



THE REPUBLIC OF UGANDA



DISTRICT STUDIES

ANNEX REPORT - VOLUME 1 (DOC. 010)

MINISTRY OF NATURAL RESOURCES

DIRECTORATE OF WATER DEVELOPMENT

1995

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UGANDA WATER ACTION PLAN

WATER RESOURCES DEVELOPMENT AND MANAGEMENT

DISTRICT STUDIES ANNEX REPORT - VOLUME 1

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Uganda Water Action Plan

Directorate of Water Development

VOLUME 1

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ANNEX 0

SYNTHESIS OF DISTRICT AND SPECIAL STUDIES

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LIST OF ABBREVIATIONS

DENRC	District Environmental and Natural Resource Committee
NGO	Non-Governmental Organization
RC	Resistance Council
WPC	Water Policy Committee

1 INTRODUCTION

1.1 Objectives of district level studies

Eight district level studies have been carried out during the Water Action Plan Phase II work. These studies had different emphasis as given below:

- district level studies in Arua, Mbale, Mbarara, Moroto and Mukono Districts focusing on identifying appropriate local water resources management levels and giving a background for outlining management procedures
- district level study in Hoima District focusing on issues regarding detailed institutional capacities for water resources management
- district level study in Kabale District focusing on the interaction between land management and water resources management
- district level study in Tororo District focusing on wetland irrigation management.

The district level studies concentrated on the identification of present and future problems and issues for which a water resources management framework was required. A further objective was to gain knowledge adequate to recommend which aspects of local water resources management can be generalized throughout the country, and which aspects are area specific. These require some adaption of the general principles for the distribution of management responsibilities between national districts and lower levels.

The general conclusions from the district visits are taken into account during the preparation of recommendations for a water resources management framework and a general synthesis is presented in the remaining part of Annex 0.

2 DISTRICT ISSUES AND PROBLEMS

2.1 General

The five districts of Arua, Mbale, Mbarara, Moroto and Mukono were found to represent a wide geographical variation as well as a wide variation in water resources issues and problems. Even within a district both geographical and water resources variations can be very large. Mukono for instance, ranges climatewise between moist sub-humid in the south to dry sub-humid in the north with rainfed agriculture as the economic base in the south and livestock rearing as the economic base in the north.

Aspects, which are emerging from the five district studies and the Hoima study and which are of general significance for the water resources management framework are summarized below under headings of water resources, consumers and water use, agencies involved in water resources management, issues, management functions and responsibilities and assessment of present management.

2.2 Water resources

The following general aspects are characterizing the water resources situation at district level in the management context:

- surface water occurs as both perennial and non-perennial streams
- the Nile and the large lakes are only economically accessible as water sources for riparian users and for large scale developers
- wetlands and their use are of special significance for the water resources
- surface water quality is generally not known, and several potential sources of pollution exist
- erosion and sedimentation are significant factors but quantitative information is lacking
- groundwater development potential is generally low but adequate for rural and small urban supplies
- groundwater quality is generally good but corrosiveness and localized high fluoride contents occurs
- variation in rainfall shows a cyclic behaviour over River Kafu catchment and there are reasons to believe that this applies to much larger areas of Uganda as well.

2.3 Consumers and water use

The common features related to consumers and their water use are summarized below seen in the district level perspective:

- rural domestic water use is dominant in most districts
- urban domestic water use is considerably less than rural domestic water use
- livestock use is significant and in some districts (for instance Moroto) dominant
- industrial consumers often have high consumption and high water pollution potential, but are localized only in a few districts outside Kampala
- irrigation water use can dominate, but scheme development depends on economics
- aquaculture in the south presents a potential risk to surface water quality
- environment and conservation set requirements to the ecosystems and the national policies may influence water use.

2.4 Agencies involved in water resources management

Throughout the districts the well established RC system with specialized sub-committees provides an important vehicle for water resources management functions. Other institutions comprise parastatals, private enterprises and development projects. In general the following institutions are found functioning:

- users committee, a sub-committee of RC 1 with responsibilities relating to the particular village water supply
- water and sanitation committee, a sub-committee of RC 3 with coordinating functions
- district water and sanitation committee, a sub-committee of RC 5 dealing with policy matters and coordination of for instance NGO implemented projects
- the district administration comprising the District Water Officer, District Medical Officer of Health, District Health Inspector, District Agriculture Officer, District Fisheries Officer, District Forest Officer and the Chiefs
- the judicial institutions engaged in conflict resolution, the RC Courts, the Magistrates Court, the Chiefs and the Elders

- donor funded water development projects which are found in all districts, playing a significant role through their major resource input
- private sector, including privately owned or operated supplies, water vendors and major consumers like breweries and sugar factories.

2.5 Issues, management functions and responsibilities

The water related key issues which are decisive for the design of the water resources management framework are either impact issues or user requirement issues. Impact issues are related to human activities affecting the water resources negatively with regard to quantity or quality. User requirement issues are appearing as a result of inadequate matching of user requirements and available water resources (quantity or quality).

The district studies revealed that in general, management functions should be available to regulate both the consumptive and non-consumptive use of surface water and groundwater. In more specific terms the following major items need to be covered by management controls:

- abstractions for domestic, industrial and livestock use and requirements from environmental protection
- impacts from sanitation, industrial discharges, cattle dips, use of fertilizers and pesticides, fish ponds and solid waste.

Wetlands, which presents unique and complex processes need controls related to cultivation, irrigation, brickmaking, fish ponds, bush fires, cattle watering and requirements from environmental protection.

It is also appearing from the district studies that regulatory controls or interventions will have to be used according to needs or the significance of the impacts or conflicts. A lean water administration is required in the present Ugandan context and decentralized decisions and actions are desirable for many reasons.

The required management functions as derived from the district studies comprise the following:

- policy making, planning and coordination
- water extraction regulation
- waste water discharge and pollution regulation
- monitoring

- enforcement
- mediation
- training and information dissemination

These functions will have to be carried out by the agencies and institutions at nation, district and community level according to the issues concerned and the capacity and capability of the particular level.

2.6 Present management

An assessment of the present water resources management in the five pilot districts supplemented by special studies in Hoima led to the following observations:

- management tools such as policies, guidelines, standards and regulations are not available
- interfaces between authorities and division of responsibilities are unclear
- shortage of qualified staff
- severe lack of resources such as finance, transport, equipment and facilities.

3 LAND AND WATER MANAGEMENT ISSUES

3.1 General

The appraisal of the interaction between land and water management are based on studies of wetland irrigation in Tororo District and landuse, soils, erosion and water use in Kabale District.

3.2 Interactions

Poor agricultural practices such as cultivation on steep slopes which are not suitable for crop production and overgrazing may lead to increased surface runoff and soil erosion and thus have a negative effect on the water resources in terms of quantity and quality, e.g.:

- transport of soil/sediment to reservoirs, intakes and pipes, causing siltation, increased turbidity and technical difficulties
- transport of nutrients and chemicals, resulting in pollution and eutrophication of surface water
- poor soil structure and decreasing infiltration rates resulting in reduced groundwater recharge and reduced flow during dry seasons
- increased peak flow during months with heavy rains

It was found that erosion hazards varied considerably geographically also within Kabale District itself. In the districts visited, where soil erosion was found to be severe, e.g. Kabale, only few soil conservation measures are practised, no comprehensive extension on soil and water conservation issues is undertaken and there is no linking of the land and water management plans and practices. The general findings are that this is, among others, due to:

- limited cross-sectoral collaboration (landuse, agriculture, soil conservation, livestock grazing, water use)
- lack of awareness among officers and extension workers about the interactions between landuse practice and water resources
- lack of awareness among farmers about the importance of soil conservation, measures and the negative effects of soil erosion on the water resources
- severe logistic constraints within most of the relevant departments.

4 WATER RESOURCES MANAGEMENT FRAMEWORK REQUIREMENTS

The district studies have clearly indicated the need for improvements in water resources management structures and frameworks at district and lower level as a basis for decentralized management. The management in the Ugandan context requires:

- completion of the enabling environment comprising policies, legislation and regulations
- strengthening and streamlining of the institutional framework including a Water Policy Committee (WPC), a District Environmental and Natural Resource Committee (DENRC) and extension and training services
- planning and prioritization capabilities based on adequate information systems, water resources assessment skills and a full set of management procedures.

The total set of conditions forming the full framework for the water resources management will have to be suitably arranged at national, district and community levels according to the principle of management at the lowest appropriate level.

ANNEX 1
DISTRICT STUDY - ARUA

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LIST OF ABBREVIATIONS

ACAV	Associazione Centro Aiuti Voluntari
AMREF	African Medical Research and Education Foundation
ATM	African Textile Mill, Mbale
BOD	Biochemical Oxygen Demand
CDO	Community Development Officer
CIDA	Canadian International Development Agency
DA	District Administrator
Danida	Danish International Development Assistance
DAO	District Agricultural Officer
DDC	District Development Committee
DES	District Executive Secretary
DHC	District Health Committee
DHEO	District Health Education Officer
DHI	District Health Inspector
DMC	District Water and Health Management Committee
DMO	District Medical Officer
DRC	District Water Engineer
DRC	District Resistance Council
DWD	Directorate of Water Development
DWO	District Water Officer
EIA	Environmental Impact Assessment
FHh	Female-headed household
HYDROMET	Hydrometeorological Survey of the Catchments of Lakes Victoria, Kyoga and Albert
IDA	International Development Agency
KDA	Karamoja Development Agency
LMNP	Lake Mburo National Park
LWF	Lutheran World Federation
MLG	Ministry of Local Government
MOH	Municipal Medical Officer
NEAP	National Environmental Action Plan
NEC	National Executive Committee of the
NGO	Non-Governmental Organization
NRM	National Resistance Movement
NWSC	National water and Sewerage Corporation
NYTIL	Nyanza Textile Industry Limited
RC	Resistance Council
RUWASA	Rural Water and Sanitation (East Uganda Project)
SCOUL	Sugar Corporation of Uganda Limited
SIDA	Swedish International Development Authority
SWIP	South-West Integrated Health and Water Programme

UNICEF	United Nations Childrens Fund
UWE	Urban Water Engineer
WAP	Water Action Plan
WATSAN	National Water and Sanitation Programme (a UNICEF programme)
WDD	Water Development Department (former name of DWD)
WFP	World Food Programme
WID	Ministry of Women in Development
WPC	Water Policy Committee

1 INTRODUCTION

1.1 Background

A first phase of the "Water Action Plan for Water Resources Development and Management" (WATER ACTION PLAN PHASE I) was prepared from February to May 1993. The major components were:

- draft water resources policy
- draft rapid water resources assessment
- draft institutional & management study
- international study

In the period from June to November 1993, follow-up work was carried out during the "Consolidation Phase I", which also comprised preparatory activities for Phase II. These activities were preliminary data collection and information gathering in five districts selected as pilot areas for studies to be undertaken under Phase II. The Consolidation Phase I activities were undertaken by the project counterpart staff.

The Project Document entitled "Water Action Plan for Water Resources Development and Management" (WATER ACTION PLAN PHASE II) describes the second phase of the project to develop a Water Action Plan for Uganda. The work on the Phase II started in November 1993. The second phase will produce among other items:

- an outline proposal for appropriate local water resources management levels based on district studies
- an outline proposal for management procedures providing the administrative machinery at national and district levels with guidelines for sustainable water resources management

District studies to support these proposals have been carried out in each of five selected pilot districts: Arua, Mbarara, Mukono, Mbale and Moroto. These studies comprise reconnaissance level evaluations of sociological and economic conditions which combine to give the background for assessments of water uses and demands. These uses and demands are compared to available water resources in terms of quantity and quality.

An unequal distribution of demands and resources leads to the identification of a number of water resource issues and cases which require management strategies and capabilities at different levels (national, district, and community). Based on the existing institutional and judicial framework, management potentials and constraints are evaluated.

1.2 District studies

The objective of the district studies is to gain knowledge adequate to recommend which aspects of local water resources management can be generalized throughout the country and which aspects are area specific and require some adaptation of the general principles. Further, the objective is to support the preparation of guiding principles for the distribution of management responsibilities between national and local levels.

The tasks undertaken in fulfilling these objectives were:

- data reviews and brief reconnaissance
- identification of water resources issues
- review of the role of formal and informal institutions in water resources management
- identification of necessary management functions
- preliminary assessment of water resources management capacity in relation to the management functions and responsibilities
- assessment of the role of women

The 5 pilot district studies were supplemented by short visits to other districts where particular issues are dominant features (wetland cultivation, aquaculture, soil erosion, etc.)

Thus, the district studies do not describe the characteristics of a district in detail, giving a comprehensive geographical profile. The focus is on management of water resources and on the issues that are related to water resources. Further, it will become apparent that it is not the intention of the studies to propose solutions, but rather to identify the present and possible problems in order to recommend a framework within which such problems can be approached.

1.3 Arua District visit

Arua District was visited by the study team during the period from 28 February to 1 March 1994. The visit started with interviews and discussions, as well as with the collection of statistics from the District Administration Headquarters in Arua Town.

After the meetings in the district centre, the team visited a number of local administration offices and sites, including:

- meetings with representatives from the town council in Arua
- meeting with representatives from CARE and Arua Diocese
- meetings at the Magistrates Court
- visits to various sites (water sources, refugee camps, etc.)

During the visit the team was accompanied by officers from the district administration, who acted as resource persons as well as guides.

The summaries and results from this district study are presented in the following chapters.

Chapter 2 summarizes in a tabular form the main characteristics of Arua District - in terms of physical features, population, economic activities, health and sanitation. The water resources, their use and availability, are described briefly in Chapter 3; while Chapter 4 gives an overview of the consumer categories, the use of water in the district, and the demands. Chapters 1 to 4 all lead up to the description of the present institutions involved in water management in Chapter 5, and to the identification of issues and management functions and levels in Chapter 6. Chapter 7 gives an assessment of the present management capacities, related to the identified management functions.

General material on, for instance, the RC system and on land tenure systems is given in appendices.

2 DISTRICT SUMMARY

Table 2.1 - Physical features of Arua District

PHYSICAL FEATURES.	
Location	Arua District is situated in the northern region of Uganda, and it borders Moyo District in the east, Nebbi District in the south, Gulu District in the southeast, Sudan in the north and Zaire in the west. (Ref. Appendix 2.1 and 2.3)
Area	7,830 km ²
Relief	The district can be divided into two zones. The highland in the west covering Vurra, Ayivu, Maracha Counties and parts of Koboko County. The Rift Valley or Nile Valley along the Albert Nile basin covering Madi-Okollo, Terego, Aringa Counties and parts of Koboko County.
Climate	<p>Rainfall: west (highland): 1250-1500 mm east: 900-1000 mm</p> <p>Arua Town average pre 1970: 1406 mm/year Max (1988-92): 1670 mm/year Min (1988-92): 1246 mm/year</p> <p>Rainy seasons March/April-June and July-November with peaks in August and October. January, June and December are the three driest months.</p> <p>Mean annual potential open water evaporation: west: 1600 east: 1800</p>
Soil	<p>West: Clay soil. Central: Sandy loam. Eastern: Sandy.</p> <p>Black cotton soil is dominant in Madi-Okollo county (in the southeastern part of the district).</p>
Landcover	<p>Forest cover: 604 km² Plantations: 722 km² The actual forest cover is probably lower than 604 km².</p> <p>Land area: 7595 km² Swamp: 218 km² Mountains: 57 km² Game reserve: 5 km²</p> <p>Arable land (estimated): 6815 km²</p>

Table 2.2 - Key population characteristics of Arua District

POPULATION	
Total	1991: 637,941 persons
Population growth	1969-1980: 2.4% per year 1980-1991: 2.7% per year Uganda 1980-1991: 2.5% per year
Population density	1980: 62 pers/km ² 1991: 84 pers/km ² Uganda 1991: 85 pers/km ² (Ref. Appendix 2.2)
Ratios	Urban pop: 26,712 pers. 4.2% Rural pop: 611,229 pers. 95.8% Uganda urban pop: 11.3% Uganda rural pop: 88.7% The total urban population might be bigger due to immigration from the rural areas. Male: 307,679 pers. Female: 330,262 pers. Sex ratio (M/F) 93.2% Uganda sex ratio(M/F) 96.5%
Ethnic groups & language	The largest population group are the Lugbara people; other smaller groups are the Alur people and the Madi people in Madi-Okollo county. The most common language is Lugbara.
Patterns of migration	Approximately 75,000 refugees have moved in from Sudan. They are settled in five transit camps in Luoara and Kei sub-counties at the border to Sudan. There are 27,000 people living in the largest camp. The total number of refugees in the area is not certain as the Sudanese men tend to return to Sudan, to fight, leaving the women and children in the camps. Refugees from transit camps in Moyo District are expected to be permanently settled in the central area of Arua District. There is migration from the rural areas to Arua Town, leading to a population increase of 7% per year in the town. Seasonal migration, from the densely populated areas in the west towards the lowland in the east, is common during the second rain (July-September).

