

The rest of the towns depend on on-site sanitation systems comprising mainly pit latrines, cesspits and septic tanks. Mumias has a sewerage system confined to one estate but without treatment works; only temporary ponds which discharge raw sewage into the environment. The on-site systems generally provide inadequate service especially in public places like markets, institutions and bus parks.

7.4.3 Screening and Scoping for Environmental Impact Assessment

Many guidelines have been used in Kenya for EIA but especially those of the World Bank. Often, the sponsor of a development has stipulated the standards to be met, because in the past Kenya did not have specific guidelines. However, as mentioned before, the Environmental Management and Coordination Act (1999) has set out the guidelines for EIA in its 4th Schedule. The guidelines propose the checklist method for screening and scoping for EIA.

7.5 INITIAL ENVIRONMENTAL IMPACT ASSESSMENT

While a comprehensive EIA was outside the scope of this study, the general environmental concerns and a checklist for every town have been provided. Initial EIA generally indicates that, by and large, the proposed rehabilitation project will have positive impacts by providing improved water service and

hence sanitation, reducing incidence of disease, and general improvement of the environment.

From the results of initial environmental examination, four main items of potential impacts of the proposed rehabilitation works have been identified for more comprehensive EIA study at the feasibility stage. These are:

- (i) Impacts resulting from abstraction of water from river or groundwater sources during operation.
- (ii) Impacts arising from the increase in wastewater generation that would result from the improved water supply.
- (iii) Impacts resulting from the operation and management of wastewater and sanitation facilities.
- (iv) Impacts resulting from construction activities during implementation of rehabilitation works.

However, it is envisaged that most of the project components will be of such small scale that their impacts will not be serious. Impacts arising from construction activities will mainly affect the human environment but can be minimized by proper construction methods.

CHAPTER 8 PROPOSED UTILITY MANAGEMENT PLAN

The 10 study towns visited can be grouped into three different institutional categories or groups under the Ministry of Environment and Natural Resources.

District water offices: Narok, Meru, Muranga, Wundanyi, Migori and Lamu report to the Ministry directly, Division water offices: Makindu, Webuye and Mumias are included in the respective District reporting, and Kabarnet Sub Area office reports to the Regional area office, which falls under the jurisdiction of the National Water Conservation & Pipeline Corporation, which again operates as a State Corporation under the same Parent Ministry, the Ministry of Environment and Natural Resources.

8.0. GENERAL APPROACH

The approach for the analysis of the 10 towns was to work with a comprehensive base questionnaire that covers the commercial, financial and technical aspects of a water utility system. Interviews and discussions were held with those staff members that are either in charge or responsible for certain aspects of the day-to-day operation.

For the commercialized systems in Kenya, three sample towns were chosen: Malindi which is operated under a management contract for the NWC&PC, and Nyeri and Kitale Water Company, which are operated on the basis of an agency agreement for and on behalf of the respective municipal councils. Different questionnaires were used in order to obtain information about the problems that they have experienced since commencement of their operation.

The current system of Government reporting and record keeping has made it very difficult to obtain reliable and meaningful data within the given timeframe. The prevailing situation in all systems is that details are available, but neither instantly ready, nor summed up. Consequently numerous figures had to be compiled and abstracted from various ledgers and folders, in order to draw a picture of the current situation. At system level, the consumer ledger was found to be the most resourceful book of information concerning number of accounts, their condition (metered, non-metered, active, in-active), monthly consumption, arrears and payments received. It was therefore decided to use the consumer ledger information and take a snapshot picture of the situation for the month of June 2000. Where annual figures and records were available, those were absorbed for the Financial Year 99/00 in order to calculate monthly averages for comparison with the snapshot month June 2000. To substantiate procedures in place, it was considered essential, to question the figures and details that are routinely forwarded to the Head Quarter.

As procedures do continue at Head Quarter level it was as well attempted to find out what procedures have to be undergone and is the information that is provided from Divisional or District Offices analyze in order to make planning assignments possible.

The details and procedures representing the NWC&PC area office in Kabarnet have been analyzed up to the Regional Office level only. Operational decision-making, funding and most personnel related issues are vested in the powers of the Regional Manager. Instructions and procedural requirements, retained by the Head Office or vested in the State Corporation Act, are however considered for the analysis.

8.1. EXISTING WATER SUPPLY& SANITATION SYSTEMS

8.1.0. Overview Of All Systems Visited

All records and details abstracted in or compiled for the ten towns visited, are compiled in Appendices: A3 for Narok Town, B3 for Meru Town, C3 for Muranga Town, D3 for Kabarnet Town, E3 for Makindu Town, F3 for Wundanyi Town, G3 for Migori Town, H3 for Lamu Town, I3 for Webuye Town and J3 for Mumias Town. Appendix K 3 holds questionnaires used for the commercialised systems and all summary information. Summary Table ST 8.2 contains the verified statistics for all 10 towns, using the month of June 2000 as the month for which verification could be done, based on the information abstracted from the various consumer ledgers. Comparisons between the towns are drawn from the same overview on details considered most relevant.

8.1.0.1. Utility Systems Organisation

8.1.0.1.1. Staffing:

All systems have a high number of unskilled Subordinate Staff being employed with different responsibilities. The O&M department integrates not only the source, treatment and distribution aspect of the water systems, but it is also responsible for billing and revenue collection. Within the billing and revenue collection department, majority of all staff have a technical background. Training, if offered, is within the technical field, financial or commercial training is not really considered. The staff assigned to the distribution system do as well undertake meter reading for which no schedules are available. Control over staff activities and whereabouts becomes very difficult. The number of consumer accounts per staff ranges from 23 in Migori to 135 in Mumias. Organisation Charts have been drawn for all 10 towns, based on the information collected and are to be found under the Appendix of the respective town.