Table 2.3 - Main economic activities in Arua District (table continues)

ECONOMIC ACTIVITIES			
Main source of income	Economic activity	Total	%
	Subsistence farming	506,113	79.9
	Commercial farming	3293	0.5
	Petty trading	23,918	3.7
	Formal trading	4125	0.7
	Cottage industry	14,255	2.3
	Property income	2254	0.4
	Employment income	57,567	9.1
	Family support	12,488	2.0
	Other	2589	0.4
	Not stated	6652	1.0
	Total	633.254	100.0
Sources of income	The vast majority of the population is dependent on subsistence farming. However, the households are normally engaged in more than one activity. E.g. approx. 45% of the population is engaged in processing of cash crops and some 10% are doing household-based cottage industry. (Ref. Appendix 2.4)		
Agriculture	<p>70.3 % of the holdings are less than one ha, and only 1.5% are larger than 5 ha. 76% of holdings are under customary tenure without individual ownership but with the right of using the land. The rest of the holdings are "kibanja" operated on freehold land. (Ref. Appendix 2.6)</p> <p>Approx. 23% of the cultivable land is under cultivation</p> <p>The agriculture in the western parts of the district (Vuria County, Ayivu County and Maracha County and parts of Koboko and Terego Counties) are dominated by the West Nile cereals-cassava-tobacco system. The major food crops are cassava, millet, sorghum, maize, cowpeas and groundnuts. The main cash crop is tobacco. Coffee is grown in suitable areas. The system is intensive and both mixed and double cropping is common. The system is claimed to lead to soil degradation (soil erosion and out flow of nutrients) and thus declining soil fertility.</p> <p>The agricultural production is limited by the climate. Simsim is grown both as a cash crop and a food crop. The most common cash crop is cotton. Other crops grown are cassava, groundnuts and cow peas.</p>		

ECONOMIC ACTIVITIES			
Livestock	Livestock type	Nos.	Households with livestock (% of total)
	Cattle	116,287	25.8
	Goats	440,429	67.8
	Sheep	103,839	20.8
	Pigs	10,832	4.6
	Chickens	934,538	70.2
	The majority of cattle (approximately 80%) are watered at surface water sources, rivers, lakes and swamps.		
Fishery and aquaculture	<p>Fishing and aquaculture are significant economic activities in the district.</p> <p>The total amount of fish caught (1993) in the River Nile was 2,500 tonnes with a value of approx. US\$2540 million</p> <p>There were 254 fish ponds, covering an area of 56 ha by the end of 1993. The stock in the ponds was 11 tonnes. The number of ponds is expected to increase to 350 by the middle of 1994.</p>		
Energy	<p>The two main sources of energy are fuelwood and charcoal.</p> <p>There is no powerplant in the district and electricity is only provided by generators.</p> <p>Fuelwood imported from Zaire is sold in the border areas.</p> <p>Charcoal is mainly produced in Koboko and Madi-Okollo.</p> <p>The processing of tobacco requires large amounts of fuelwood. However, the tobacco cooperatives are planting woodlots in order to compensate.</p>		
Trade	<p>Arua Town is a major trading centre in the area, not only for the district but also for traders from Zaire.</p>		

Table 2.4 - Key health and sanitation characteristics for Arua District

HEALTH AND SANITATION			
Most common diseases	The most common water related diseases are; diarrhoea, guinea worm, typhoid bilharzia, malaria. --- The reported incidence of guinea worm has decreased, due to increased awareness and the introduction of filters.		
Health services	Hospitals 4 Health centres 5 Dispensaries 14 Sub-dispensaries 38 Aid posts 7		
Sanitation	Type of facility	Persons served	Persons (% of total)
	Water borne, not shared	2,182	0.3
	Water borne, shared	840	0.1
	Pit latrine, not shared	223,615	35.2
	Pit latrine, shared	166,548	26.1
	None	239,182	37.5
	Other	361	0.1
	Not stated	4,526	0.7
	Total	637,254	100.0

3 WATER RESOURCES

3.1 Availability

The availability of water resources in Arua district decreases from west to east corresponding to the rainfall pattern. During the WAP Rapid Water Resources Assessment, the district was classified as moist sub-humid in the west to dry sub-humid in the east. The dividing line more or less corresponds to the north-south Rift Valley escarpment. The mean annual rainfall varies from less than 1000 mm in the Rift Valley areas in the east to more than 1400 mm in the west. The seasonal pattern of the rainfall is bimodal, with peaks between April-June and August-November. On average, rainfall is more reliable in the west than in the east, but over the past year, a decline has been reported in rainfall amounts and reliability over the entire district - with a corresponding decline in water resources availability.

The western boundary of the district corresponds to the watershed between the Congo Basin to the west and the Nile Basin to the east. Therefore, with the exception of a small northern portion of the district which drains into the White Nile in Sudan, most of the district drains into the Albert Nile to the East. At the headwaters in the west, the stream network is dense and perennial, decreasing to sluggish first order rivers in the Rift Valley areas - before joining the Albert Nile through extensive swamps.

The major tributary rivers draining the district into the Albert Nile include Rivers Ala, Ora, Anyau and Kochi. All the rivers join the Nile through extensive swamps, which extend along the entire flat shores of the Albert Nile. The major swamps include Waka and Balala.

Based on historical data up to 1979, the flow characteristics of the rivers are as follows:

Table 3.1 - River flow characteristics

National Station No.	River	Period	Area	Monthly flow (m ³ /s)			
				Max.	Mean	Min	1:5 Year Low
87310	Albert Nile	1955-78		3029.2	1217.3	483.0	498.260
87303	Ora	1962-79	1750	35.60	11.04	2.3	0.005
87306	Anayu	1964-78	749	42.93	6.44	0.32	0.350
87302	Ala	1965-78	306	69.55	4.17	0.02	0.226

The average annual runoff in the district is therefore estimated at 300 mm/year and the one in five year minimum flow varies between 0.05 to 0.5 l/s/km² from east to west.

Due to the high and reliable rainfall and the local topography, shallow groundwater potential, especially springs, in the western part of the district seems to be high - Ayivu, Vurra, Maracha and Koboko. However, in the flat plains of the Rift Valley area (Terego, Madi-Okollo and Aringa) there is limited to nil spring/shallow well potential.

With respect to deep groundwater potential, the western part corresponding to the plateau is covered by the basement complex with an estimated yield of 3 m³/hr. In the lower plains, the major formation is an alluvial deposit of recent age. Large areas of these deposits are underlain by clays or diatomite, and borehole yield is reportedly low. However, coarse sediments exist along the Nile - e.g. from Rigbo to Panyigoro - and groundwater potential should be reasonable. Yields of up to 20m³/hr have been recorded. Generally, the area has not been properly explored and data on aquifer characteristics is lacking.

3.2 Water quality

The quality of groundwater in Arua can be considered suitable for domestic use except in the Rift Valley areas where the water is reportedly saline - possibly due to restricted groundwater movement and low rainfall/high evaporation. In general, the water quality is not being monitored, nor is water quality analysis done as routine before commissioning a new source.

With respect to surface water quality, this is not documented - but the following observations have been made:

- due to the low coverage of safe water supply (40%) there is high reliance on surface water for diverse uses, including domestic use, for which the quality is not suitable - which leads to a high incidence of water borne diseases
- comparatively high sediment loads in the rivers and streams due to a high rate of deforestation, mainly to open up areas for cultivation - and to provide fuel wood for tobacco curing, especially in Terego, Maracha, Ayivu and parts of Vurra
- use of fertilisers for tobacco possibly causing contamination problems - not only of surface water but also of groundwater
- surface water used for domestic purposes is not boiled due to lack of fuelwood and awareness

In Arua town, the solid waste and excreta disposal system is poor. The bucket system is used in the town centre, and the excreta is dumped on open ground.

Finally, the Albert Nile - a main source of fish in the district - is infested with water hyacinth. The water hyacinth creates serious water quality problems for the water intake for Arua. The water below the plant cover becomes devoid of oxygen and hydrogen sulphide is released from the bottom sediment, making the water unfit for consumption.

4 CONSUMER CATEGORIES, WATER USES AND DEMANDS

4.1 General

The major consumptive demands in Arua District are for domestic water supply (rural and urban) and livestock water supply. The main non-consumptive demand is for aquaculture and fisheries.

4.2. Rural domestic water use

Approximately 75% of the total population (urban and rural) depend on open water sources, such as open wells, rivers, lakes and impounded reservoirs. Thus, most of the population in Arua have no access to safe water sources. Particularly in the mid-east part of the district (Bileafe, Rigbo, Rhino Camp and Ogoko sub-counties) the domestic use of surface water is causing serious health problems, because of the abundance of Guinea Worm.

The settlement pattern follows the availability of water. The highest population density is found in the western part of the district where a relatively higher rainfall is reflected in the occurrence of a number of springs and streams. The average walking distance to a water source is generally 2-4 km. There are spatial and seasonal variations to the accessibility of water in the district. The maximum walking distance in Madi-Okello, Terego and Aringa Counties is 7 km. The walking distances increase during the dry season when open water sources dry out.

Table 4.1 - Water source use (1991 Census figures)

SOURCE	NOS. OF PEOPLE	% OF TOTAL POPULATION
Piped water inside	1,643	0.2
Piped water outside	2,041	0.3
Borehole	55,045	8.7
Protected well/spring	89,118	14.1
Open well/spring	318,197	50.2
Stream/river	150,755	23.9
Lake/pond/dam	13,040	2.1
Other	10	0.0
Not stated	3,405	0.5
Total	633,254	100.0

The in-migration of approximately 75,000 refugees from Sudan has created an increased demand for domestic water supply in the sub-counties of Ludara and Kei. The refugee camps have therefore been prioritized by CARE, which recently has drilled five boreholes in the area. Otherwise, the camps are served from surface water sources - the supply being managed by the Red Cross. The in-migration of refugees is likely to continue as long as the civil unrest in Sudan remains. A planned resettlement scheme for Sudanese refugees, now living in Moyo District, to the central area of Arua District will increase the demand for water in the central area.

4.3 Urban domestic water use

According to the 1991 Census, 27,000 people are living in urban areas in Arua District. This figure is likely to be higher now, and the district administration has estimated the total population in Arua town to be 40,000 people. The population in Arua town increases by 5-10% per year.

The main sources for domestic water use in Arua town comprise approximately 20 boreholes and a number of protected and unprotected springs. A piped water system is run by DWD, but it is often out of operation due to lack of diesel for the pumps at the water works. A number of boreholes have been taken over by individuals: the so-called "blockers". The blockers are charging the borehole users 100 US\$. per jerrycan. This has led to physical struggles between users and blockers. According to the RC 5 Secretary for Women, no authorities have yet been able to solve these disputes. On the other hand, the blockers are maintaining the boreholes in order to secure their source of income.

Approximately 75% of the population in Arua Town are buying water during the dry season.

4.4 Livestock water consumption

The water demand for 116,000 head of cattle (all of indigenous breed), 440,000 goats and 104,000 sheep is mainly met from surface water sources. During the dry season, the livestock daily move up to 15 km to the water sources.

Table 4.2 Number of cattle by water source (Agricultural Census)

	BOREHOLES	VALLEY DAMS	SWAMPS	WELL/ SPRINGS	RIVER/ LAKE	TOTAL
No.	359	643	27555	20965	66573	116288
% of total	0.3	0.6	23.7	18	57.2	100
Tot.consump. m ³ /y	3276	5867	251439	191306	607479	1061128

4.5 Water for agriculture

Agriculture is rainfed and the cultivation pattern is influenced by the rainfall pattern in the district. Coffee is grown in the rainy highland in the western part of the district, while cotton is grown on the drier plains in the east. No significant irrigation is practised in the district

4.6 Aquaculture and fisheries

Fishing and aquaculture are significant economic activities in the district.

The total amount of fish caught in the River Nile was 2,500 tonnes in 1993, with a value of US\$2,540 million.

The same year, there were 254 fish ponds in the district, covering an area of 56 ha. The stock (mainly Tilapia) in the ponds was 11 tonnes. The number of ponds is expected to increase to 350 by the middle of 1994. The ponds are mainly abstracting water from streams and rivers.

4.7 Environmental requirements

Basically, the environmental requirement is the need to maintain the natural resources, including land and water ecosystems - and, thereby, also the original diversity of plant and animal species.

Arua District has experienced an increasing deforestation due to an extensive use of firewood for curing tobacco leaves, and the river flows are claimed to have decreased during the same period. Today, the tobacco corporation increasingly uses planted eucalyptus trees for this purpose. However, the wood balance is still negative.

5 AGENCIES INVOLVED IN WATER RESOURCES MANAGEMENT

5.1 Introduction

This chapter identifies the institutions involved in the management of water resources in Arua District, and it describes their present functions. In this context, the term "institution" should be taken to have a broad meaning: it includes any formal or informal agency which does, or might, make decisions related to water resources.

In the following sections, an attempt has been made to distinguish between institutions involved in policy making, administration, enforcement, and conflict resolution - even though these functions are not always clearly separated in the present system. In subsequent sections, other types of institutions which play a role in water management are identified: parastatals, development projects, private enterprises, etc. Finally, there is a commentary on the role of the Ministry of Women in Development, Culture and Youth.

5.2 Water committees

5.2.1 Users Committee - RC 1

Two responsible residents living near to a source are charged with day-to-day running of the utility (borehole, spring, well, etc) These two are members of a larger Users Committee but with specific assignments - for example, keeping order at collection points and collecting money. The Users Committee acts as a sub committee of the RC 1 Council, partly responsible to the RC 1 Executive Committee. The committee is also responsible for health, water and community mobilization.

5.2.2 District Steering Committee (DSC)

This committee acts as a policy organ drawing out broader district programmes and giving direction to the District Management Committee. It is composed of the Central Government Representative (formerly DA), the District Executive Secretary (DES) as secretary, RC 5 as chairman, the National Programme coordinators (DWD, MLG, MOH, Com.Dev: etc). The committee meets every three months.

5.2.3 District Health and Water Management Committee (DMC)

This committee is responsible for the implementation of policies formulated by the DSC. It is composed by the DES as Chairman, DHI as Secretary, DWO, DMO, a representative of the Ministry of Women in Development (WID) and representatives from NGOs. It meets once a month.

5.3 District administration

Arua is one of ten pilot districts where the decentralization policy - the devolution of powers and functions from central government - is currently being implemented. The departments of central government operating at local level have thus become constituent units of the District Resistance Council. They operate under the control and supervision of the DES, who, as head of administration, is now responsible for their performance.

5.3.1 District Water Officer

The key functions of water resources management in the district are performed by the District Water Officer (DWO). The formal duties of the DWO include:

- identifying water projects
- making demand forecasts
- collecting hydrological data
- siting and drilling boreholes
- protecting springs
- promoting an extension service related to operation and maintenance
- collecting and analysing data on water quality
- preparing a district water budget
- supervising the implementation of water schemes (with or without consultants or contractors)
- supervising NGO water programmes
- monitoring and evaluating water programmes

In Arua District, the responsibility for urban and rural water supply is divided between the Urban Water Engineer (UWE) and the DWO. Until recently, both officers were representatives of DWD. However now they are becoming constituent units of the DRC, and they will operate under the DES, to whom they will report on a day-to-day basis.

5.3.2 District Medical Officer

The DMO is the main district health programme manager. He is the Community-Based Health Coordinator, the technical advisor for health; he trains extension workers, prepares progress reports and handles supplies and finance. All the sub-county health committees report to him through the District Health Inspector.

At present, the DMO is also carrying out the duties of the Municipal Medical Officer of Health (MOH), as this post is not filled. The role of the MOH is parallel to the DMO. The MOH handles public health aspects within the municipality, such as the inspection of all industries and he issues annual licences according to the Public Health Act. He plays an advisory and inspecting role for DWD (on treatment processes, pipeline leakages etc.). The MOH uses the Government Chemist in Kampala (Ministry of Internal Affairs) to monitor effluent quality, food standards and water supply.

5.3.3 District Health Inspector

The office of the District Health Inspector is directly responsible to the DMO. The Health Inspectors perform a number of functions in relation to rural water development: the formation of water and sanitation committees, identification and protection of springs and shallow wells, training and equipping of implementation staff. The health inspectors and health assistants are supposed to operate on county and sub-county level. However, the number of staff does not match the number of counties and sub-counties - there are 6 health inspectors to 7 counties and 18 health assistants to 33 sub-counties. The number of staff on lower levels is generally insufficient.

5.3.4 Natural Resources Officer

This officer represents and coordinates the functions of the three directorates of Water, Forestry and Environment which, on a national basis, come under the Ministry of Natural Resources.

5.3.5 District Fisheries Officer

The District Fisheries Officer is in charge of all fisheries activities, including aquaculture and fishing on the River Nile. He manages all the landing sites. There is one Fisheries Officer 3, Assistant Fisheries Officers and 7 Fisheries Assistants.

The officers issue permits, collect government revenue at landing sites, control the size of the fish caught (regulate net size and fishing methods) and prosecute those who violate the Fisheries and Crocodile Act.

5.3.6 District Forest Officer

The major activities under the Forest Office include establishing boundaries of forest reserves, mobilising and training people from selected pilot parishes in agricultural practices and tree planting (woodlots) at the household level. There are at least two forest rangers in each county as extension staff.

5.3.7 Chiefs

A key feature of the Local Government Administration is a hierarchy of salaried officers, the Chiefs, who administer well established units, such as: the Saza Chief at county level, the Gombolola Chief at sub-county level, the Muluka Chief at the parish level and the Mutongole Chief at the sub-parish level. These levels correspond to the RC 4, RC 3, RC 2 and RC 1 levels. The office holders need not be residents of the particular area. In addition to collecting government revenue, the chiefs are instrumental in keeping law and order - by controlling the local police. In this respect, they are essentially an arm of central government. They also have an important role in mobilising community participation. Furthermore, the chiefs are involved in conflict resolution - as discussed in Sub-section 5.4.3.

5.4 Judicial institutions

There are a number of complementary institutions engaged in conflict resolution at various levels. These are: the RC Courts, the Magistrates Courts, the Chiefs and the Elders.

5.4.1 The RC Courts

The extent of judicial power for the Resistance Council Courts has been clearly defined by the Resistance Committees (Judicial Powers) Statute, 1987. This statute establishes the RCs as Courts and outlines their proceedings. Civil disputes governed by customary law that can be handled by the RC Courts include water and land disputes relating to customary tenure. RC Courts help to settle disputes on any violation of local by-laws or offence to traditional ethics - with regard to water and land management. Such disputes could relate to trespassing, for example, access to domestic and livestock water points, and livestock watering at water sources on privately owned lands. (Ref. Appendix 5.1).