The managers responsible for the various systems have no commercial or managerial, but technical background. There is no training offered to prepare officers into their managerial responsibilities, even though the assignment described in The "Schedule of Duties for the Ministry of Water Resources" – January 1999, issued by the Permanent Secretary, describes the duties of every District Water Officer as:

Representative of the MWR in the District and responsible to the PWO/Central for the following duties and responsibilities:

- Overall planning, control and management of all water related matters in the District, including financial management thereof
- Any other duties as may be assigned

8.1.0.1.2. Office Set-up, Facilities and Transport:

While some District offices have adequate space, Division offices visited are in dire need of a decent working- and consumer-receiving-environment. Hard furnishing can be termed as basic, but storage facilities for keeping and archiving documents reflect additional requirements in all places visited. Shortage of stationary or calculators is common everywhere.

The new NWC&PC office in Kabarnet has been taken over from the contractor just recently and basic requirements are still in very good condition. The transport situation of all systems visited is below requirement. Water systems that are shared with the District water operation do have the advantage that transport can at least be shared in case of an emergency. All other systems do depend on well-wishers, public transport or they walk.

8.1.0.1.3. Consumer and Meter Information:

The existing level of information concerning the status of the meters, disconnection/ re-connection or new connection statistics or their operability, must be termed as low. In a number of towns, the available though estimated figures are not diverting too much from the snapshot situation taken for the month of June 2000, but others are completely "off-track" and reflect that the value of information has to be more emphasized.

Ad hoc information was difficult to obtain anywhere. The statement that everything is available somewhere, somehow, but not in a comprehensive and meaningful format, easy to analyze, applies to all systems. As an example can be taken that the cost for maintaining a vehicle cannot be abstracted from one ledger card, but different kind of items are reflected on different ledger cards for certain expenditure categories. This means that cost determination could only be made by going through a number of ledger cards and then compiling the same information.

8.1.0.1.4. Production and Consumption:

For a number of systems, neither production nor consumption figures can be determined with certainty. Where master meters were either not working or simply lacking, pumping hours were used to calculate the production; where gravity flow does not provide meter information, the situation was on the assessment offered by the staff of the respective water system and then compared with the engineer's information. All systems operate well below their capacity, which can be related to:

- Limited use of power, because more pumping cannot be justified with equally increasing billed consumption
- Weak distribution systems, which cannot take the increased pressure and result in higher UfW
- Faulty pumps
- Reduced source capacity

To confirm consumption details is even more difficult, as the majority of consumer meters are not operational. The number of estimated accounts range from 31.19 % in Wundanyi to 99.55 % in Mumias. The verification of

consumption details was only possible for the month of June 2000, by abstracting consumer ledger information in a uniform format for all systems. While the information still reflects a number of discrepancies, it was considered the closest one can get, within the scopes and limited timeframe of the study.

While Webuye has a very high estimated number of accounts of 99.07 %, the consumption abstracted exceeds the production by more than 20 % and raises the question of: what is the assessment tool for estimating accounts, or their consumption?

8.1.0.1.5. Un-accounted for Water (UfW):

Where production and consumption details are not very reliable, the determination of UfW is difficult and equally unreliable. While most systems do fill monthly returns with arithmetical calculations on the UfW, the verified information reflects differences. Where a calculation of UfW was possible, the percentages range from 15.47% for Mumias town to 77.45% for Kabarnet town (excluding Webuye and Migori towns which reflect a higher consumption than production).

The overall calculated loss, expressed in Kenya Shillings is considerable. The verified month of June 2000 calculates for 8 out of the 10 towns, for which UfW calculation was done, a total of approximately Kshs 5,4 million per month, or extrapolated: Kshs 64,8 million per calendar year.

As the calculation is based on water lost and the average tariff calculated for every town, this calculation should serve as a guiding figure only, as the figures used for the calculation are based on the month of June 2000 information and might vary, when a deeper analysis is carried out. The loss furthermore does not yet capture the full cost of the loss, because the current tariff is taken as not cost covering.

8.1.0.1.6. Billing and Revenue Collection:

Many monthly billing records and returns were found to be estimates. Various explanations were offered, but all centered around the fact, that the information has to be monthly and manually abstracted from all consumer ledgers after the billing has been completed. The time available between completion of billing and submission of the monthly return is considered too short to complete the time consuming exercise. As monthly returns do not seem to be returned by the Head Quarter, the estimation is seen as an accepted practice. While the practice of estimation could be accepted for the given reason, the reconciliation at the end of the FY is missing, and annual details for the Head Quarter are simply wrong. Only Muranga town seems to be reporting monthly records.

The tariff increment effective November 1999 could not be seen in the estimated billing figures for most systems, neither was it apparent for some of the revenue officers, that delayed implementation of the tariff increment should be captured with a retro-active adjustment.

The issue of estimation of monthly billing returns was not applicable for Kabarnet, as the water system only obtains meter readings and the Regional Office prepares computer-generated bills. Monthly information about what was billed to the consumer should be correct.

For the verification exercise of June 2000 bills, the consultant filtered out consumers with the same actual consumption and noted, that different billing amounts seem to be calculated for the same consumption. As the majority of the billing officers do not have a calculator, this can be seen as a possible explanation for the variations. Appendix K 3 – ST 1.1 shows the analysis and reflects the situation for a few sample towns. The same bill variation seems to be the case for Kabarnet (very few cases only), explanation for which should relate to the billing program.

Revenue collection records and returns are based on records obtained from the District Commissioner's office. Only minor discrepancies were noted, which can be explained by the fact, that report preparation does not necessarily fall together with calendar end month.