5.4.2 Magistrates Courts

Magistrates Courts exist at sub-county level (Grade II), at the district level (Grade I). Some cases go direct to the Magistrates Courts; others are referred from RC 3 Courts - for example, cases of trespassing, land ownership, assaults at watering points. Most of the

water-related conflicts are solved at RC 3 or lower levels - very few reach the Magistrates Courts. Most cases referred to these courts are land related. In civil cases, people can chose to have their case tried at the Magistrates Court directly, without passing through the RC court system.

5.4.3 Chiefs

The Local Administration's Chiefs play an important part in conflict resolution over matters related to the management of water and land. Matters such as:

- being in arrears or refusing to pay debts (water contributions, by-laws)
- refusing to construct pit latrines (for improved common environmental sanitation)
- causing land problems (squatting, trespassing, blocking access to water sources, etc.)
- breaking by-laws regulating water use

Decisions of the Chiefs do not need the backing of a committee consensus, but they often consult with or refer to the RC Committees - particularly when more facts or evidence are required. This joint consultation is regarded as a kind of appeal court, whose legitimacy is upheld and whose decisions are more respected than those arrived at by either of the institutions alone.

5.4.4 The role of the Elders

The role of Elders and traditional cultural heads is important in Arua District. Their power is deeply embedded in local beliefs and traditional practices that quite clearly legitimize their involvement in the arbitration of disputes. The elders also function as useful mobilisers and opinion leaders through whom programmes can be channelled. Clan elders also play a significant role in the arbitration of disputes - particularly related to land ownership - before they are forwarded to RC or Magistrates Courts, where the elders again appear as witnesses.

5.5 Water development projects

Much of the water supply planning and management - and, thus, to a certain degree also the water resources management - in Arua is influenced by a number of development projects implemented by NGOs. There are 34 NGOs operating in the district, out of which 5 are developing water and sanitation projects. Several of the other projects are related to water - projects on health, refugees, social services, environment, industry, community mobilization, animal husbandry and fisheries.

5.5.1 Associazione Centro Aiuti Volontari (ACAV)

The Italian NGO, ACAV, began its activities in Arua in 1990. The objectives of the project in which they are presently engaged are:

- drilling of boreholes and installation of handpumps in order to secure safe water for domestic consumption
- training of local technicians
- formation of local committees for maintenance and management of boreholes and pumps

5.5.2 CARE

CARE operate a drilling programme with the goal of constructing 100 boreholes in two years, in areas with a high incidence of Guinea Worm. The areas are chosen by the DMO/DHI. The Water and Sanitation Programme (WATSAN), funded by UNICEF, is handling the community mobilization.

5.5.3 WATSAN (Water and Sanitation)

This UNICEF-funded programme is in its initial stage in Arua. The objectives are to protect springs and wells, rehabilitate old boreholes, and community mobilization.

5.5.4 Arua Diocese

Arua Diocese is supervising and providing the running costs for the Spring Protection Programme implemented under the Public Health Committee. The Public Health Committee is formed by the Catholic Secretariat. UNICEF supplies materials, while the communities contribute labour. 120 springs have been protected within a 3 1/2 year period.

Source committees are formed after one day's training. However, this has proved to be too short a time, and the committees are not functional. Extension staff from other programmes and departments are not effectively involved in the programme.

5.6 The private sector

The major private water users are the fish farmers. Aquaculture is an expanding enterprise in Arua District. At present, the water management (diversion and discharge) is unregulated and in the hands of the fish farmers. The role of the government, through the District Fisheries Officer and DAO is basically advisory.

5.7 Traditional structures

The new systems of managing domestic water sources through committees do, in fact, draw on some long established practices. In traditional societies, it was common, for example, to appoint a caretaker who lived near the source - though sometimes the responsibility was handed down within certain families, through the generations.

Heads of households used to take great pride in protecting ancestral wells - some of which had been a clan responsibility for centuries. Sometimes they imposed a ban on cutting trees near these wells, for example. Occasionally, these traditional taboos run counter to the modern processes protecting the wells or springs. There are some customary concepts regarding ownership, access to and control of communal water sources and swamps, that impinge on current objectives of water resource management. One is that water is a "God given gift", to which everybody has a right - irrespective of where it is located or who developed it. This perception cuts across the notion that water is an economic good - which should be utilized in a most careful and economic manner.

5.8 Ministry of Women In Development, Culture and Youth

The Ministry has seconded staff to districts and sub-counties with the purposes of stimulating women's participation in the management of development activities.

The involvement of women in point water source management is not well established in Arua. However, each point water source under the various NGO projects has one woman and one man as caretakers. In the RC system, each executive committee has one guaranteed post of Secretary for Women. The remaining eight posts are equally open to men and women. So far, however, most executive posts are held by men.

In spite of the opportunities recently made available to the women of Arua, many of them, even if duly elected, choose not to take up the challenge. Some of the reasons that have been put forward to explain this reluctance are:

- lack of support from other women
- lack of adequate formal education
- family responsibilities
- shyness
- lack of management experience
- lack of support from men

6 ISSUES, MANAGEMENT FUNCTIONS AND RESPONSIBILITIES

6.1 Introduction

Based on the findings from the visits to the districts a number of water related key issues have been identified. The issues fall into two categories:

- impact issues
- user requirement issues

The impact issues are derived from human activities affecting the water resources negatively with regard to quantity or quality. The negative effects can either concern other direct uses or relate to environmental degradation.

The user requirement issues are derived from inadequate matching of user requirements and the available water resources (quantity and/or quality).

Such situations require interventions, based on rational decisions and operational management functions, in order to obtain a stable and sustainable beneficial use of the water resource. The process is shown in Fig 6.1 below.

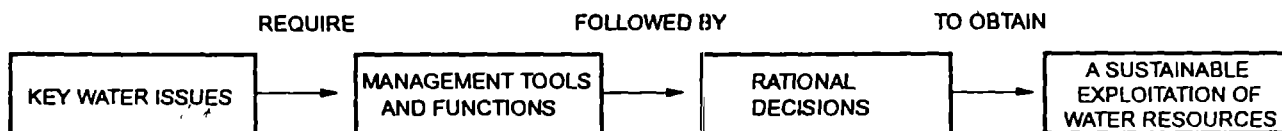


Figure 6.1 - Water resources issues management process

The present chapter describes the issues that have been identified as well as the rationale behind the selection. Management functions necessary to approach and tackle the issues, and tools for intervention in the district is also briefly described here.

The identified issues have been grouped under the following headings:

- surface water quantity
- surface water quality
- groundwater quantity
- groundwater quality

The issues identified may not all be perceived by the district population as being critical issues for which interventions are required. Some of the problems, for instance those related to water quality and environment, are in many cases not possible to observe directly but require specialized investigations for exact identification and description. They can, however, be just as potentially damaging as those which are obvious to the observer.

An overview of the issues identified in the general district context is given in Fig 6.2, while details of issues are given in the tables below. For each issue identified the rationale behind its inclusion as an issue is given. Further, a tentative listing of management functions necessary to approach the issue is given and finally the functions are distributed as responsibilities at different management levels (national, district or community level).

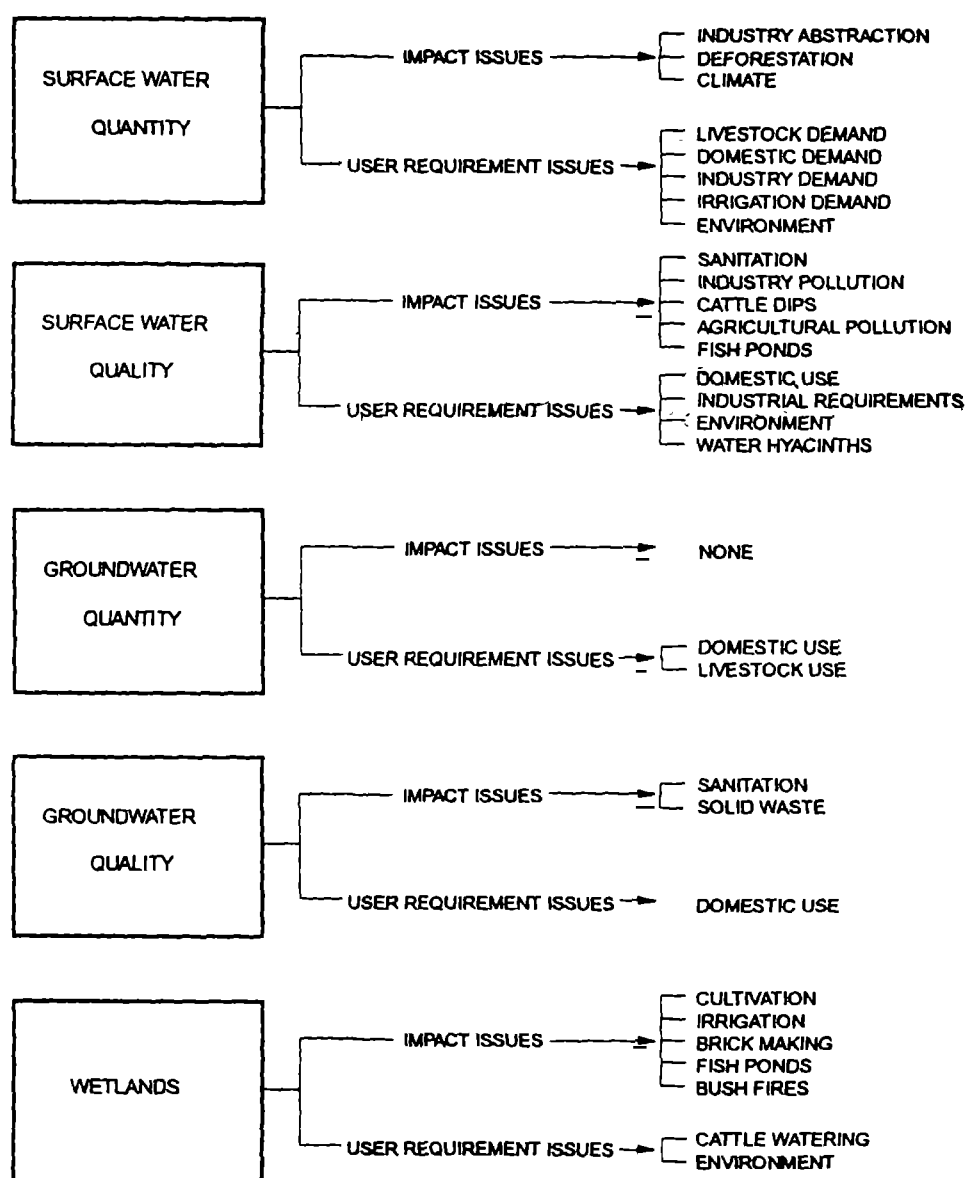


Figure 6.2 - Overview of general district issues

Table 6.1 - Surface water quantity

SURFACE WATER QUANTITY (Arua)			
IMPACT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Deforestation	Deforestation due to cultivation and collection of fuelwood for curing tobacco is claimed to reduce minimum flow in streams (documentation needed)	Regulatory control of gathering of fuelwood and felling, incentives for use of alternative fuels (Eucalyptus; biomass briquettes, kerosene), declaration of forest reserves, legal means of intervention.	NATIONAL: Framework for regulatory control of biomass use, declaration of forest reserves, legal means of intervention. Promotion of soil and water conservation measures and sound agricultural practices DISTRICT: By-laws and incentives for use of alternative fuels COMMUNITY: Incentives and awareness raising, by-laws and community self-control
USER REQUIREMENT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	
Environment	Reduction of minimum flows in rivers and streams affects the gradient from perennial-intermittent-ephemeral streams (from south to north of the district) and thereby the ecological base conditions for plant and animal life	Environmental policy and operational strategies, environmental impact assessments, ecological monitoring and regulatory means of intervention	NATIONAL: Environmental policy and strategies, legal intervention framework, major EIAs DISTRICT: Ecological monitoring, impact assessments, by-laws COMMUNITY: Environmental awareness

Note: District means District Administration or Town Administration

Table 6.2 - Surface water quality

SURFACE WATER QUALITY (Arua)			
IMPACT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	
Sanitation	Low sanitation levels in areas near the rivers and ponds increase the risk of spreading water borne diseases due to the multi-use of these surface water resources	Increased awareness on sanitation, education within health and hygiene, promotion of pit latrine construction and use.	NATIONAL: Policy and strategy for sanitation DISTRICT: Latrine promotion, hygiene and sanitation education COMMUNITY: Construction and increased awareness about benefits of latrines
Agricultural pollution	No precise estimate of the use of agrochemicals has been obtained for the district. However, the tobacco plantations are run with use of fertilizers and pesticides which to some extent reach the drainage system.	Regulations on acceptable pesticide types, education on application methods, timing and amounts in order to minimize waste and thus impacts on surface water, efficient fertilizer use (amounts, timing, methods)	NATIONAL: Regulation and control of import of pesticides DISTRICT: Extension/education on efficient and proper handling of pesticides and fertilizers COMMUNITY: Awareness of efficient and proper handling of fertilizers/pesticides
Fish ponds	Arua has more than 250 fish ponds, and this activity is increasing. The ponds take in water from streams and rivers, and from time to time they are flushed releasing settled organic material to the receiving waters.	Regulations for flushing procedures and assessment of trade-offs between stream water quality and fish production	NATIONAL: Policy and strategy for development of fish ponds DISTRICT: Permits for water abstraction for ponds and impact assessments in case of intensive aquaculture COMMUNITY: Awareness of possible environmental impacts of fish pond operation.
USER REQUIREMENT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Domestic use	Due to scarcity of developed ground water sources in Arua district, more than 25 % of households depend on surface water for consumption (rivers and ponds). No direct monitoring of the surface water quality actually takes place, but it is well known that the quality of these sources often is questionable for drinking purposes. Often the source used for drinking water is also used for wastes, washing, cattle watering etc.	Coordination between upstream/downstream riparian use and enforcement of regulations and standards for effluents. Monitoring and control. Effluent permits based on environmental impact assessments and legal means of intervention are also required.	NATIONAL: Effluent standards and wastewater regulations, legal means of enforcement DISTRICT: Planning of water intake and wastewater discharge locations, monitoring and control. COMMUNITY: Awareness of water quality of sources
Environment	Pollution and nutrient enrichment from eg. use of fertilizers causes (besides direct unsuitability for users) also ecological changes of the aquatic environment.	Management requires environmental policy and operational strategies, environmental impact assessments, ecological monitoring and regulatory means of intervention.	NATIONAL: Environmental policy and strategies. Legal intervention framework. EIAs for major projects. DISTRICT: Ecological monitoring. Impact assessment, by-laws. COMMUNITY: Environmental awareness.

SURFACE WATER QUALITY (Arua)

USER REQUIREMENT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Water hyacinth	<p>During the last 5 years the Lake Victoria and Lake Kyoga systems have been infested by the non-native water hyacinth <u>Eichornia</u>. This floating weed proliferates fast and has now reached a level where large areas of the water surface periodically is totally covered. This infestation adds another dimension to the eutrophication phenomena since nutrient loadings (nitrogen and phosphorus) are rapidly converted into huge amounts of biomass. In Arua, direct impacts from this infestation is oxygen depletion (and release of hydrogen sulphide) below the vegetation mats (making the water unsuitable for drinking) as well as severe obstruction of navigation on the river.</p>	<p>Management strategies are not yet available for East Africa conditions and only pilot tests aiming at restricting the growth of the water hyacinth have been made.</p>	<p>NATIONAL: Eradication policy, strategy and actions coordinated internationally with upstream countries DISTRICT: Support to national actions COMMUNITY: None</p>

Table 6.3 - Groundwater quantity

GROUND WATER QUANTITY (Arua)			
IMPACT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
None			
USER REQUIREMENT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Domestic use	The domestic use of ground water in Arua District is mainly limited by the progress of development of single sources (boreholes, protected springs etc.).	Demand driven planning of source development consistent with overall national policies. Management of maintenance aspects requires action at consumer group level, intermediate level and district level.	NATIONAL: Source development policy and strategies DISTRICT: Promotion of demand driven source development COMMUNITY: Participation

Table 6.4 - Groundwater quality

GROUND WATER QUALITY (Arua)			
IMPACT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Sanitation	Location of pit latrines near water sources such as springs and wells impose risk of faecal contamination of the source, resulting in increased risk for spreading of diseases	Development of standards for location of latrines in relation to sources, adequate technical guidance for borehole and well construction and creation of awareness of sound hygiene and sanitation practices near boreholes and wells	NATIONAL: Standards for latrine construction DISTRICT: Enforcement of standards COMMUNITY: Awareness of sound hygienic behaviour near water points
Solid waste??	In the Arua Town the collection systems for solid wastes is not very developed. However there is a risk of contamination of the groundwater sources locally near dump sites.	Clear definition of institutional responsibility, guidelines for environmental assessment of solid waste disposal sites, regulatory means of rejecting proposed sites and guidelines for operation of solid waste deposits.	NATIONAL: Solid waste policy, strategy, allocation of institutional responsibility, guidelines for planning, design and O & M. DISTRICT: Site selection and EIA COMMUNITY: Awareness of need for solid waste management at household level.
USER REQUIREMENT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Domestic Use	In general the basic quality of the ground water resources in the district is adequate. However, a high number of non-protected springs and open wells are used.	Monitoring of groundwater quality and enforcement of standards by closure of boreholes with substandard water quality	NATIONAL: Drinking water standards with appropriate flexibility DISTRICT: Groundwater quality monitoring COMMUNITY: Awareness of sound hygienic behaviour near water points

7 ASSESSMENT OF PRESENT MANAGEMENT

The existing institutions for district and community management were described briefly in Chapter 5, and the water resources issues and their related management functions were identified as they appeared in Arua District in Chapter 6. In the following tables, water resources management in the district will be assessed with respect to significant potentials, as well as constraints, within the existing management system at district level.

The management functions are divided into three categories according to the character of the issues to be dealt with. These are:

- management issues concerning geographically localized water resources problems with relatively simple responsibility relations and management functions
- management issues concerning geographically scattered water resources problems (or causes) with unclear definitions of responsibility and complex cause/effect relationships
- management issues concerning the availability of water compared with the demand. The related management functions mainly include prioritization of funds to be used in water development projects.

It should be noted, however, that the major constraint affecting all the water management functions is financial. There are at present severe constraints on both national and district finances, with very few funds available for development purposes.

7.1 Geographically localized water resources issues

Table 7.1 - Water extraction for aquaculture

MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS
Policy formulation for local water extraction	Political system in place (RC councils and water committees) Water Officer and Fishery Officer in position as advisors	National water resources policy framework not in place Lack of guidelines for policy making
Monitoring of surface water quantities	Water Officer in position	No formulated monitoring strategy. No engineer level staff (hydrology). No extension staff. No monitoring equipment. Inadequate transport. Inadequate budget for monitoring costs.

MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS
Technical assessment of requirements and impacts	Water Officer in position	No guidelines for impact assessment. No engineer level staff. No environmental impact assessment expertise. Inadequate transport. Inadequate budget.
Issuing permits	Administrative system operational in district and municipalities. Water Officer in position	
Control of fulfilment of permit conditions	Water Officer in position	No engineer level staff. No monitoring equipment. Inadequate transport. Inadequate budget. Inadequate authority of DWO.
Enforcement of permit conditions	Court system (magistrate), police etc. functioning	No specific legislation. Public and political pressure

Table 7.2 - Wastewater from aquaculture

MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS
Policy formulation for local water pollution	Political system in place (RC councils and water committees) Water Officer and Health Inspector in position	National water resources/environmental policy framework not in place Lack of local standards
Monitoring of surface water quality	Water Officer in position	No formulated monitoring strategy. Inadequate knowledge on surface water quality. No qualified staff to dedicate for WQ monitoring. No monitoring equipment. Inadequate transport. Inadequate budget for monitoring costs. Very limited access to laboratory facilities - no test kits
Technical assessment of requirements and impacts	Water Officer in position	Low theoretical knowledge on WQ impact assessment. No guidelines for impact assessment. No national or local standards limited budgets.
Issuing permits	Administrative system operational in district and municipalities	No
Control of fulfilment of permit conditions	Water Officer in position	No formulated control strategy. Low knowledge on surface water quality. No qualified staff to dedicate to WQ discharge control. No monitoring equipment. Inadequate transport. Low budget for running costs. Very limited access to laboratory facilities.
Enforcement of permit conditions	Court system (magistrate), police etc. functioning	Lack of specific legislation. Unclear responsibilities towards third parties

7.2 Geographically scattered water resources issues

Table 7.3 - Adverse impacts on hydrological regime

Management functions for:		Decreased minimum flow in rivers caused by deforestation (cultivation, collection of fuelwood for tobacco processing)	
MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS	
Local policy formulation and regulations for deforestation	Political system in place (RC councils) Forestry Officer and Agricultural Officer in position for advice	National water resources/environment/forestry policy framework not in place Lack of guidelines for local policy making No Environment Officer	
Cross-sectorial coordination between water, agriculture and forestry incl. technical assessments of agriculture and forestry development related to impact on the water resources	Water Officer in position Agricultural Officer (incl. extension service) in position. Forestry Officer in position (incl. extension service) District Development Committee in place District Extension Coordinator for Agriculture, Forestry and Fisheries in place	Low theoretical knowledge on water resources impacts from agriculture forestry activities Lack of formalised coordination regarding water aspects of agriculture/forestry projects	
Incentives for alternative agricultural practices and efficient use of wood fuel	District development Officer (incl. extension service) in position Forestry Officer (incl. extension service) in position. Agricultural Officer (incl. extension service) in position RC's and Chiefs in place (as mobilizers)	Processing of tobacco is a major income generating activity Land ownership, land rights and land use policies need adjustment Low public awareness	
Enforcement of regulations	Forestry police, Chiefs and local police in place. Court system functioning (RC and Magistrates).	Lack of specific legislation	

Table 7.4 - Agrochemical pollution

MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS
Registration of types and quantities	Agricultural Officer (incl. extension service) in position	
Extension/education on efficient use and proper handling of pesticides and fertilizers.	Agricultural officer (incl. extension service) and Health Inspector (incl. extension service) in position	Lack of regulation and control of import of pesticides at the national level.
Environmental monitoring	Agricultural officer (incl. extension service), Water Officer and Health Inspector (incl. extension service) in position	No formulated monitoring strategy. Inadequate knowledge of agrochemical impact on the environment. No qualified staff to dedicate to monitoring. No monitoring equipment. Inadequate transport. Inadequate budget for monitoring costs. Very limited access to laboratory facilities.

Table 7.5 - Sanitation impacts

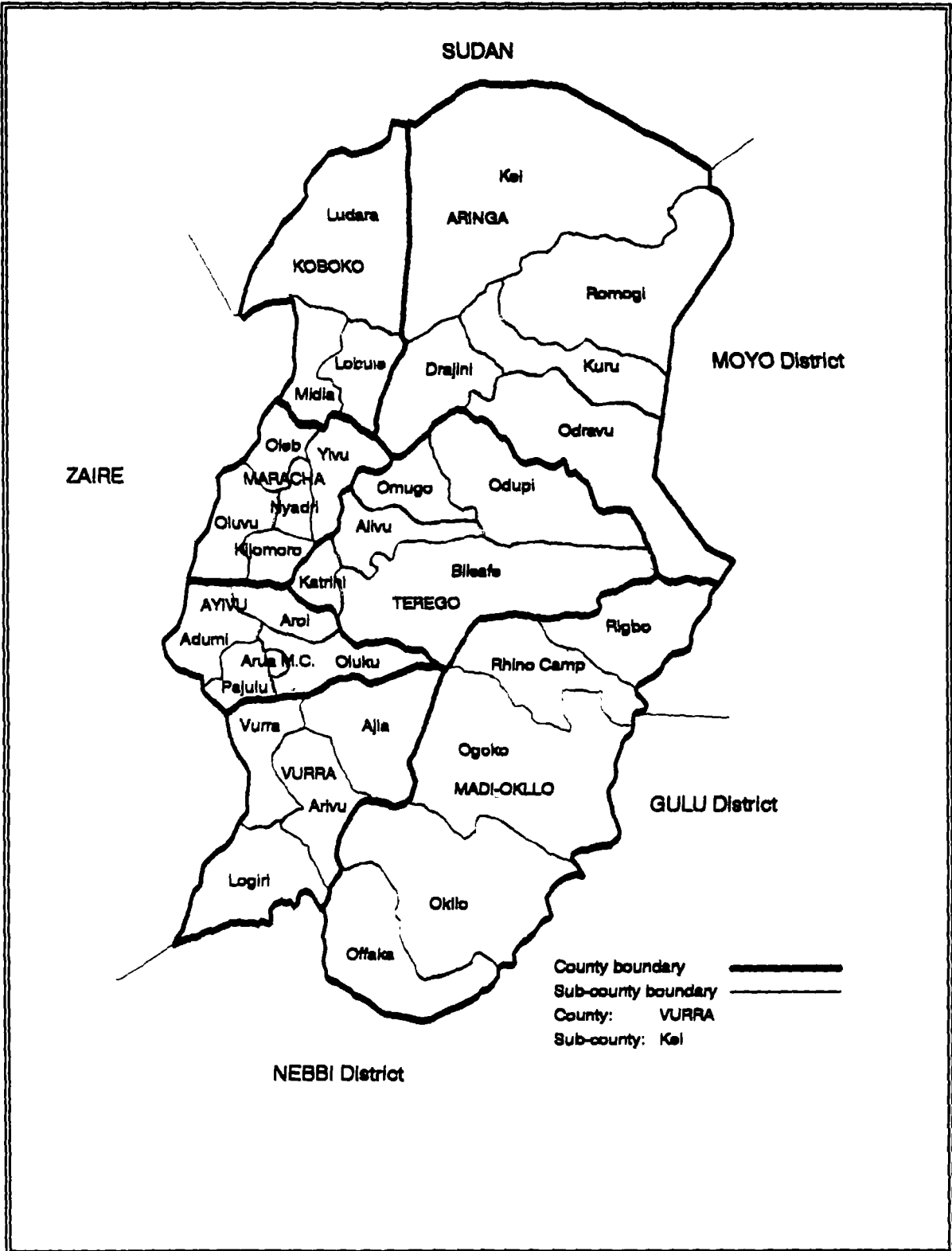
MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS
Management functions for: Local contamination of surface and groundwater due to low sanitation levels		
Latrine promotion, hygiene and sanitation education.	Health Inspector (incl. extension service in position). CARE and ACAV projects in operation	Funding. Lack of awareness. Local beliefs and taboos. Soil conditions

7.3 Issues concerning availability of water compared with demand

Table 7.6 - Demand/supply imbalance

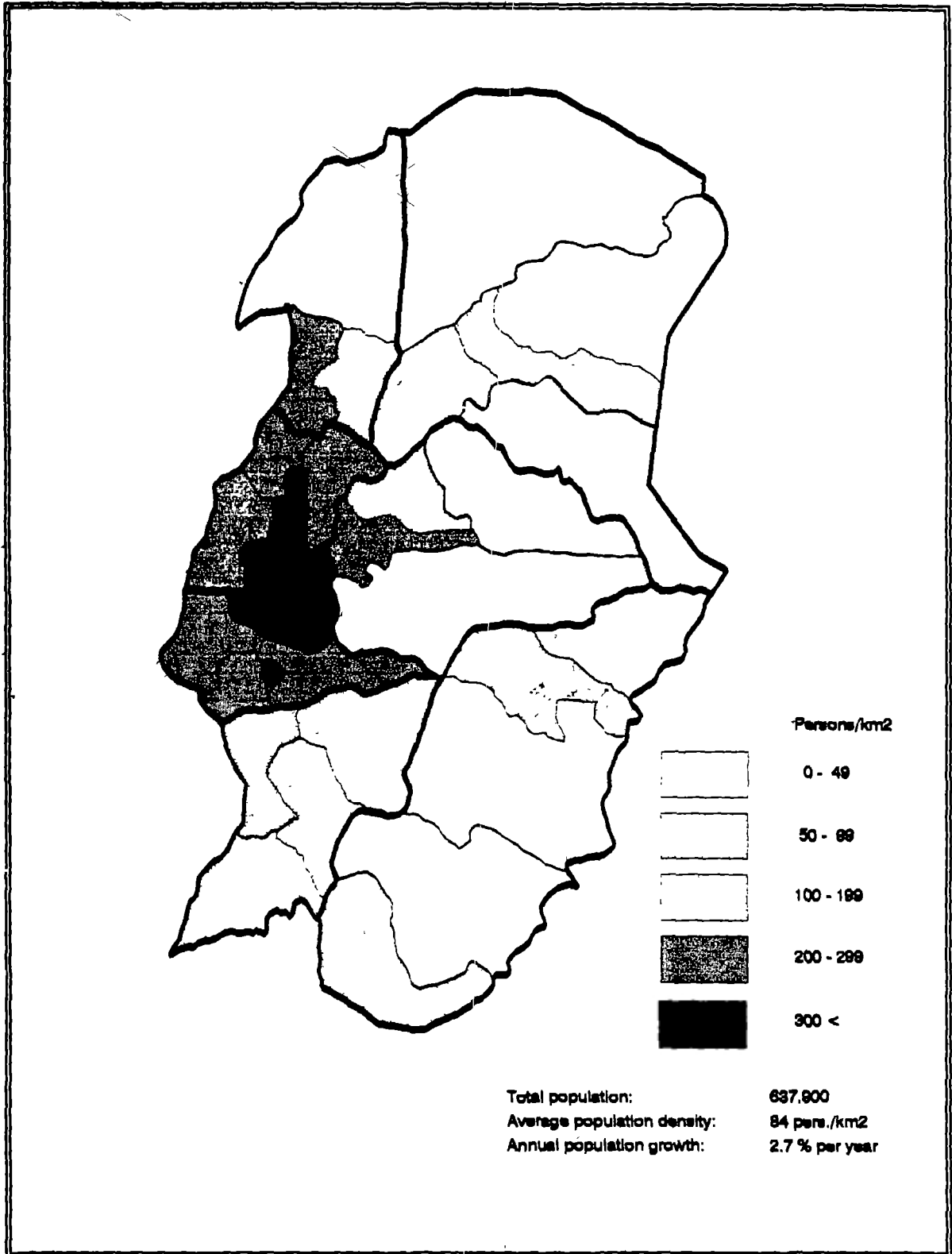
Management functions for:		Scarcity of safe water sources
MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS
Assessment of quantity and quality incl. spatial distribution of water sources and resources	Water Officer, Community Development Officer; Health Inspector (incl. extension service) in place. RC's and water committees in place. CARE and ACAV projects operating.	Limited capacity Inadequate transport Limited budgets
Policy/prioritization of development of domestic/livestock water supply	Political system in place (RC councils, water committees and District Development Committee) assisted by Water Officer, Health Inspector, Veterinary Officer and Chiefs. CARE and ACAV in operation	Weak coordination of priorities between DWD, District and projects. High demand. Local customs (cattle before people). Unwillingness to pay for O&M
Development	Water Officer, Water committees, and CARE and ACAV projects in place	Relatively limited funds. Remoteness. Limited availability of equipment.