The attempt, to verify consumer payments against reported revenue collection, failed. The payment situation abstracted from the consumer ledgers for the month of June 2000 was explained to reflect the situation as at 30.06.00. Unfortunately **ALL** the 9 water systems involved in the exercise, misunderstood the information requested for and reflected last payments up to December 2000.

The billing efficiency for the various towns ranges between 22.55% and 84.52%, while the collection efficiency ranges between 21.96% and 97.21%. It should be noted that Migori and Webuye have not been considered for this comparison, as their billing efficiency is exceeding 100 % and unrealistic, as consumption should not be higher than the production. The combined billing and collection efficiency ranges between 15.24% and 49.41% and is proposed to be used as one of the criteria for selecting priority projects.

Muranga is the only town where consumers voluntarily come to the DC's office to ask for the amount due for payment, which they then pay, without even having received the bill. Bills are only issued for GOK institutions, schools or companies on request.

8.1.0.1.7. Average Tariff:

The average tariff had not been calculated in any of the towns visited, because it is not required for any of the GOK returns, hence not a commonly used term. The calculation of the average tariff, where possible, was prepared for the month of June 2000. It ranges between Ksh. 12.30 and Ksh. 42.70. The low rate of Ksh. 12.30 calculated could relate to billing errors.

The June 2000 average tariff read in conjunction with the percentage of consumers billed on 10 cbm minimum charge, indicates which towns have a substantial base of minimum consumers. The minimum charged consumers range from 10.91 % in Meru to 78.14 % in Lamu. An analysis for the number of consumers falling into the various consumption brackets is commented on

in the report for the various systems and gives an indication of the revenue base and the consumer portfolio.

8.1.0.1.8. Debt Situation:

The monthly debt situation is reported to the Head Quarter, where the brought forward balances are increased by the monthly ("averaged or estimated") billed revenue less revenue collected. For all towns it was therefore found, that balances abstracted from the consumer ledgers did not correspond with the reported information. Discrepancies reflected are substantial for some towns. It can however not be established where or when those differences slipped into the system. An analysis was undertaken to split between GOK, major and minor consumers where possible. The one consumer taking the biggest share of unpaid bills in each town is the Government of Kenya. While the debt situation increases on a monthly basis, no effective measures seem to be in place to improve on the prevailing situation. Collection targets are set for the WS systems, but collection of GOK debt must be termed as very difficult and the possibility of involving the MENR Head Quarter should be considered after verification and substantiation of existing GOK debts.

The verified debt, as abstracted from the consumer ledgers, for all the towns visited amounts to: Kshs 61,899,977.00 as at the end of May 2000 and Kshs 64,678,039.00 as at the end of the Financial Year 99/00. This can be interpreted to mean that the debt outstanding increases by approximately 3 million per month for all the ten towns. Even though this information has been abstracted from the respective consumer ledgers, it must be pointed out, that a much more intensive analysis will have to be done, to confirm the collectable debt, as it includes disputed bills relating to wrong billing calculation, wrong meter reading or no water situations. The abstracted figure can however be used as an indicator. When comparing the total outstanding at the end of the Financial Year with the value of the annual water loss of approximately Kshs 64,8 million, the need for intervention concerning UfW, becomes even more apparent. Remedial efforts should concentrate and start with the attempt to reduce this aspect of water lost.

8.1.0.1.9. Funding:

Salaries, power and chemical expenses are paid through MENR Head Quarter. All other expenses at District level are funded through A.I.E. (Authority to Incur Expenses). The A.I.E. earned during the FY is not automatically the A.I.E. received. Any application pending approval at the end of the FY, is not returned for resubmission in the new year, but becomes null and void. It appears, that the 7 towns (excluding Kabarnet, Mumias and Makindu) have earned a total of Kshs 16,940,592.20 in A.I.E., but only incurred expenditure relating to the whole District can be drawn for comparison and is reflected on a system basis and where available in Summary Table ST 8.2.

The proportion between District and Division expenditure is difficult to establish. For Meru WSS the expenditure allocated to the town was achieved by applying the same percentage to the votebook expenditure, as established for the revenue collection. This allocation must however be seen as only an attempt to allocate expenditure to the town WS. Actual expenditure could only

be established, if ledger card expenditure and stock issuance records are analyzed further.

For Kabarnet, the only NWC&PC operated system, only 6 months expenditure could be obtained from the Regional Office and no direct relation between collected revenue and expenditure could be established. It is, however, understood, that the expenditure is based on the station or system requirements and the decision is made by the Regional Manager.

8.1.0.2. Utility System Procedures

Existing procedures were analyzed against the facts, figures and details obtained. Statements were questioned against the background of facts established.

8.1.0.2.1. Administration:

8.1.0.2.1.1. Staff:

No personnel management, training or recruitment procedures are in place and the approach of utilizing staff where and when needed, results in a situation of no control over staff movements. Moving the technical staff into billing and revenue, instead of recruiting qualified and trained staff for the commercial aspect of the utility operation reflects on the system efficiency. The staff morale is equally affected and the low salary structure and delayed promotions attribute to the often understandable, but "not really concerned" situation. Sanctioning within the civil service structure has not been very effective in the past. The worst to happen was a transfer with no financial repercussions. At the same time positive efforts are not appreciated which often leads to the above indifference.

The recent retrenchment exercise has however changed the prevailing opinion concerning job security. The criteria used in the recent retrenchment of staff have not been clearly understood by the staff. In a number of systems, important and knowledgeable staff members were removed from service through retrenchment.

8.1.0.2.1.2. Consumer Accounts:

Clear guidelines on new connection, dis-connection, re-connection and any other routine procedure, are not in place. Especially for cases of recently gazetted changes, the gazette notice seems not sufficiently explained with the consequence, that every system handles the issue differently. Concerning new meters, deposit levels or delayed tariff implementation, wrong implementation of the gazetted notice translates into loss of revenue. If for example the tariff adjustment information and implementation instruction reaches the systems with a certain delay, the gap between gazettement and implementation should be closed. Some systems did so; others did not.

The maintenance of consumer and connection records must be considered as vital for any utility system. All systems lack however clear guidelines and control at system level. The ever-prevailing shortage of stationery or operating material is the excuse and/or explanation for messy filing or files and books

not found or records not kept. Clear guidelines on consumer record keeping were not found and the recording varies from application form to meter reading book to consumer ledger, depending on the WS system.

8.1.0.2.1.3. Meter Reading, Billing and Revenue Collection:

Meter reading schedules and procedures are not in place and there is no control over the process, neither the staff entrusted the exercise. Wrong or no meter reading affects the billing efficiency and eventually revenue collection, as consumers dispute by simply not paying. When wrong or over estimated bills go along with no supply and service, the payment morale drops and illegal activities increase. While all District water offices have water bailiffs on their staff list, they are not used to handle cases of illegal water consumption, but only deal with water rights and granting permits for water abstraction.

All systems operated by the MENR issue manual bills and varying bill formats are used. Formats of the system have not been improved for years and some reflect for example consumption stated in gallons, while almost all consumer meters are read in cbm. This increases the risk of error calculations. Majority of consumer bills are hand delivered or collected from the water office, as no funds are available for mailing.

Systematic dis-connection and control procedures were not found to be in place. Explanations given relate always to shortage of funds and/or lacking plugging material, no transport or shortage of staff. Once an account is disconnected, the consumer retains this status, unless he comes forward to regularize his/her account. Routine checks on long dis-connected accounts, are not practiced or not really possible, because the transport or staff necessary, is not available. This fact bears a high risk of undetected illegal re-connections and contributes into the high UfV.

8.1.0.2.1.4. A.I.E. and Procurements:

An A.I.E. is calculated based on the monthly revenue collection and a certain A.I.E. percentage, determined by MENR, and varying from town to town. In the case of the towns visited, the percentage ranges between 60 % and 90 %. The basis for the different percentages could not be established.

The receipt of an A.I.E. is affected by many factors and in all cases causing delays for procurements and the day-to-day operation. Appendix K 3 – Figure 8.2 illustrates the 17 steps between revenue collected at the DC's office and the approved authority to spend. The approved A.I.E. can only be used for procurement, if the Local Purchase Order (L.P.O.) processing procedure has been complied with. Suppliers often reject to supply against an L.P.O., because the payment processing procedure is another lengthy procedure to follow. Appendix K 3 – Figure 8.3 illustrates the path a pro-forma invoice has to take, before a cheque can be issued. Supplies are limited to listed suppliers within the District and the District Tender Board has to approve such suppliers.

The issuance of a cheque to a supplier is furthermore dependant on District Office liquidity and priorities set by the District Administration. As the District Administration is not only responsible for A.I.E. of the water department, but

all the other GOK departments represented within the District, priorities might be given to other departments, depending on the situation. Collection efforts from the water department can be frustrated by such factors, which are beyond their control.

As long as quotations are obtained as required and vouchers signed by the respective signatories, decision on expenditure seems to be at the discretion of the respective District Water Officer. It must only be ensured that it can be booked against votes that have been budgeted for. Finally, the District Administration has to account for the expenditure incurred.

Transport and staff related expenditure absorbs a relatively high percentage of the approved and received A.I.E., while stationary or other inexpensive items are said to be lacking. It could not be established based on which criteria approved A.I.E. are spent and whether quotations obtained, reflect a realistic market price, when compared. The process shows that Water department requirements are not only at the discretion of the water department through its representative the District Water Officer, but mainly depend on the District Administration, which is answerable to the Office of the President and the Treasury/Ministry of Finance.

Divisional Offices are affected by the same procedure, but their requirements have to undergo an additional step in order to be incorporated into the District requirements.

The Kabarnet area office submits all its requirements through the Regional Office, which in turn still has to follow the same or similar GOK procurement procedures.

8.1.0.2.2. Operation & Maintenance:

No preventive maintenance is in place, neither are technical manuals available. There is no guidance on standards and no procedure control over quality of water. Consumer meter servicing is neither scheduled, nor controlled or guided. Master meter preventive or routine maintenance is not covered by any procedure, and servicing lacks skill and the necessary tools. While some provincial water offices do have the necessary equipment, they lack spares. The reason for all shortcomings is said to be the lack of funding.

Chronically empty stores are explained by the same lack of funding. Only Lamu town had stock balance records available, which could relate to its location and island status. In most cases it was explained that procurements mainly relate to a technical problem that has to be attended to and parts are used as soon as they are available.

The WS Operators Handbook was found in the Webuye WS system, but the available version seemed very old (without any printing date) and not reflecting any system specific information or guidance.

8.2. COMMUNITY SYSTEMS WITHIN THE EXISTING UTILITY SYSTEMS

Only three towns had community maintained systems within their supply area. Western Province, unlike any other province visited, has enjoyed massive support of community projects through Finnish Aid. Phase 1 of the KIFINCO project initiated and financed between 1981 and 1995 almost 4000 community projects. The current Phase 2 has now 4 main components under the overall objective of "increasing access to safe water for improved health and well being of the communities in Western Province, by increasing community management skills for maintenance, operation, improvement and replication of water facilities and for the protection of water resources":

- Monitoring and evaluation whether systems are functioning
- Support to those communities that approach the project and are prepared to contribute
- Provincial/District capacity building
- Water Resource Management

Implementation of new or rehabilitation projects are done through external contractors, while MENR staff is involved in the technical supervision. During Phase 1 all work was done through external staff, which led to frictions between MENR staff and those employed from outside.