Arua District

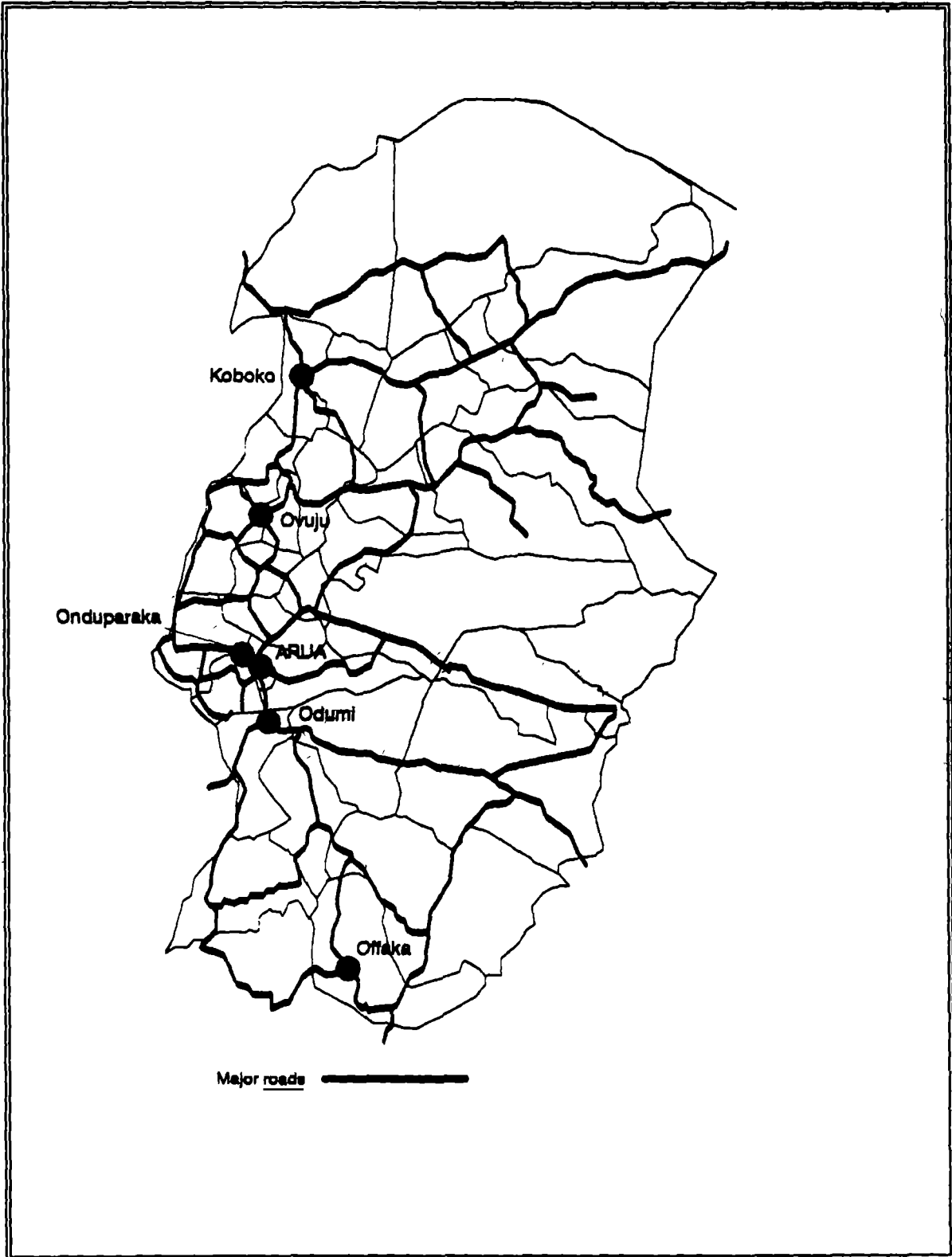


APPENDIX 2.2

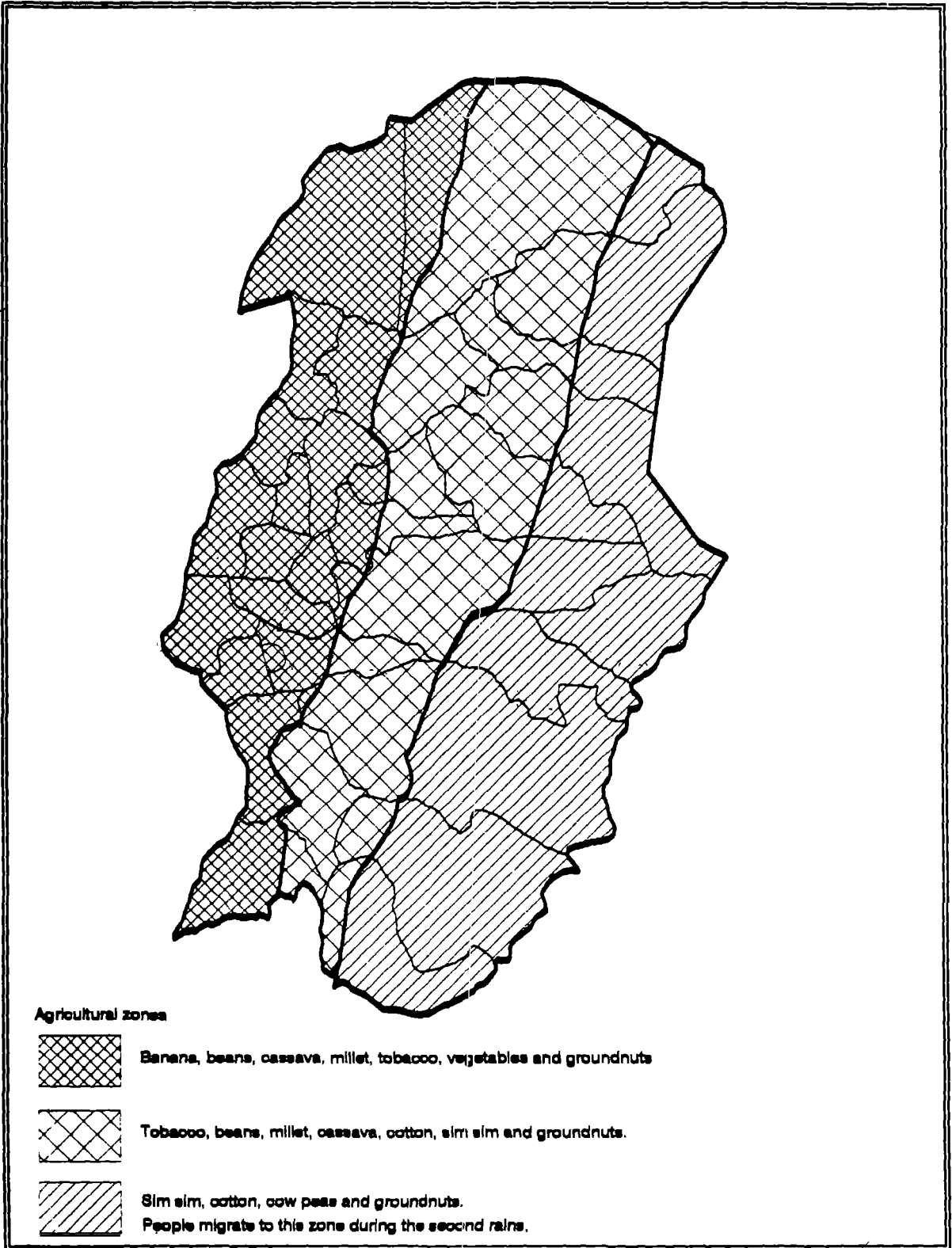
Population density



Infrastructure



Economic activities



1 GENERAL

The present land tenure situation in Uganda is a complex of various co-existing pre-colonial, colonial and post-colonial land tenure systems and land reforms. There are, also, some significant differences between what the law dictates and what goes on in practice.

2 LAND TENURE LAW

The 1975 Land Reform Decree No. 3 declared all land in Uganda to be public land - to be administrated by the Uganda Land Commission. All individual holdings were supposed to be converted into leaseholds. The lease period was meant to be 99 years for individuals and 199 years for public bodies. The 1975 Land Reform Decree No. 3 is the binding law on land tenure. However, various pre-colonial and colonial systems are still followed, both by the land administrators and by the landowners. These systems are:

- customary tenure
- mailo land
- freehold
- leasehold

3 CUSTOMARY LAND TENURE

These systems are pre-colonial, and they are the most widespread in the country. Specific regulations vary, of course, with each ethnic group and with certain localities. However, two major types of customary land tenure systems can be identified:

- specific permanent single holdings
- communal land with non-permanent holdings

The practice of having specific permanent single holdings is predominant in the southern and the eastern parts of Uganda. Each family has its own plot where it lives and cultivates the land. The head of the household decides on the use and transferability of the land. Access to land is gained through inheritance.

Communal land with non-permanent holdings is most common in the northern part of the country, but is also found in rangeland areas of the southern districts (Mbarara, Mubenda, Kiboga, Luwero, Rakai, Mukono, and Kamuli) and in the Lake Albert flats. Most of the traditional cattle are kept on communally held land. Where arable agriculture is dominant, areas of land are set aside for communal grazing and specific plots are allocated to families for homesteads and cultivation. There is no permanency in the system. Land is only retained as long as it is in use. The male elders decide who shall use a particular piece of land. Customary holders do not have any formal legal rights to the land according to the 1975 Land Reform Decree No.3.

4 MAILO LAND

The "mailo" system originates from the Buganda Agreement of 1900 between the Kabaka and the Protectorate Government. The Buganda land was divided between the Protectorate Government (Crown land and later public land) on the one hand and the Kabaka and his family and chiefs (mailo land) on the other. The mailo land was parcelled out into private and official estates. Later on, the land was surveyed and titles were given to the recipients. Customary holders became tenants of the mailo land owners. These tenants were required to pay mailo landlords for the use of the land. The system was officially abolished in 1967, and mailo land transformed into public land. In reality, the private mailo land remained as before. However, some of the mailo land has been transformed into leaseholds.

The mailo land owner enjoys full right of ownership and use of his land. Government has no access to mailo land, except in an advisory capacity. However, the mailo land owner is limited in his use of certain economic resources (minerals, for example) on his land. Government reserves the use of such to itself.

5 FREEHOLD

The term "freehold" refers to land owned by private individuals or organizations in perpetuity. By the Toro and Ankole Agreement of 1901, and the Bunyoro Agreement of 1933, the kings and their chiefs were granted land either as private or official estates. The rights to important resources remained with the Protectorate Government. Peasants on the land were transformed to tenants.

Another type of freehold land is crown land sold for development purposes. These freeholds were subject to development conditions and could be forfeited to the Colonial Governor if conditions remained unfulfilled. The 1969 Public Lands Act vested former Crown land occupied for Government purposes in the Uganda Land Commission as freehold. Crown land formerly occupied by public bodies was also vested in those bodies as freehold.

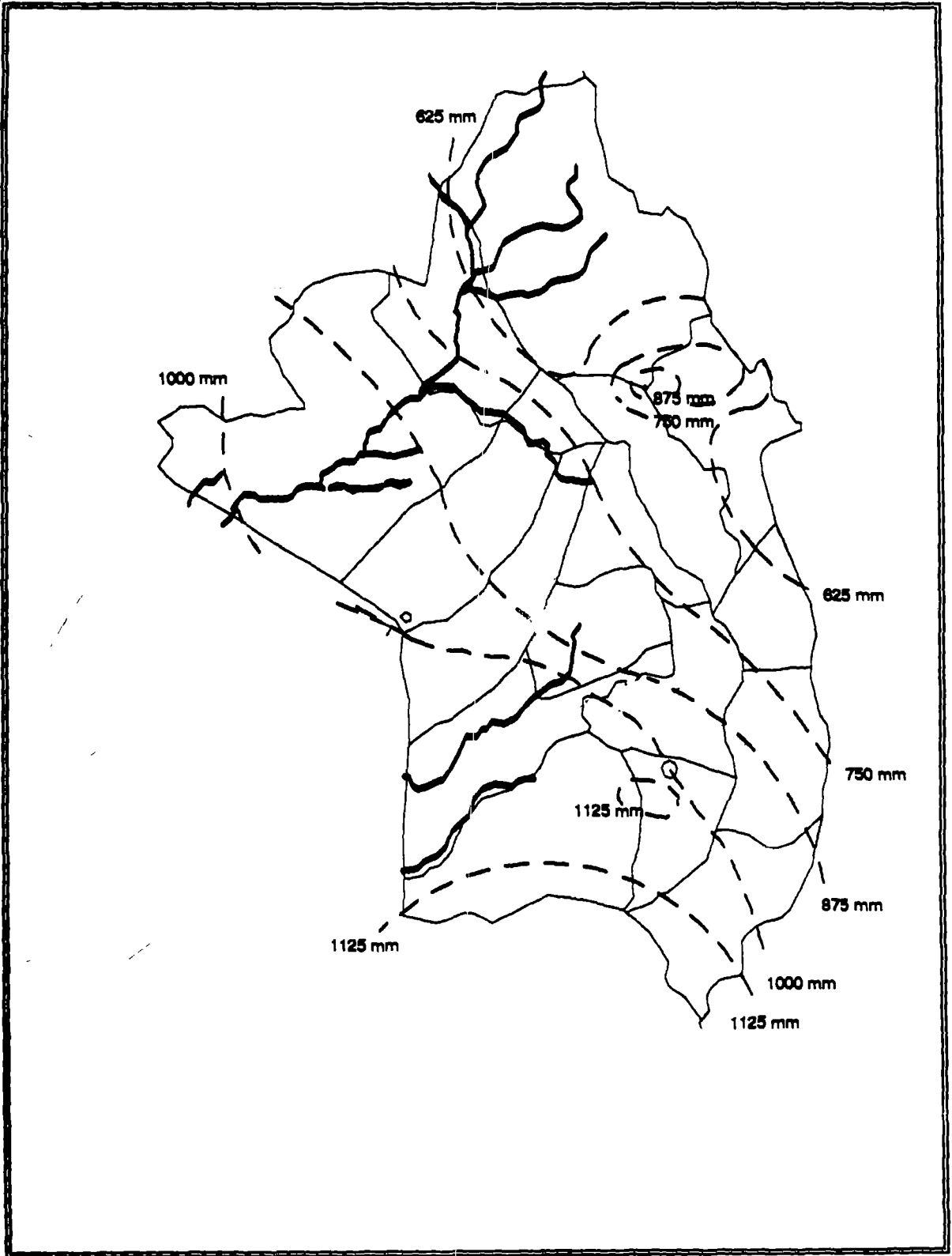
The leasehold system is based on an agreement (lease title) between the lessor (usually the Government) and the lessee (a developer). Land is leased out for development. It is more common in urban areas than in rural areas. The system originates from the 1975 Land Reform Decree.

There are three ways to obtain a lease:

- from the Uganda Land Commission
- from an urban authority on behalf of Uganda Land Commission
- from a private individual outside Government as a private lease.

Land gazetted for a specific purpose (eg. a forest reserve) cannot be leased. The Minister's approval is required for lands exceeding 200 ha or 500 acres.

Hydrology



1 GENERAL

The most distinctive and vital feature of politics in Uganda is the hierarchial system of Resistance Councils and Committees. This RC system was originally set up in the bush by the National Resistance Movement (NRM) during the civil war. The purpose then was to maintain links with the civilian population; after 1986 it has become the main mechanism through which local grievances can be expressed and officials, at all levels, can keep contact with the public.

2 THE RC STRUCTURES

2.1 Local level

All adults (those of 18 years and more) in a village or a sub-ward constitute the RC 1. The members of the Council elect the nine member RC 1 Executive Committee.

RC 1 committee members within a parish or a ward compose the RC 2, which elects the nine member RC 2 Executive Committee. The RC 3 at sub-county or town level is composed of members of the RC 2 committees. The members of the RC 3 elect the RC 3 Executive Committee. The process is continued at county or municipality level, the RC 4. (But the RC 4 is generally not active except in municipalities.) The RC 5, at district level, consists of two elected representatives from each RC 3 and one elected female representative from each RC 4. The RC 5 elects an Executive Committee from among its own members.

Each RC Executive Committee consists of a Chairman, Vice chairman, Secretary - and Secretaries for Finance, Security, Youth, Women, Information, Mobilization and Education. The total number of committee members in Uganda is over 350,000. The committees are elected every second year.

2.2 National level

The membership of the National Resistance Council is as shown in the following table.

Table 1.1 - Composition of the National Resistance Council

THE NATIONAL RESISTANCE COUNCIL	
NO. OF REPRESENTATIVES	ORIGIN OF REPRESENTATIVES
	The historical members (constituted in the bush during the resistance war)
1 from each county	Representatives elected from every county, by councillors of all RC 3 (sub-county) councils
10	The National Resistance Army (NRA)
1 from each district	Female representatives elected from every district by councillors of the RC 5 (District)
5	Youth representatives elected from the National Youth Organisation.
3	Workers' representatives, representing all the workers elected by the National Workers' Organisation
20	Presidential nominees
1 from each Division of Kampala	Representatives from each Division of the city of Kampala, elected by councillors of all wards in the division
1 from each municipality (2 from Jinja)	Representatives from each municipality

Policy is formally made by the National Executive Committee of the National Resistance Movement. The NEC comprises:

- the historical members of the NRC
- one representative from each district elected by the NRC, from among the RC 5 representatives.
- ten presidential nominees, from among the members of NRC.

3 POWERS AND RESPONSIBILITIES

The NRM has always tended to increase the authority of the RCs. They have been given powers to hear domestic and land disputes, try minor misdemeanours, maintain law and order, develop and maintain infrastructure. And they are encouraged to set up local defence units. All levels of the RC system can pass by-laws. The RC 3 and RC 5 have been given corporate legal status, so they can engage in economic as well as political activities (which means that they are entitled to sell services in competition with the private sector). They are also used as implementing agencies by donors and NGOs. In performing their judicial, service delivery and development roles, the RCs coexist with the administrative system.

3.1 RC Courts

Resistance Committee Courts are courts established by the Resistance Committee (Judicial Powers) Statute of 1988. The RC Courts comprise the nine members of the RC Executive Committee. RC Courts exist at RC 1, RC 2 and RC 3 levels.

The jurisdiction of the RC Courts is within civil cases and customary law. They are supposed to deal with cases concerning, for example, debts, contracts, trespass, land disputes relating to customary tenure, marital disputes. The RC Courts have no powers to try criminal cases, though they may arrest an offender and hand the offender to the police. Every suit should be instituted in a court within the local limits. Where a defendant objects to the jurisdiction of the court, the case should, if the objection is upheld, be referred to a higher court.

Court proceedings are held in an open place, where members of the public can enter and listen to the proceedings. Every question arising before court should be determined by consensus; in default of a consensus, it is determined by a majority vote of the members sitting - provided that, where decisions are made by voting, the chairman does not have an original vote, but, in cases of equal votes, he has a casting vote.

In cases of infringement of by-laws, the RC Court can impose a fine or any other penalty authorised by the particular by-law. All cases brought before the RC 1 Court have rights of appeal to RC 2 and RC 3 levels. If a case is not settled satisfactory at the RC 3 level, it can, in certain circumstances, be brought to the Magistrates Court, Grade I.

3.2 Water committees

Initially, the RC system did not contain any special institutional arrangements for the management of water resources. Now, however, there are many groups and committees set up for the management of water sources and facilities.

3.2.1 RC 1 Village Water Committees.

Two responsible residents in the village, a man and a woman, living near the water source (borehole, spring, well, etc.) are charged with the responsibility for the day-to-day care of the utility. These two belong to a larger "Users' Committee", but they have specific assignments, such as keeping order at the point source and collecting users' fees. The Users' Committee acts as a sub-committee of the Village Water Committee within the RC 1, and it is responsible to the RC 1 Committee. The caretakers should normally report to the RC 1 Committee. In areas where the RUWASA project is operating, the Users Committees are permitted to report directly to the RC 3 Water and Health Committees.

3.2.2 RC 3 Sub-county Water and Sanitation Committees:

These are sub-committees of the RC 3, in charge of water and sanitation. Their main functions are to coordinate and supervise the work of the Users Committees - to receive progress reports from these committees and to take appropriate action. They can organize meetings for disseminating information to the community or for training committee members and water facility attendants.

3.2.3 RC 5 District Water and Sanitation Committees.

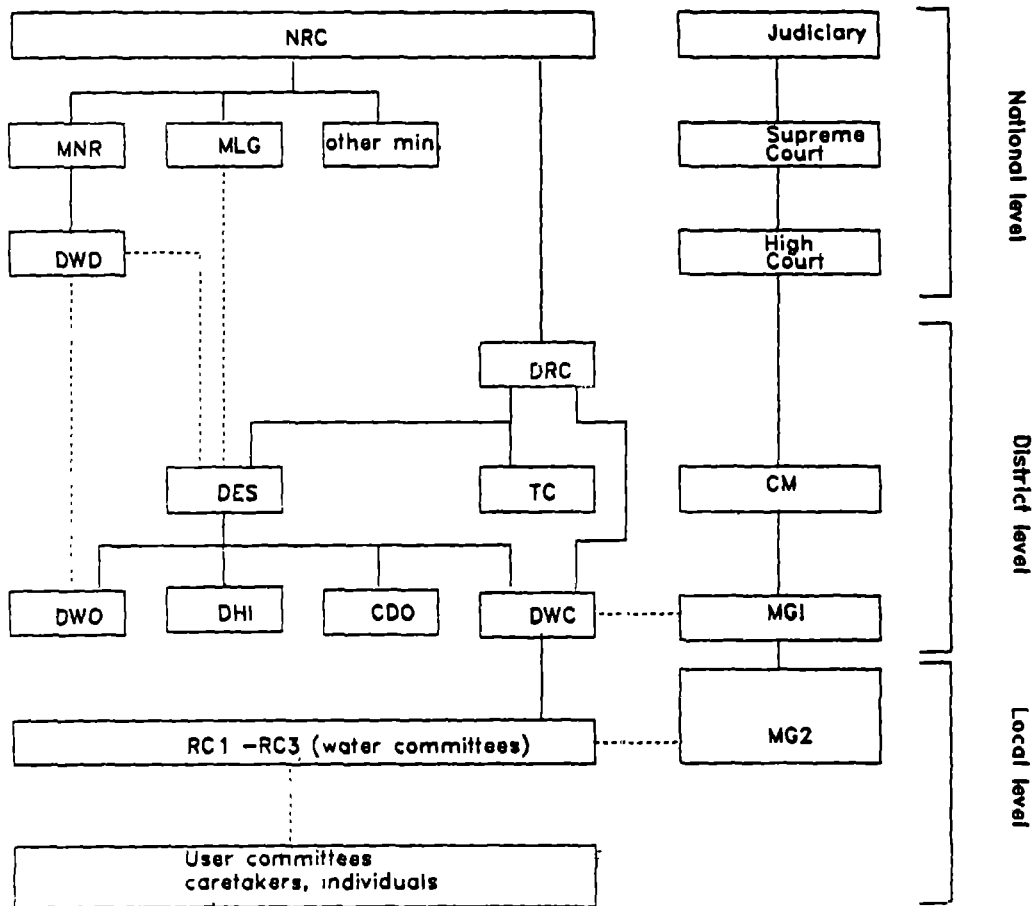
These committees are sub-committees of the District Resistance Councils charged with the overall policy formulation and guidance in matters relating to water supply and sanitation within the district. They register, monitor and coordinate NGOs who are active in the water and health sector. They report to the RC 5, which, as the district parliament, debates policies, designs strategies, passes budgets and approves programmes.