Phase 2 concentrated at the onset on awareness creation amongst all District and Divisional Offices, using the ToT approach (Train the Trainer), and then involved other leaders and representatives of communities, to disseminate the new approach.

8.2.1. Makindu

There are four operational and functioning community systems within the Makindu water supply area, but information could only be obtained from three. Kikumbuli Community took over 136 accounts in 1992, because they received water from Umani Springs. No information could be obtained on how it is managed, but community members are receiving water.

AMREF financed 2 additional projects, the Kai Water Project and the Nzumi Water Project. Both systems serve approximately 7.400 people. Amref conditions were the involvement of the community in trenching and laying of the pipes and construction of the tanks. Community members were trained in the technical field and bookkeeping, and training included formulation of the By-laws.

Both systems operate smoothly and the Makindu WS system receives payment of bills promptly. Maintenance of the line is the responsibility of the community. Artisans and Kiosk attendants are from within the community and receive a salary for the work they do. The Community plans to use the money on the account for maintenance and expansion of the line.

The Mulili Water Project was financed by German Agro Action and started its operation just recently. It serves approximately 3.700 people. The approach

for the project was similar to Amref's, whereby the community is actively involved in the work during and after the completion.

Bulk supply from Makindu WSS to all communities at Kshs 15,00/cbm and no problems have been experienced so far.

8.2.2. Migori

The Nyasare Water Supply community project is registered under the Society Act and has been in operation since 1994. The project was financed by the Austrian Government and serves the rural and part of the urban population of Migori town. The community has 989 paid up members.

The management and operation of the system is paid for work done and O&M cost incurred monthly are covered out of the collected revenue. The management comprises of the Chairman, Vice chairman, Secretary, Ass. Secretary, Treasurer and Ass. Treasurer.

Since 1997, the organisation has been operating without donor funds. Even though the community faces problems in revenue collection, there are efforts to increase the tariff. The organization works closely with the District Water Officer Migori.

The community intends to come up with a Phase 2 project, to develop other water sources and the Institute for International Co-operation (Austrian Aid) is willing to assist. They have also applied to take over Migori Water Supply under the Ministry.

8.2.3. Webuye

Webuye has one community project for which no information could be obtained. The Muchi Milo Community project, initially financed by KIFINCO, is non-operational since 1995. Electrical fittings were vandalised twice, now the project seems completely stalled. KIFINCO in Kakamega had information that chairman of the project has political ambitions and is therefore suspected to have political enemies, who could be responsible for the vandalism. The new approach of KIFINCO is the "demand driven approach", i.e. communities can come for help, if they are prepared to contribute 50% into the cost.

Muchi Milo treasurer did not seem to know, neither did the Divisional Water Officer, even though KIFINCO had informed all Districts and Divisions creating awareness down to the communities through leaders and representatives. Consumers are now neither receiving water from the mains nor through the community project.

8.3. PROBLEMS AND SHORTCOMINGS OF THE EXISTING SYSTEMS

All systems visited suffer from a number of problems, which in turn lead to more shortcomings, ultimately translating into:

- Low efficiency on production,

- Limited supply situation,
- Billing below expectation, and
- Revenue collection, which cannot sustain the operation.

An assessment of the problems seen and experienced in the various systems visited is represented in the Problem-Symptom-Cause Matrix under Appendix K 3 – ST 8.3. To various degrees the systems show that neither the Head Quarter nor the water systems do know what they produce, what is in place, what is outstanding, what are the actual cost for the water production and/or what is the financial position they are in.

Community systems established with the involvement and / or contribution of the community, combined with training into the management and operation, seems more successful, than those systems that have been simply handed over to the people. This equally reflects in the second phase approach of the KIFINCO project, which is demand driven and with financial involvement of the community.

8.3.1. Division Specific Problems

Divisions operate under the District offices. The systems visited operate under even more difficult circumstances. All problems are similar to the problems experienced in the Districts, because whatever is a problem for the District results in an even bigger problem or longer delay for the Division.

The criteria for categorizing the water supply scheme offices as either Divisional or District does not relate to the population served. While Mumias is a Divisional office, with less than a decent office and the necessary skilled staff, it serves a population of 110,400; Wundanyi is a well-equipped District office and serves a population of 7,600 people. The same applies to Webuye Divisional office, serving approximately 73,000 people and lacking the absolute basics.

The Division is run with no imprest at all and the most basic requirement like making a photocopy or using public transport to visit the District office, expects the staff member to pre-finance the expense and claim it from the District in due course. Refund procedures can take weeks, even months.

8.3.2. Districts Specific Problems

The biggest problem seen at District level is the A.I.E. funding and procurement procedure. While the District Administration is involved throughout the lengthy procedures, the District Administration has to cater for all the Government Departments and does not necessarily give the Water Department priority over other Departments. Special efforts in revenue collection may result in Nil A.I.E. received, as was the case in Narok, where the approved A.I.E. came just before the end of the Financial Year and lacking liquidity at the District Administration office resulted in an approved A.I.E. but no funds. Un-utilized A.I.E can then not be carried forward into the new FY.

8.3.3. NWC&PC Area Office Specific Problems:

The area office is totally dependant on the Regional Office and faces the same problems as the Division Offices under the Districts. Decision-making does not take place on the ground and any requirement has to be organized through the Regional Office.

Recent changes turned a small imprest previously available into a NIL cash flow. The 50% of re-connection and labour charges do not seem to come forward. Even the smallest operational requirement becomes a problem. A further problem is, that billing and consumer related issues face considerable delays, as they cannot be dealt with immediately. They have to be forwarded to the Regional office and reply has to be awaited. Disputes are decided by a committee at the regional level, while the recommendation of the area manager seems to be given lesser or often no consideration.

8.4. MENR HEADQUARTER PROCEDURES, SHORTCOMINGS AND IMPEDIMENTS

Every utility system visited had the feeling that the Head Quarter receives monthly forms and returns only to file the same away. No reaction is received. Considering the meaning of reporting, facts and figures should be used for planning, control and management decisions.

As the majority of the information reflects discrepancies or plain gaps and no reaction comes from the Headquarter, it means that either the information is not used for decision-making, or the discrepancies are not seen and plans are based on wrong information.

Procedures and tangible details are more difficult to obtain at Head Quarter level than at the District. Efforts by the consultant to get clear and substantiated information, were fruitless in most cases. Similar to the record keeping at District or Division level, information is available somewhere and somehow, but the magnitude of data handled at the Head Quarter makes the search even more complicated.

8.4.1. Personnel Issues and Procedures

All Division, District and Province staff salary matters are dealt with at Head Quarter. The structure seems to be such that within the personnel department at the Head Quarter, one officer is allocated a certain number of staff numbers. Following up several personnel issues for the District, can result in having to see several officers for the same problem relating to several staff members. The attempt to obtain comprehensive remuneration details for the towns visited, failed.

8.4.2. Power

Payment of power bills from the District has been changed during the last Financial Year. The processing procedure at District level had caused a number of power accounts being cut. The current practice is, that power bills

for all water systems operated by the MENR, are paid for from the Head Quarter. If the bills are received at District level, they are passed on to Nairobi for settlement. As many bills are paid for many Districts with one payment, to find and obtain details for any particular water supply scheme requires lengthy searches. The question as to whether credits are correctly reflected on the relevant power bills, could not be established.

8.4.3. Chemicals

Sourcing and procurement for chemicals is done centrally for all the WS systems operated by MENR. The procedure involves an annual open tender, approved by the MTB (Ministerial Tender Board), followed by the CTB (Central Tender Board). While the District gave the information that chemicals have to be collected from the Nairobi Central store, the information at the Head Quarter was that chemicals are delivered to the Districts and only additional requirements over and above the planned quantity have to be collected. It remains to be analyzed, whether the centralized procurement procedure bears any price advantages over the system level procurement, as the existing system does not reflect any other advantages.

As chemical requirements are planned from the Head Quarter and information of chemicals from the Districts is in most cases based on estimated past experience, the question arises also, whether there is a realistic basis for actual chemical requirements, relating to actual production?

8.4.4. A.I.E. Issues and Procedures

The A.I.E. procedure originates from the District and has to be processed through MENR Head Quarter and Ministry of Finance/Treasury, before it can go back for further processing at the District. Appendix K3 – Figure 8.2 and Figure 8.3 reflect the whole process, which is lengthy and complicated.

8.4.5. Planning and Control

Planning is based on information about the performance of a water supply system. Indices like production-, consumption-, billing- and revenue collection-efficiency or system compiled cost, are necessary tools to control the use of chemicals, calculate a cost-covering tariff or determine the right transport requirements or staffing levels. As reported information from the water supply systems lack the correct information or if available, are not translated into an efficient Management Information System, the question arises as to: Which are the tools that the Head Quarter plan with?

While the A.I.E. process and involved procedures are lengthy and complicated, accounting for the money spent is by the District Administration to Treasury. The MENR receives only the printed information, against which votes the expenditure has been booked. The question is, whether GOK procurement procedures have been complied with, but not whether the three or five quotations obtained reflected a realistic market price, hence the whole system is more procedure than financial control.

8.5. PROVINCIAL WATER OFFICE FUNCTIONALITY

The functionality of the provincial water offices could not be clearly established. However, the schedule of duties for the Provincial Water Officer is giving the following duties and responsibilities:

- Development, maintenance, control and supervision of all Ministry's operations in the Province
- Any other duties as may be assigned.

Meetings with the district water officers, receiving donors and delegations and general co-ordination, were the comments received. While all technical and financial returns are as well copied to the Provincial Office, reminders on performance and targets do originate from the MENR Head Quarter. It therefore remains to be explored further, what role the Provincial Office plays in the context of management support, control and/or assistance, when compared with the schedule of duties? Is the Provincial Office an information and control filter for the mass of operational and financial details that are sent to the Headquarter? Is the Provincial Office used as an information dissemination medium? How is the infrastructure, which is in place at the Provincial Office, utilized?

8.6. NWC&PC SHORTCOMINGS AND IMPEDIMENTS

NWC&PC has already a partly de-centralized reporting system, as the Regional Manager only reports filtered information to Nairobi. Decision-making remains, however, an equally lengthy procedure (experienced as well, where commercialization is involved). Since NWC&PC has to comply with the normal GOK procurement procedures, only slightly modified, problems are of similar nature.

8.7. COMMERCIALISED SYSTEMS IN KENYA

The number of commercialized systems, evolving from former Government operated systems, is limited. Malindi, Nyeri and Kitale were chosen. All systems visited and analyzed are currently operated under an agency agreement. The difference in their structure is, that the agent in Malindi is a privately owned company, while the other two companies: Nyeri and Kitale are wholly owned by the former operator, with a Board of Directors representing the stakeholders of the water and sanitation system. Assets remained in all three cases with the former operator of the system.