4 LINKS TO THE ADMINISTRATIVE SYSTEM

The RC system has always co-existed with the administrative system, but, sometimes, there have been uncertainties concerning the demarcation of tasks. The ongoing decentralization programme is expected to eliminate any such "boundary" issues.

The Resistance Councils have acted as legislative bodies, while the Local Government Administrations have assumed the executive role. Now, the Chairman of the RC 5 will replace the appointed DA as the political head of the district. All locally-based Ministry staff will become accountable to the DES, who is the administrative head of the district - responsible to the Council rather than to the Ministry of Local Government. The DA remains, but becomes a "Representative of the Central Government" - with a responsibility for overall security and defence.

Administrative levels



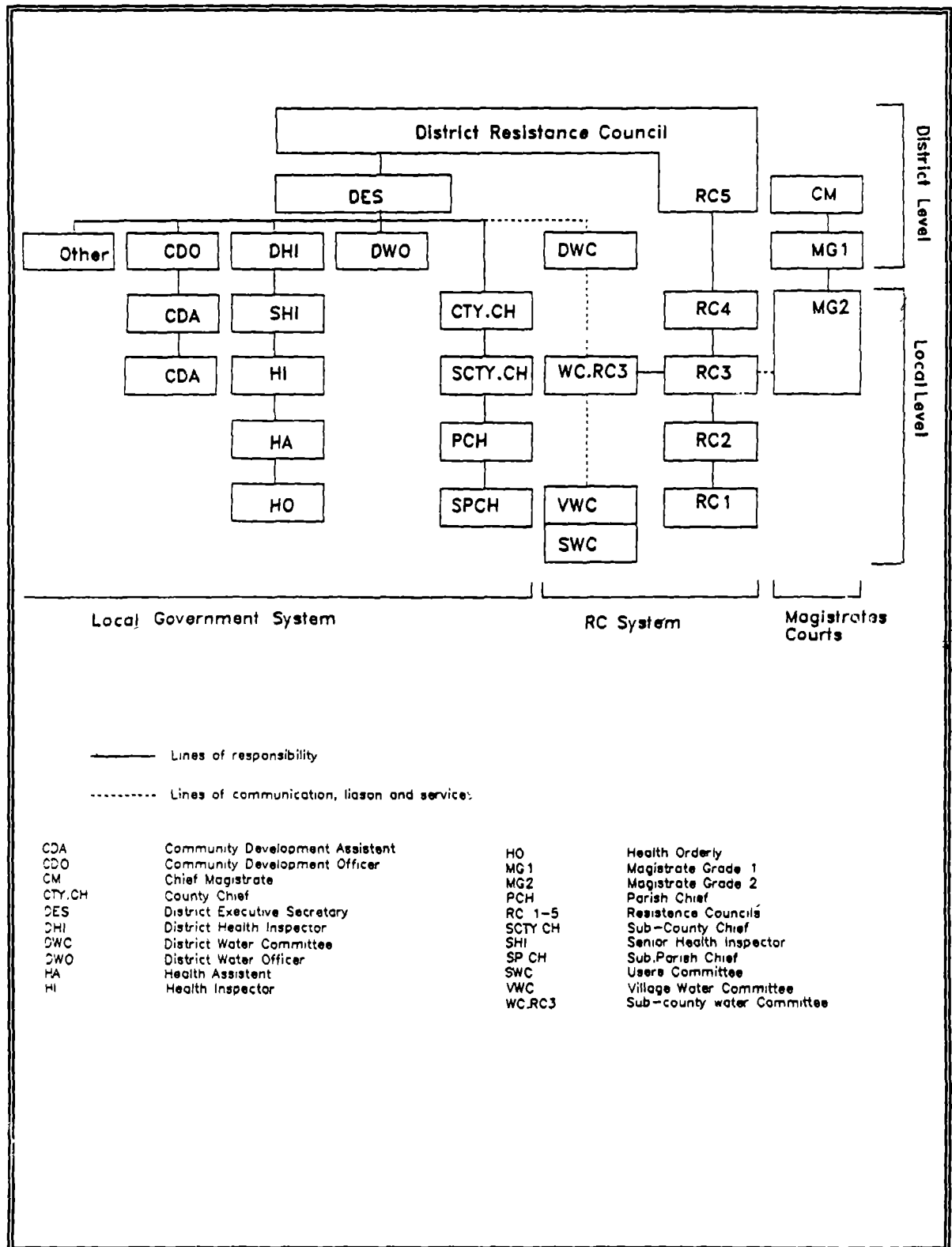
— Lines of responsibility
 - - - - Lines of communication, liaison and services

Notes: 1 Lines of responsibility from district level will conform to decentralization directives
 2 WPC policies, guidelines and standards will be communicated to the DRC through the relevant ministry - Ministry of Local Government
 3 The Ministry of Finance and Economic Planning, as one of the related ministries, has a special role in setting national financial guidelines and budgets

MG I	Magistrates Court Grade I	CDO	Community Development Officer
MG II	Magistrates Court Grade II	CM	Chief Magistrate
MLG	Ministry of Local Government	DES	District Development Secretary
MNR	Ministry of Natural Resources	DHI	District Health Inspector
NRC	National Resistance Council	DRC	District Resistance Council
RC 1-5	Resistance Council 1-5	DWC	District Water Committee
TC	Town Clerk	DWD	Directorate for Water Development
		DWO	District Water Officer

APPENDIX 5.3

District level and local level institutions



ANNEX 2

DISTRICT STUDY - MBALE

MBALE DISTRICT REPORT**LIST OF CONTENTS****Abbreviations**

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LIST OF ABBREVIATIONS

ACAV	Associazione Centro Aiuti Volontari
AMREF	African Medical Research and Education Foundation
ATM	African Textile Mill, Mbale
BOD	Biochemical Oxygen Demand
CDO	Community Development Officer
CIDA	Canadian International Development Agency
DA	District Administrator
Danida	Danish International Development Assistance
DAO	District Agricultural Officer
DDC	District Development Committee
DES	District Executive Secretary
DHC	District Health Committee
DHEO	District Health Education Officer
DHI	District Health Inspector
DMC	District Water and Health Management Committee
DMO	District Medical Officer
DRE	District Water Engineer
DRC	District Resistance Council
DWD	Directorate of Water Development
DWO	District Water Officer
EIA	Environmental Impact Assessment
FHh	Female-headed household
HYDROMET	Hydrometeorological Survey of the Catchments of Lakes Victoria, Kyoga and Albert
IDA	International Development Agency
KDA	Karamoja Development Agency
LMNP	Lake Mburo National Park
LWF	Lutheran World Federation
MLG	Ministry of Local Government
MOH	Municipal Medical Officer
NEAP	National Environmental Action Plan
NEC	National Executive Committee of the
NGO	Non-Governmental Organization
NRM	National Resistance Movement
NWSC	National water and Sewerage Corporation
NYTIL	Nyanza Textile Industry Limited
RC	Resistance Council
RUWASA	Rural Water and Sanitation (East Uganda Project)
SCOUL	Sugar Corporation of Uganda Limited
SIDA	Swedish International Development Authority
SWIP	South-West Integrated Health and Water Programme

UNICEF	United Nations Childrens Fund
UWE	Urban Water Engineer
WAP	Water Action Plan
WATSAN	National Water and Sanitation Programme (a UNICEF programme)
WDD	Water Development Department (former name of DWD)
WFP	World Food Programme
WID	Ministry of Women in Development
WPC	Water Policy Committee

1 INTRODUCTION

1.1 Background

A first phase of the "Water Action Plan for Water Resources Development and Management" (WATER ACTION PLAN PHASE I) was prepared from February to May 1993. The major components were:

- draft water resources policy
- draft rapid water resources assessment
- draft institutional and management study
- international study

In the period from June to November 1993, follow-up work was carried out during the "Consolidation Phase I", which also comprised preparatory activities for Phase II. These activities were preliminary data collection and information gathering in five districts selected as pilot areas for studies to be undertaken under Phase II. The Consolidation Phase I activities were undertaken by the project counterpart staff.

The Project Document entitled "Water Action Plan for Water Resources Development and Management" (WATER ACTION PLAN PHASE II) describes the second phase of the project to develop a Water Action Plan for Uganda. The work on Phase II started in November 1993. The second phase will produce among other items:

- an outline proposal for appropriate local water resources management levels based on district studies
- an outline proposal for management procedures providing the administrative machinery at national and district levels with guidelines for sustainable water resources management

District studies to support such proposals were carried out in each of five selected pilot districts: Arua, Mbarara, Mukono, Mbale and Moroto. These studies comprise reconnaissance level evaluations of sociological and economic conditions which combine to give the background for assessments of water uses and demands. These uses and demands are compared to available water resources in terms of quantity and quality.

An unequal distribution of demands and resources leads to the identification of a number of water resource issues and cases which require management strategies and capabilities at different levels (national, district, and community). Based on the existing institutional and judicial framework, management potentials and constraints are identified and evaluated.

1.2 District studies

The objective of the district studies is to gain knowledge adequate to recommend which aspects of local water resources management can be generalized throughout the country and which aspects are area specific and require some adaptation of the general principles. Further, the objective is to support the preparation of guiding principles for the distribution of management responsibilities between national and local levels.

The tasks undertaken in fulfilling these objectives were:

- data reviews and brief reconnaissance
- identification of water resources issues
- review of the role of formal and informal institutions in water resources management
- identification of necessary management functions
- preliminary assessment of water resources management capacity in relation to the management functions and responsibilities
- assessment of the role of women

The 5 pilot district studies were supplemented by short visits to other districts where particular issues are dominant features (wetland cultivation, aquaculture, soil erosion etc.)

Thus, the district studies do not describe the characteristics of a district in detail, giving a comprehensive geographical profile. The focus is on management of water resources and on the issues that are related to water resources. Further, it will become apparent that it is not the intention of the studies to propose solutions, but rather to identify the present and possible problems in order to recommend a framework within which such problems can be approached.

1.3 Mbale District visit

The Mbale District was visited by the study team during the period from 20 to 25 January 1994. Two days were used for interviews and discussions as well as for the collection of statistics from the District Administration Headquarters in Mbale Town.

After the meetings in the district centre, the team visited a number of local administration offices and sites, including:

- meetings with representatives from the town council in Mbale
- meeting with representatives from Water Aid
- meetings with representatives from selected sub-county councils
- meetings with sub-county chiefs
- meetings with representatives from NWSC in Mbale
- visits to various sites (water sources, gravity schemes, treatment plant)

During the visit the team was accompanied by officers from the district administration, who acted as resource persons as well as guides.

The summaries and results from this district study are presented in the following chapters.

Chapter 2 summarizes in a tabular form the main characteristics of Mbale District - in terms of physical features, population, economic activities, health and sanitation. The water resources, their use and availability, are described briefly in Chapter 3; while Chapter 4 gives an overview of the consumer categories, the use of water in the district, and the demands. Chapters 1 to 4 all lead up to the description of the present institutions involved in water management in Chapter 5, and to the identification of issues and management functions and levels in Chapter 6. Chapter 7 gives an assessment of the present management capacities, related to the identified management functions.

General material on, for instance, the RC system and on land tenure systems is given in appendices.

2 DISTRICT SUMMARY

Table 2.1 - Physical features of Mbale District

PHYSICAL FEATURES	
Location	Mbale district is located in eastern Uganda, bordering the Republic of Kenya in the east, the districts of Tororo in the southwest, Kumi and Moroto in the northwest and Kapchorwa in the northeast. (Ref. Appendix 2.1 and 2.3)
Area	2,546 km ²
Relief	The altitude varies from the plains west of Mbale town, with altitudes of 1,100 m to 1,300 m, to the foot hills of Mount Elgon, east of the town, with altitudes ranging from 1,200 m to 3,600 m. More than half the district is covered with mountains, from which numerous springs flow.
Climate	Rainfall: Low plains (west): 750 mm/year Mountain ranges (east): 1000-1500 mm/year Rainfall is reliable and relatively well distributed. Rains start in February, peak in March and gently decrease to November. Mean annual temperatures: Low plains (west): Min. 12-15 C, Max. 25-27C Mountains (east): Min. 10-12 C, Max. 22-25 C
Soil	Low plains (west): Alluvial deposits and peaty swamps. Mountains (east): Well drained red friable clay and shallow stony soil.
Landcover	Total forest cover: 530 km ² Woodlots: 180 km ² Area of cultivated land: Arable land (1981): 1,664 km ² Area under cultivation: 1,231 km ² Land area: 2,504 km ² Open water and swamps: 42 km ²

Table 2.2 - Key population characteristics of Mbale District

POPULATION	
Total	1991: 710,980 persons
Population growth	1969-1980: 2.7% per year 1980-1991: 2.2% per year Uganda 1980-1991: 2.5% per year
Population density	1980: 222 pers/km ² 1991: 284 pers/km ² Uganda 1991: 85 pers/km ² (Ref. Appendix 2.2)
Ratios	Urban pop: 60,298 8.5% Rural pop: 650,682 91.5% Uganda urban pop: 11.3% Uganda rural pop: 88.7% Male: 355,803 Female: 355,177 Sex ratio M/F 100.0% Uganda sex ratio M/F 96.5%
Ethnic groups and language	Most of the population belong to the Basigu people. The common language is Lumasaba.
Patterns of migration	In-migration over the years has led to increased pressure on land for agricultural production and grazing of livestock. Now the trend is changing.

Table 2.3 - Main economic activities in Mbale District (table continues)

ECONOMIC ACTIVITIES	
Sources of income	Agriculture is the most important source of income. A growing number of people are involved in agrp-based activities: e.g. aquaculture, beekeeping, cattle raising - all providing an additional income to many households. Processing of agro produce and manufacturing of furniture, tools, pharmaceuticals etc. provide industrial employment opportunities. (Ref. Appendix 2.4)
Agriculture	<p>Most households in the district are practising subsistence farming: 80% having less than 1 ha on which they practise intercropping with perennial and annual crops. Only 1% of the holdings are larger than 5 ha. The main subsistence crop is bananas and the main cash crop is coffee, although cotton is a significant crop in some areas.</p> <p>Valley/plain cultivation: bananas, maize/beans, finger millet/maize, banana/beans, cassava.</p> <p>Slope cultivation: banana/coffee, coffee, coffee/beans.</p> <p>Cultivation is rainfed.</p> <p>As 122% (double cropping) of the cultivable land is being used (30% average for Uganda) Mbale ranks among the most intensively cultivated areas in the country. Cultivation on the slopes is normally not practised on terraces, and farmers dig furrows uphill instead of across the hill. This might lead to accelerated soil erosion. People plant grass-strips along the contours and some of the hills are being afforested in order to prevent soil erosion.</p> <p>Population growth and soil degradation (erosion and depletion of nutrients) might lead to an increased pressure on the more fertile lands and thereby reduce the fallow periods.</p> <p>The combination of an increased population density and the traditional customs of inheritance have led to fragmentation of land. 97% of the holdings are "kibanja", without ownership title and without rent, but with legal rights of landuse.</p> <p>Large parts of the few wetlands in the district have been turned into agricultural land within the last 25 years.</p>

ECONOMIC ACTIVITIES			
Livestock	Livestock type	Nos.	Households with livestock (% of total)
	Cattle	109,390	40
	Goats	117,546	35
	Sheep	24,056	10
	Pigs	32,868	9
	Chickens	583,366	64
	<p>The majority of the livestock is found in Bubolo, Bungokho and Manjiya counties. Water for livestock is widely available, except in few areas where streams dry up during the dry seasons. However, most of the dams, built 40-50 years ago, have silted up. None of the 21 cattledips in the district have worked for the past 7 years. Rehabilitation of valley tanks is needed.</p> <p>Karimojong pastoralists enter Banambutye sub-county during the dry seasons in search of water and grazing. This is not a cause of conflict, as there are customary rights of access to land and water.</p> <p>During dry seasons livestock owners in the northern part used to move their stock south, to Bubolo, Bungokho and Manjiya counties.</p> <p>Cattle raising with zerograzing is a common economic activity among women and the selling of milk is an important regular contribution to the owners' income.</p>		
Fisheries and aquaculture	<p>Subsistence fishing, using poison (red pepper paste, local leaves, etc.) to kill the local species of river fish is practised at many locations and most often takes place in the dry season.</p> <p>There are 237 fishponds in the district. The number is expected to rise as extension services improve and fish fries becomes widely available. It is estimated that the total number of fishponds, within 5-10 years, could come to around 2000.</p>		
Energy	<p>The two dominant sources of energy for domestic consumption are fuelwood and charcoal. 91% of the households use fuelwood while 7% use charcoal. Charcoal is the dominant source of energy in the urban areas. A growing demand for fuelwood has contributed to deforestation. 60% of the households buy their fuelwood.</p> <p>40% of the households have established woodlots in order to meet their own needs as well as to provide an additional source of income.</p> <p>No charcoal is produced in the district and what is used is brought in from nearby districts.</p>		
Other activities	<p>Beekeeping and waragi-brewing are two common homebased activities among the rural households, as they provide a complementary income. 20% of all the households in the district were estimated to brew local beer and spirit. Water quality for brewing is uncontrolled.</p>		

Table 2.4 - Key health and sanitation characteristics for Mbale District

HEALTH AND SANITATION			
Common diseases	The most common diseases in the district are malaria, intestinal worms, upper respiratory infections, diarrhoea, lower respiratory infections, trauma and skin diseases.		
Health services	Hospitals 2 (nos. of beds 425) Health centres 13		
Sanitation	Type of facility	Persons served	Persons (% of total)
	Water borne not shared	10,796	1.5
	Water borne shared	9,876	1.4
	Pit latrine not shared	415,641	58.8
	Pit latrine shared	149,323	21.1
	None	115,017	16.3
	Other	515	0.1
	Not stated	5,805	0.8
Total	706,946	100.0	

3 WATER RESOURCES

3.1 Water resources availability

In general, the availability of water resources in Mbale district is high, though it varies with the rainfall pattern - which also depends on the topography. The annual mean rainfall varies from 1500-1800 mm in the Mount Elgon ranges in the north-east - to between 1200-1500 mm in the lower plains. During the Rapid Water Resources Assessment, the climate of the district was classified as moist sub-humid.