8.7.1. Malindi: Management Contract (NWC&PC)

The Malindi Management Contract is actually an agency agreement between the National Water Conservation and Pipeline Corporation and H.P. Gauff in association with Gauff Utility Services Kenya Ltd. The Amendment to the State Corporation Act under which NWC&PC has been incorporated, gives NWC&PC the formal mandate to enter into agency agreements, which are accepted by the Attorney General.

The agreement was signed in March 2000, covering a period of 4.5 years. The company is given autonomy for the day-to-day operation and related decision making. The overall regulations guiding the NWC&PC do, however, relate as well to the agency agreement. This means that Government procurement regulations and procedures or writing off debt procedures have to be observed and complied with by the agent as well.

Appendix K 3-Q 8.6.1 reflects the interview with the representative(s) of the agent. While the Malindi agency agreement built on an earlier pilot project, where consumer account aspects, billing and revenue collection, Meter reading and O&M aspects had already been systematically taken up in the past, the new agency agreement took off with the experience gained before. The major task is to get procedures and schedules refreshed and close the information gap that was caused by a delay of almost two years between the old project and the new agreement.

As the project was only in operation for a period of 8 months by the time of the visit, comments on the self-sustainability could not be obtained yet. The initial setting up time required must be considered and self-sustainability should be looked at, at a later point in time.

8.7.2. Nyeri: NYEWASCO Private Water Company

Nyeri Water Company, NYEWASCO, operates under an agency agreement which was signed on 19th March, 1999 and amended on 7th April, 2000. The duration of the agency agreement is 20 years. The agreement is between the Municipal Council of Nyeri and the company.

A Core Management Team is in place and all other staff members were taken over. However it was said that the individual staff performance determines whether they will stay with the company. Salary increments of 15% and 7.5% have been effected since the operation started. An incentive scheme for the staff is being worked on.

Appendix K3 – Q 8.6.2 reflects the interview with the Managing Director of NYEWASCO.

8.7.3. Kitale: KIWACO Private Water Company

The Kitale Water Company operates under an agency agreement drafted, but not yet finalized or signed. The agreement is between KIWACO, the new company and the Municipal Council of Kitale.

A new Core Management Team (CMT) has been recruited and is supported by a Financial Advisor, seconded by CIM (Centre for International Migration). All other staff members were taken over from the Council Water Department, pending finalization of the agency agreement.

Day to day operation has been transferred to the agent at the beginning of the year 2000, while numerous financial issues have not yet been sorted out with the former operator and creditors of the former operator. Much of the

manager's time is therefore spent on issues relating to the past and negotiation concerning the agency agreement. The day-to-day operation is independent.

Appendix K 3 – Q8.6.3 reflects the interview with the CMT and the Financial Advisor.

8.8. PROBLEMS AND SHORTCOMINGS OF EXISTING COMMERCIALIZED SYSTEMS

The problems or impediments experienced in Malindi and adversely affecting the efficiency, can be summarized as follows:

- The line of command is too long and decision making processes take too much time and additional effort
- Government procurement procedures

The problems or impediments experienced in Nyeri seem very limited and reduced to staff related issues. All former problems, concerning interference of some Councilors with the Board, seem no longer applicable.

- Audited Accounts from the Council to start with the Opening Balance of the company are not yet available
- Not clear how consumer balances absorbed? (audited or not)
- Not clear how old creditors to be absorbed (audited or not)

The problems and impediments experienced in Kitale and adversely affecting the current operation of the company, can be summarized as follows:

- The agency agreement should be signed prior to the commencement of the new company
- Liabilities taken over from the previous operator should be reconciled and audited, to enable the company to start off with a clear picture of the Opening Balance situation
- Financial start up help should be available
- Amount or mode of lease for the assets not yet finalized
- Loan balance of assets not yet clear with the council
- Production affected, due to power on cut off, not for current but old KP&LC debt, carried forward
- Staff issues (transfer, provident fund etc) not finalized as agency agreement still pending

8.9. OPTIONS FOR VIABLE MANAGEMENT AND OPERATION

The approach for recommended changes has focussed on the intention to offer viable approaches that can be implemented within the shortest possible timeframe. Achievements should be possible, while more substantial changes touching on the institutional and legal framework are discussed, formalized or registered.

The various degrees of implementation carry the risk that other players involved in the changes do not agree to the recommended changes. To avoid this major risk, which has been experienced in the Kenyan environment, especially in the Water Sector, a gradual approach is recommended.

While the registration of a private company, Water User Association, Trust or Trust Corporation can be done within a few months, it is seen as a very time consuming and involving exercise, to prepare a detailed network condition plan, existing asset and liability information and clarify the position on the consumer accounts. The assessment, training, selection and repeat training of existing staff into a commercial environment requires "change management" in order to build capacity.

The problems caused by not having reconciled or audited data ready, when registering the "commercial" institution, can be learned from the commercialized systems currently already in operation. The preparation of these details can fall into the operation of the "commercial" institution, provided the mode of establishing and confirming the figures has been agreed upon, prior to commencement of the 'commercial' operation.

Recommended changes have been worked out in Appendix K3 – ST 8.3 and are used as the basis for further analysis, leading to the phased options, reflected in the Action Plan. Refer to Appendix K3 – ST 8.4

8.9.1. Recommended Changes within the current Institutional Framework

Recommended changes for Phase I of the Action Plan are those changes that can be implemented immediately, with the assistance of a consultant and jointly with the client MENR. All recommended changes are vested within the powers of the client.

8.9.2. Recommended Changes for a De-centralized Framework

The analysis of the current situation reflects that the centralized system under which all water systems are managed and operated, accounts for many of the impediments listed. Phase II of the Action Plan indicates, which steps are recommended to be taken.

The decentralization approach is as well seen as a step-by-step movement towards bringing the systems closer to the communities, pending a gradual approach towards Private Sector Participation. No lead model has been confirmed yet and a countrywide move can only be implemented by a gradual approach, as capacity building will be a lengthy process and not just a decision or declaration.

8.9.3. Recommended Changes for a Transition Approach

It is expected that recommended changes of Phase I will lead into and continue during Phase II and III. Any changes recommended under the institutional framework management, can build on the grass root work that

has commenced with the preparatory measures of Phase I, as they are seen as a requirement for any kind of improvement or change towards a commercialized operation.

8.10. RECOMMENDED UTILITY MANAGEMENT PLAN

No.	Action	Narok	Meru	Muranga	Kabarnet	Makindu	Wundanyi	Migori	Lamu	Webuye	Mumias	Utility Management Plan
1.	Arrange for decent office space							x		x	x	
2.	Set up organisation charts with detailed job description and skill requirements.	x	x	x	x	x	x	x	x	x	x	x
3.	Arrange for intensive management training for Engineers or recruit well-qualified managers.	x	x	x	x	x	x	x	x	x	x	
4.	Arrange for commercial and technical staff training	x	x	x	x	x	x	x	x	x	x	x
5.	Set up positive and negative staff sanctioning system.	x	x	x	x	x	x	x	x	x	x	x
6.	Limit recruitment to the system requirement, based on skill and merit.	x	x	x	x	x	x	x	x	x	x	x
7.	Prepare criteria for transport requirements based on size of system coverage, pipe network, number of consumer e.t.c.	x	x	x	x	x	x	x	x	x	x	x
8.	Redesign consumer recording and reporting formats	x	x	x	x	x	x	x	x	x	x	x
9.	Computerise consumer data base and consider billing software	x	x	x		x	x	x	x	x	x	
10.	Obtain field information from all existing consumer using the re-designed application format	x	x	x	x	x	x	x	x	x	x	
11.	Prepare implementation guidelines related to gazette notices and relating procedures	x	x	x	x	x	x	x	x	x	x	
12.	Prepare consumer and connection management guidelines	x	x	x	x	x	x	x	x	x	x	
13.	Design consumer / connection - management guidelines	x	x	x	x	x	x	x	x	x	x	
14.	Design meter reading / servicing / disconnection schedules and guidelines.	x	x	x	x	x	x	x	x	x	x	
15.	Undertake analysis to substantiate and confirm old debts	x	x	x	x	x	x	x	x	x	x	
16.	Propose write off procedure for old debtors	x	x	x	x	x	x	x	x	x	x	
17.	Recommend commercial charges and penalties	x	x	x	x	x	x	x	x	x	x	
18.	Create staff, consumer and stake holder awareness on cost of production and distribution of water	x	x	x	x	x	x	x	x	x	x	

19.	Outsource the servicing for master meters and condition future supply / tenders to procurement with service backup	x	x	x	x	x	x	x	x	x	x	
No.	Action	Narok	Meru	Muranga	Kabarnet	Makindu	Wundanyi	Migori	Lamu	Webuye	Mumias	Utility Management Plan
20.	Decentralise AIE funding and procurement procedures to system level and transfer efficient and stringent control to the provincial / regional office level	x	x	x	x	x	x	x	x	x	x	
21.	Decentralise decision making process to station level	x	x	x	x	x	x	x	x	x	x	
22.	Decentralise planning and control of cost	x	x	x	x	x	x	x	x	x	x	
23.	Design efficient and stringent control system for the provincial / regional office level (Price analyst, independent external auditors, adequate use of chemicals)	x	x	x	x	x	x	x	x	x	x	
24.	Design MIS reporting system for Povincial to HQ reporting (investment planning, policy making)	x	x	x	x	x	x	x	x	x	x	
25.	Set up stock management system and controls	x	x	x	x	x	x	x	x	x	x	
26.	Set up consumer meter workshop (with volumetric test facilities)	x	x	x	x	x	x	x	x	x	x	
27.	Prepare / update O&M guidelines / manuals	x	x	x	x	x	x	x	x	x	x	
28.	Propose outsourcing criterias for pump maintenance depending on the pump capacity.											
29.	Include consumer lines into the planned network	x	x	x	x	x	x	x	x	x	x	
30.	Clarify and document water wayleafs	x	x	x	x	x	x	x	x	x	x	
31.	Introduce retainer security on contracted civil works and quality control	x	x	x	x	x	x	x	x	x	x	

8.11. RECOMMENDED PRIORITY PROJECTS

The final choice of priority projects is recommended to be made during or as a result of the stakeholders workshop. The utility indices and figures compiled in Annex K3 – ST8.2 allow however to draw conclusions and give a basis for good comparison. There are a number of criteria offered to be used for selection e.g:

- Which town promises the fastest results?
- In which town are the highest savings expected?
- Where is the intervention most urgently needed?
- Billing and Revenue Collection Efficiency highest or lowest? or
- Which town has shown the highest effort under the prevailing circumstances?

8.12. RECOMMENDED PRIORITY MEASURES

The reduction of Un-accounted for Water (UfW) must be considered as the overall priority measure, necessary for all the systems analyzed. Un-accounted for Water is made up of:

- Physical losses in the transmission and distribution system
- Wrong meter reading and billing, and
- Water theft

For those towns where the calculation showed no UFW, the consultant is of the opinion that the information availed needs further confirmation and more detailed field investigation, because such a situation is unrealistic.

To reduce the said water losses it is therefore recommended to give the following priorities:

- 1) Full rehabilitation of the existing distribution system, including standardised meter connections,**
- 2) Replacement or repair of all faulty consumer meters,**
- 3) Setting up of a consumer data base and a reliable billing program, and**
- 4) Management and Staff Training for the relevant staff members**