The rain falls in mainly two seasons, with the main rain between March and May, and the shorter rains between August and November. It is reported that the rainfall is reliable in the district, but in 1993 the second rains failed - which led to a loss of the second season crops.

This relatively small district has more than eight permanent rivers, all of which originate from Mount Elgon ranges (considered to be the water catchment of the district) and flow down to the plains. At their upper reaches in the mountains the rivers flow swiftly, with steep gradients, and then rapidly fall to flat and gentle gradients at the lower plains, where they meander. Some of the falls that are created are of great scenic beauty and offer a potential for mini-hydropower development. In general, there are plenty of possibilities for the development of gravity-flow schemes to the lower plains.

Due to the steep gradients, the high population pressure (800 people/km²) on the limited land for cultivation, poor cultivation practices, and the encroachment on the forest reserves, most of the rivers carry high sediment loads compared to rivers in other parts of the country.

Apart from the flood plains (which are cultivated) there is one significant swamp on the border with Kumi/Karamoja. The rest of the small swamps that existed in the past have all been drained and cultivated.

Spring potential, especially in the hilly and mountains parts of the district, is high - estimated at 800 protected springs and 1000 unprotected springs. Some of these protected springs reportedly dry, but this may be associated with lack of experience in identifying reliable springs. In the lower plains there seems to be no significant spring potential. However, shallow well potential in these plains also seems to be high. For example, in Muyembe sub-county alone, over 90 tube wells have been developed by Water Aid. There is no information, however, on their characteristics and reliability.

All the permanent rivers were gauged in the past (1950 - early 1980's) but most of the stations are not operational at present.

Gauging resumed on a few stations in 1987, but the quality of the data is doubtful due to lack of competent staff, logistics and finance for effective supervision and concurrent discharge measurements.

Based on the historical data the flow characteristic of the rivers is as follows:

St. no.	Station name	Period of record	Area (km ²)	Annual mean m ³ /s	Minimum monthly m ³ /s	Maximum monthly m ³ /s
02012	R. Manafwa Tororo/Mbale Rd	1048-1992	404	7.92	0.66	26.25
82318	R. Malaba (0203092)	1955-1980	1458	15.10	0.98	79.43
82313	R. Namatala Mbale/Soroti	1948-1991	152	2.70	0.20	94.80
82343	R. Sipi Mbale/Tororo Rd	1953-1989	92	3.73	0.00	25.78
82340	R. Siroko	1953-1983	265	4.93	0.00	27.92
82341	R. Simu	1958-1984	165	3.94	0.35	12.28
82342	R. Muyembe Mbale/Tororo Rd.	1954-1980	136	3.11	0.03	12.92
82331	R. Kelim Mbale/Tororo Rd.	1957-1979	1400	6.31	0.05	67.34

The average annual run-off in the district is estimated at more than 500 mm/year and the minimum dependable yield (one in five years minimum monthly flow) is above 0.6 l/s/km², - both of which are indicative of high run-off potential.

3.2 Water quality

The information available on groundwater quality in Mbale District is scarce. However, there are no indications of general water quality problems related to the groundwater resources in the district (only few saline boreholes have been reported).

In the Eastern counties, the domestic consumption mainly relies on springs and wells. Many of the springs are not yet protected, and the location of pit latrines near these water sources imposes risks of faecal contamination. In the lower plain a number of tube wells (bucket system) have been installed, and many are not maintained properly - which is why these sources similarly are likely to be contaminated.

In the towns of Mbale district the collection systems for solid waste are not very developed. However, some collection of solid waste is done and indiscriminate dumping of these wastes take place. Thus, there is a risk of contamination of the groundwater sources locally near the dump sites.

The general quality of surface water resources (mainly rivers and streams) is similarly not documented by actual measurements, but except for widespread siltation (due to the steep slopes of the mountains in the east) there is no evidence of general water quality problems

(e.g. the water has proved to be suitable for fish farming). However, there are a number of locations where the water quality is not likely to meet the requirements of the actual use of the water - some examples are given below:

- effluents from Mbale Municipal waste water treatment works contaminate the Manafwa river, which is also used for domestic water supply. For example, Water Aid has constructed a pumped water supply system downstream the discharge of the old sewage plant, and up to 5000 E. Coli/100 ml have been measured in the intake.
- a number of smaller factories are connected to the NWSC sewer system and depending on the efficiency of the two existing treatment plants, pollution of the Manafwa river is likely to occur. An increased capacity of the textile factory (ATM) in Mbale town will furthermore increase the risk of discharging hazardous substances to the river.
- localised pollution of River Tsutsu in Budada from local liquor brewers set up on the edge of the river was noticed where the water is used for cooling and the waste discharged directly into the river.
- use of surface water bodies (rivers and streams) for diverse purposes increases the risk of spreading pollution and pathogenic bacteria.
- a transboundary case exists in the district, where the Malikisi river crosses the border from Kenya. The villagers on the Kenyan side drain the latrines directly to the river, which on the Ugandan side is used for drinking water.

4 CONSUMER CATEGORIES, WATER USES AND DEMANDS

4.1 General

The main consumptive demands in Mbale district are for domestic water supply (rural and urban), livestock and industrial water supply. A non-consumptive demand is for aquaculture. At present, the available resources are adequate to meet these demands - but not developed to a degree of a high coverage for the different sectors.

4.2 Rural domestic water use

The overall safe and accessible (maximum walking distance of 1.5 km) rural water supply coverage in the district - by installed capacity - is estimated at 60% but the actual coverage is much less, owing to the low reliability of some of the springs and the non-operational status of most of the boreholes. The coverage, however, is not uniform and it varies from the high coverage in the mountain areas to the very low coverage in lower plains - depending on the availability of resources, ease of development, and the area of concentration of NGO efforts.

In the mountains, the overall installed coverage is almost 100%, with most of the homesteads within a maximum walking distance of 1 km from a source. Supply is mostly from springs, with a total assessed potential of over 1800 - of which 800 have been protected. However, some of the protected springs are not reliable. Two gravity schemes have also been developed in Buhugu and Nagimesu and an additional three schemes are being developed by Water Aid. Furthermore, 20 feasible gravity schemes have been identified by Water Aid for development under RUWASA. There is also a piped water supply at Bubwaya, developed by Water Aid and run by the users. However, there is a gap in supply to settlements on the ridges, especially in Bududa where rainwater harvesting would be required.

In the lower plains, the installed coverage is estimated at 36% and the worst hit areas are the lower plains of Bulambuli, Bulamisi, Bungokho and Central Bugisu. Supply is mostly through boreholes - estimated at 171 - but about half them are not operational owing to a lack of a sustainable maintenance system. Ninety tube wells have been developed in Muyembe, on a pilot basis, but the quality of water from these sources is doubtful, because of the possibility of pollution when it is collected.

4.3 Urban domestic water use

The only major urban centre in the district with a central water supply system is Mbale town, with a population of approx. 65,000 (1992). The coverage is estimated at 82% and the system is owned and managed by NWSC. The piped supply is based on treated and pumped surface water from River Manafwa and Wanale gravity supply. Most of the consumers have house connections, and where consumers depend on communal standpipes the maximum walking distance does not exceed 400 m. The main problem with the Manafwa supply is siltation and high pumping costs. Augmentation of the yield of the gravity supply was claimed to be a more sustainable and cheaper option. Presently, the yield of the Wanale gravity supply is not adequate and there were reported conflicts with the upstream farmers who diverted the source for small scale irrigation of horticultural crops during the drought of 1992. The issue was amicably resolved by the RCs.

There is also an increasing demand on NWSC to get involved in the protection of the upstream catchment to control soil erosion and siltation of the water bodies - since they would be direct beneficiaries.

The remaining small towns and rural growth centres - with the exception of Bubwaya, Nagimesu and Buhuga, as discussed above - have service levels comparable to the surrounding rural areas. The point sources are often crowded and scuffles occur.

The total coverage of domestic (rural and urban) water supply in the district is shown in the table below. It is estimated that for 100% coverage the present demand would be 5.9 million m³/year.

Table 4.1 - Water source use

TYPE OF SUPPLY	POP.	POP%
Piped water, inside	12024	1.7
Piped water, outside	31516	4.5
Borehole	23234	3.3
Protected well/spring	183227	25.9
Unprotected well/spring	245953	34.8
Stream/river	200214	28.3
Lake/pond/dam	5398	0.8
Other	217	0.0
Not stated	5163	0.7
Total	706946	100.0

Source: Population and Housing Census, 1991

4.4 Industrial consumers

The only major industry in Mbale is ATM (Textiles) which is currently operating at very low capacity and depends on NWSC supply. Other small industries include grinding mills and abattoirs, which all depend on the NWSC supply. The quantity and quality requirements of the industries are adequately met.

ATM discharges its waste directly into NWSC sewerage works without pretreatment, and

the effluent eventually ends up in Namatala River. At present, there is no problem because the sewage treatment works are still new and efficiently operated, the factory is running far under capacity, and there are no significant users of the water downstream of the treatment works outfall. However, if there is an increased capacity of the factory, poor operation of the sewerage works, and an increase in use downstream, there will be a high risk of pollution of the river.

Localized pollution of River Tsutsu in Budada from local liquor brewers set up on the edge of the river was also noticed. Water is used for cooling and waste is discharged directly into the river.

4.5 Livestock water consumption

There are presently 110,000 head of cattle and 64,000 goats and sheep distributed throughout the district - with communal grazers in the lower areas (Bubolo and Bungokho) and tethering in the highland areas. Some people practise zero grazing. However, most of the cattle are said to have been shifted from the north to the south due to fear of cattle rustling from the neighbouring Karimojong who invade the district during severe drought in search of water and pasture.

Livestock water supply is based mainly on numerous springs in the highlands and streams or rivers in the lower plains, and the maximum walking distance in the dry seasons does not exceed 8 km. Ten dams and valley tanks were constructed and managed by DWD in the past, but most of these have silted up due to a breakdown in maintenance functions.

It is estimated that the carrying capacity of the district could be increased to 180,000 head of cattle. Therefore, the present total water demand of 1 million m³/year is expected to rise to 1.6 million m³/year, but supply is not limited - though problems of access to water sources could increase due to the dense settlement pattern.

Table 4.2 - Livestock water source use

	BOREHOLES	VALLEY DAMS	SWAMPS	WELL/SPRING	RIVER/LAKE	TOTAL
No. of cattle	5027	1208	481	53212	48918	109390
% of total	4.6	1.1	0.4	48.6	44.7	100
Tot. m ³ /year	45871	11023	4389	485560	446377	998184

Source: Agricultural Census 1992

4.6 Water for agriculture

Mbale is predominately an agricultural district with a banana-coffee system which is basically rainfed. The rainfall has been reliable - except over the last five years. For example, in 1993 the second rains failed and the yield of maize - one of the major crops - is reported to have dropped by 30-40%. The recent unreliable rains is locally believed to be attributed to the reduction in forest cover.

It has also been reported that the agricultural production in the district has been declining due to a loss of soil fertility associated with the poor cultivation practice, the steep slopes and the high population pressure on the land. The recommended soil conservation methods - terracing and contour bonding - are not being practised; nor are the existing by-laws enforced. The main constraint seems to be the cost of the soil conservation and lack of awareness among the farmers of the direct benefits of such measures. Though not visibly evident, soil erosion due to the poor agricultural practice is the single most important contribution to the high sediment load in the rivers from the district.

Irrigation is not significantly practised in the district, but the potential for gravity-fed irrigation in the low-lying flood plains is high and some farmers have expressed a need for it as security against drought. At present, most of the swamps in the district have been cultivated and some horticultural farmers divert the streams and rivers for dry season cropping.

4.7 Aquaculture

There are 200 registered private fish ponds in the district and the rate of growth is said to be very high - especially with the increased extension service activities and the recent improved supply of a fish fry. The main problem is the seasonality of some of the streams and the potential pollution.

5 AGENCIES INVOLVED IN WATER RESOURCES MANAGEMENT

5.1 Introduction

This chapter identifies the institutions involved in the management of water resources in Mbale District, and it describes their present functions. In this context, the term "institution" should be taken to have a broad meaning: it includes any formal or informal agency which does, or might, make decisions related to water resources.

In the following sections, an attempt has been made to distinguish between institutions involved in policy making, administration, enforcement, and conflict resolution - even though these functions are not always clearly separated in the present system. In subsequent sections, other types of institutions which play a role in water management are identified: parastatals, development projects, private enterprises, etc. Finally, there is a commentary on the role of the Ministry of Women in Development, Culture and Youth.

5.2 The RC system and committee structure

In Mbale, the political decision making structure is well established through the RC councils at all levels. However, not all the committees related to water management at the different levels (ref. Appendix 5.1) appear to be fully functioning, since they were formed in anticipation of (and as a pre-requisite for) the RUWASA Project commencement which is foreseen in Mbale in 1996. The presently defined functions of the water committees are given below.

5.2.1 Users Committees (RC 1)

Two people who live near to a water source are given the responsibility of the day-to-day running of the utility - whether a borehole, spring or well. These two persons are members of a larger "Users Committee", but they have specific assignments of, for example, keeping order at collection points or collecting fees. The Users Committee acts as a sub committee of the RC 1 (village council), and it is responsible to the RC 1 Executive Committee. However, it should be noted that the present RUWASA system permits the Users Committees to report directly to the RC 3 (sub-county) Water and Health Committees.

5.2.2 Sub-county Water and Sanitation Committee (RC 3)

This is a sub committee of the RC 3 Council in charge of water and health. The main function is to follow the work of the Users Committees (through progress reports) and to coordinate and supervise the Users Committees. Among the activities are the organising of seminars and training.

5.2.3 District Water & Sanitation Committee (RC 5)

This committee is a sub-committee of the District Resistance Council (RC 5) charged with overall policy formulation and guidance in matters related to water and health management in the district. It registers, monitors and coordinates NGOs and their programmes in the water and health sectors. Since the DRC is the "district parliament", it debates policies and strategies - and passes budgets and programmes.

In Mbale, the District Executive Secretary (DES) acts as chairman of the Water and Sanitation Committee, on behalf of the RC Secretary for Mass Mobilization - since water and sanitation are considered technical matters. An Assistant DES is permanently charged with the routine coordination of water activities as a "water desk officer".

5.3 District administration

Mbale is one of ten pilot districts where the decentralization policy - the devolution of powers and functions from central government - is currently being implemented. The departments of central government operating at local level have thus become constituent units of the District Resistance Council. They operate under the control and supervision of the District Executive Secretary (DES), who - as head of administration - is now responsible for their performance.

5.3.1 District Water Officer

The key functions of water resources management in the district are performed by the District Water Officer (DWO). The formal duties of the DWO include:

- identifying water projects
- making demand forecasts
- collecting hydrological data
- siting and drilling boreholes
- protecting springs
- promoting an extension service related to operation and maintenance
- collecting and analysing data on water quality

- preparing a district water budget
- supervising the implementation of water schemes (with or without consultants or contractors)
- supervising NGO water programmes
- monitoring and evaluating water programmes

The DWO now reports directly to the DES and not to the DWO. However, the District Water Office continues to receive some technical support from the DWD Headquarters. The various water committees do not report to the DWO, but are independent.

In Mbale District the DWO also acts as Regional Hydrologist (for Iganga, Tororo, Pallisa, Kumi, Soroti and Moroto districts) under DWD. The functions of the Regional Hydrology Office is to monitor the water resources (lake levels, river discharges etc.) as well as to advise the district water officers within the region. Presently, these functions are virtually dormant due to lack of equipment and personnel.

5.3.2 District Health Inspector

Although the office of the District Health Inspector (DHI) is directly responsible to the District Medical Office (DMO), all the functions of rural water development are presently undertaken here. The formation of water committees, identification and protection of springs - as well as training and equipping of implementation staff (masons and handpump mechanics) - are covered by the DHI. The department has an elaborate plan of action (1994) with specific goals covering both sanitation and water supply.

The DHI has furthermore a considerable extension staff reaching out to the communities and capable of being utilised in implementing some of the water related activities. In addition to the formally trained Health Inspectors (9) and Health Assistants (15), there are the Health Orderlies at sub-county level (2), Community Change Agents (1137 volunteers), Community Health Workers (322) and the Traditional Birth Attendants (100) - all working together at the community level.

5.3.3 District Agricultural Officer

The major issues for the District Agricultural Officer are soil conservation and prevention of soil erosion in the hilly areas of East Mbale. The DAO has, for example, educational staff at parish level teaching, among other things, terracing techniques.

5.3.4 District Fisheries Officer

The District Fisheries Officer collects fishery statistics and advises on fishing techniques. An increasingly important activity has been the introduction (and rehabilitation) of fish farming activities in the district. His work covers the provision of fish fry and advice on siting/construction of fish ponds and the optimization of farming techniques.

5.3.5 District Extension Coordinator

A district unified extension service for the departments of Fisheries, Agriculture and Veterinary Services are coordinated under a World Bank (IDA) financed project. Mbale is one of the pilot districts where the scheme is operational. The three professional field staff each heads a parish in a rotational manner - bringing services closer to the people, while complicated cases are being referred to the subject matter specialists.

This is a form of decentralisation within the Ministry of Agriculture, Animal Industry and Fisheries. The District Extension Coordinator (DEC), who coordinates the work of the District Agriculture Officer, the District Veterinary Officer and the District Fisheries Officer, reports to the DES on routine matters and has the possibility to consult the parent ministry on all technical issues.

5.3.6 District Forest Officer

The District Forest Officer works closely with the Elgon Conservation Project (a World Bank funded project) regarding Nature Conservation around Mt. Elgon (the major component is afforestation). The activities include delimitation of forest reserves, mobilising and training people from selected pilot parishes in safe and profitable agricultural practices (fodder, fish, fruit trees, terracing and grass belts) and tree planting (woodlots) at the household level.

5.3.7 Community Development Officer

Under the Community Development Officer (CDO), there are 3 assistants at county or sub-county level. They mobilize communities for the provision of materials and labour, through the RC 1, Health Assistants, elders and women leaders. The CDO has a close collaboration with the Health Department and he acts as a communication link with communities and other departments (e.g. regarding health and water problems). The development activities are coordinated in the District Development Committee meetings held every 2nd month (meetings last a full day and all district officers participate).

5.3.8 Municipal Medical Officer for Health

The Municipal Medical Officer for Health (MOH) in Mbale Town has functions parallel to the DMO and he handles public health aspects within the municipality. The MOH inspects all industries, according to the Public Health Act, and he issues related licences. Furthermore, he inspects and advises the NWSC (on treatment processes, pipeline leakages, etc.). The MOH uses the Government Chemist in Kampala (Ministry for Internal Affairs) to monitor effluent quality, food standards and water supply.

5.3.9 Chiefs

A key feature of the Local Government Administration is a hierarchy of salaried officers, the Chiefs, who administer well established units, such as: the Saza Chief at county level, the Gombolola Chief at sub-county level, the Muluka Chief at the parish level and the Mutongole Chief at the sub-parish level. These levels correspond to the RC 4, RC 3, RC 2 and RC 1 levels. The office holders need not be residents of the particular area. In addition to collecting government revenue, the chiefs are instrumental in keeping law and order - by controlling the local police. In this respect, they are essentially an arm of central government. They also have an important role in mobilising community participation. Furthermore, the chiefs are involved in conflict resolution - as discussed in Sub-section 5.4.3.

5.4 Judicial institutions

There are a number of complementary institutions engaged in conflict resolution at various levels. These are: the RC Courts, the Magistrates Courts, the Chiefs and the Elders.

5.4.1 The RC Courts

The extent of judicial power for the Resistance Council Courts has been clearly defined by the Resistance Committees (Judicial Powers) Statute, 1987. This statute establishes the RCs as Courts and outlines their proceedings. Civil disputes governed by customary law that can be handled by the RC Courts include water and land disputes relating to customary tenure.

RC Courts help to settle disputes on any violation of local by-laws or offence to traditional ethics - with regard to water and land management. Such disputes could relate to trespassing, for example, access to domestic and livestock water points, and livestock watering at water sources on privately owned lands. (Ref. Appendix 5.1)

5.4.2 Magistrates Courts

Magistrates Courts, exist at sub-county level (Grade II) and at the district level (Grade I).

Some cases go direct to the Magistrates Courts; others are referred from RC 3 Courts - for example, cases of trespassing, land ownership, assaults at watering points. Most of the water-related conflicts are solved at RC 3 or lower levels - very few reach the Magistrates Courts. Most cases referred to these courts are land related. In civil cases, people can chose to have their case tried at the Magistrates Court directly, without passing through the RC court system.

The magistrates in Mbale District organize and conduct seminars for RC members to enlighten them further on the law, to assist them in keeping records and to develop routines for referral cases. The two institutions are complementary and function effectively in the district.

5.4.3 Chiefs

The Local Administration's Chiefs play an important part in conflict resolution over matters related to the management of water and land. Such matters would include:

- being in arrears or refusing to pay debts (water contributions, by-laws)
- refusing to construct pit latrines (for improved common environmental sanitation)
- causing land problems (squatting, trespassing, blocking access to water sources, etc.)
- breaking by-laws regulating water use

Decisions of the Chiefs do not need the backing of a committee consensus, but they often consult with or refer to the RC Committees - particularly when more facts or evidence are required. This joint consultation is regarded as a kind of appeal court, whose legitimacy is upheld and whose decisions are more respected than those arrived at by either of the institutions alone.

5.4.4 The role of the Elders

The role of elders and traditional cultural heads is important in Mbale District. Their power is deeply embedded in local beliefs and traditional practices that quite clearly legitimize their involvement in the arbitration of disputes.

The land is owned by clans and distributed by clan heads, under the customary land tenure system, with no land titles. This practice is a major cause of conflict (considering the scarcity of land, owing to a high population density) as shown by the large number of appeal cases to the Chief Magistrates Court.

5.5 Parastatals

Mbale Municipal Water Supply used to be operated by WDD (now DWD) until 1988. After a full rehabilitation, it was deemed viable and was handed over to the National Water and Sewerage Corporation (NWSC), a government parastatal. DWD now deals with the rural water supply and water supply for smaller urban centres. The National Water and Sewerage Corporation only deals with water supply and sewerage in the Municipality. The organisation works on commercial terms.

NWSC manages a surface water source (River Manafwa) combined with a gravity flow scheme. The treatment takes place within the municipality and distribution is by gravity. The coverage is still low (60% for water supply and 25% for sewerage). Furthermore, NWSC manages the sewerage system including two wastewater treatment plants. The corporation faces a lot of difficulties in collecting water bills and, as a result, the Mbale operation cannot break even, and it has to be subsidised by operations elsewhere - particularly by Kampala.

5.6 Water development projects

Much of the water supply planning and management - and thus to a certain degree also the water resource management - in Mbale is, or will be, influenced by water development projects. Besides their strong influence on the overall planning of water sources development, the projects also impose policies on local water resources management, such as the formation of committees, rules for payment, etc.

5.6.1 RUWASA

The physical implementation of the Danida-funded RUWASA project, under DWD, has not yet started in Mbale. It will still be in its mobilisation phase until 1996. When it finally begins, rural water supply planning and management in the district will be addressed. The project objectives are a 70% coverage within rural domestic water supply and sanitation.

The activities include: borehole drilling, spring protection, shallow well development, water quality monitoring, community mobilization, training and institutional support. The allocation of water supply schemes is based on the population size and density at district and sub-county level. The design population is equal to 70% of the population in a target area. The standard set is that 300 people should share one water supply unit (one borehole or two springs). The number of water supply units allocated to an area is calculated by

dividing the design population by 300. The villagers decide where in the village the water supply units should be located. Their decision is followed if technically feasible.

A RUWASA pre-requisite for implementation is the formation of User Committees responsible for operation and maintenance. This condition has already been satisfied in Mbale District.

5.6.2 Water Aid

Water Aid is a British NGO. It has operated in Mbale since 1986, dealing mainly with spring protection, in coordination with the DHI. 450 springs have been protected though only 350 are working satisfactorily.

Water Aid has also developed shallow tube wells (100% coverage in Mayembe, the driest area), 2 gravity schemes, 2 pumped schemes and has made an agreement with RUWASA to handle more gravity schemes and shallow/hand dug wells. The organisation is also involved in capacity building by training DWD engineers (4), community mobilisation before implementation, training programmes for masons, and is assisting DWD to establish a gravity unit with standard designs/specifications. It is also involved in health and sanitation programmes.

Committees formed under Water Aid are for their schemes only, and the philosophy is that they will be self-sustaining both in relation to operation and cost recovery.

5.7 The private sector

The private sector is an emerging stakeholder in water resources management. The development and management of water resources - and especially the provision of water for domestic supply in the District - have been considered exclusive functions of the Central Government. However, a number of private initiatives have emerged, especially in the towns, due primarily to gaps in supply.

Moreover, the few operational valley tanks and dams in the livestock areas are privately owned. Presently they are used for both livestock and domestic supply - especially in the dry season. The public gets access to the water at a cost (i.e direct labour, in kind, or cash) as agreed with the owner.

Private initiatives are in line with the new government policy of encouraging private sector involvement. The quality of water supplied for domestic use to the public is, however, doubtful. Though the developers are licensed it is apparent that technical expertise is lacking, "treatment works" are deficient and the developers' activities and deliveries are neither being monitored nor regulated.

5.8 Informal structures

The new systems of managing domestic water sources through committees do, in fact, draw on some long established practices. In traditional societies, it was common, for example, to appoint a caretaker who lived near the source - though sometimes the responsibility was handed down within certain families, through the generations.

Heads of households used to take great pride in protecting ancestral wells - some of which had been a clan responsibility for centuries. Sometimes they imposed a ban on cutting trees near these wells, for example. Occasionally, these traditional taboos run counter to the modern processes of protecting the wells or springs.

There are some customary concepts regarding ownership, access to and control of communal water sources and swamps, that impinge on current objectives of water resources management. One is that water is a "God given gift", to which everybody has a right - irrespective of where it is located or who developed it. This perception cuts across the notion that water is an economic good - which should be utilized in a most careful and economic manner.

5.9 Ministry of Women In Development, Culture and Youth

The Ministry has seconded staff to districts and sub-counties with the purposes of stimulating women's participation in the management of development activities.

The involvement of women in point water source management is well established in Mbale. Each point water source under the RUWASA project has one woman and one man as caretaker. All other established committees have three women out of the six members as mandatory - and women are encouraged to compete for the remaining three posts on merit. In the RC system, each executive committee has one guaranteed post of Secretary for Women. The remaining eight posts are equally open to men and women. So far, however, most executive posts are held by men.

In spite of the opportunities recently availed to the women of Mbale, many of them, even if duly elected, choose not to take up the challenge. These are some of the reasons that have been put forward to explain this reluctance:

- lack of support from other women
- lack of adequate formal education
- family responsibilities

- shyness
- lack of management experience
- lack of support from men

6 ISSUES, MANAGEMENT FUNCTIONS AND RESPONSIBILITIES

6.1 Introduction

Based on the findings from the visits to the districts a number of water related key issues have been identified. The issues fall into two categories:

- impact issues
- user requirement issues

The impact issues are derived from human activities affecting the water resources negatively with regard to quantity or quality. The negative effects can either concern other direct uses or relate to environmental degradation.

The user requirement issues are derived from inadequate matching of user requirements and the available water resources (quantity and/or quality).

Such situations require interventions, based on rational decisions and operational management functions, in order to obtain a stable and sustainable beneficial use of the water resource. The process is shown in Fig 6.1 below.

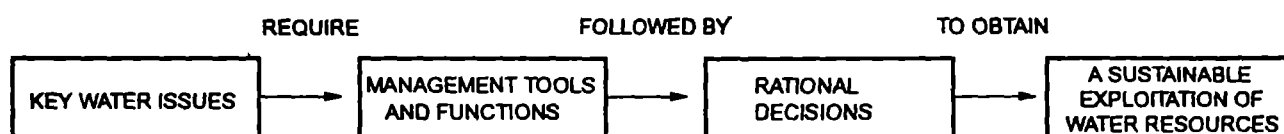


Figure 6.1 - Water resources issues management process

The present chapter describes the issues that have been identified as well as the rationale behind the selection. Management functions necessary to approach and tackle the issues, and tools for intervention in the district is also briefly described here.

The identified issues have been grouped under the following headings:

- surface water quantity
- surface water quality
- groundwater quantity
- groundwater quality

The issues identified may not all be perceived by the district population as being critical issues for which interventions are required. Some of the problems, for instance those related to water quality and environment, are in many cases not possible to observe directly but require specialized investigations for exact identification and description. They can, however, be just as potentially damaging as those which are obvious to the observer.

An overview of the issues identified in the general district context is given in Fig 6.2, while details of issues are given in the tables below. For each issue identified the rationale behind its inclusion as an issue is given. Further, a tentative listing of management functions necessary to approach the issue is given and finally the functions are distributed as responsibilities at different management levels (national, district or community level).

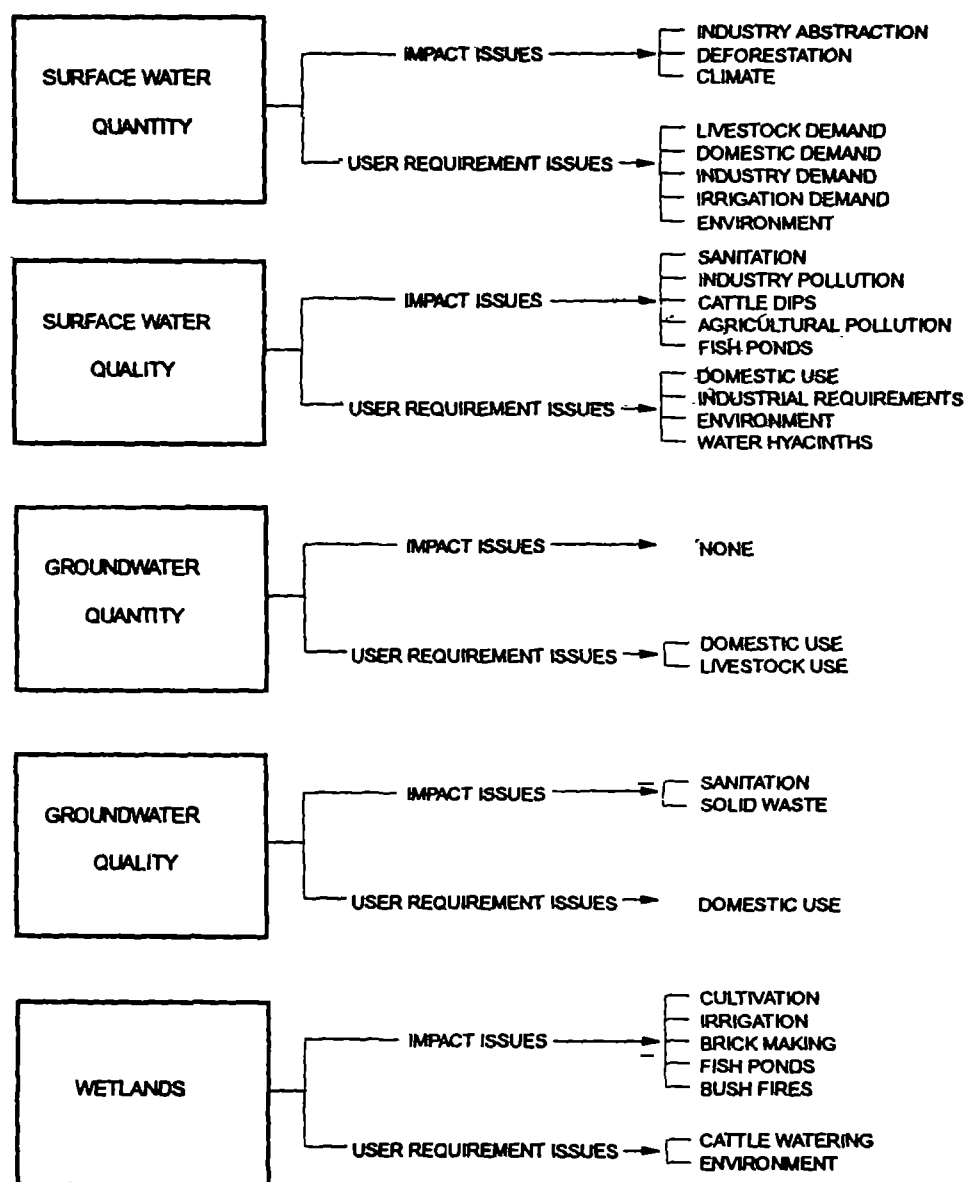


Figure 6.2 - Overview of general district issues identified

Table 6.1 - Surface water quantity

SURFACE WATER QUANTITY (Mbale)			
IMPACT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Deforestation	Deforestation mainly due to cultivation (high population pressure) is claimed to reduce minimum flow in streams (documentation needed)	Regulatory control of land use. Promotion of and advise on use of appropriate soil and water conservation practices, declaration of forest reserves, legal means of intervention.	NATIONAL: Framework for regulatory control of biomass use, declaration of forest reserves, legal means of intervention. DISTRICT: By-laws and incentives for use of alternative fuels. COMMUNITY: Incentives and awareness raising, by-laws and selfcontrol.
Climate	Declining rainfall is claimed to reduce the surface water availability, especially in the central plain around Mbale town (documentation needed)	Landuse regulation and control in particular relating to forests, general environmental protection and protection of water catchment areas.	NATIONAL: Framework for landuse planning, regulation, control and legal intervention. DISTRICT: By-laws relating to wetland use, forestry, water catchments and environment. COMMUNITY: Tree planting, community forestry, wetland conservation, environmental awareness.
USER REQUIREMENT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	
Environment	Reduction of minimum flows in rivers and streams affects the gradient from perennial-intermittent-ephemeral streams (from the mountains to the plain) and thereby the ecological base conditions for plant and animal life	Environmental policy and operational strategies, environmental impact assessments, ecological monitoring and regulatory means of intervention.	NATIONAL: Environmental policy and strategies, legal intervention framework, major EIAs. DISTRICT: Ecological monitoring, impact assessments, by-laws. COMMUNITY: Environmental awareness

Table 6.2 - Surface water quality

SURFACE WATER QUALITY (Mbale)			
IMPACT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Rural/semi urban sanitation	Low sanitation levels in areas near rivers and streams increase the risk of spreading water borne diseases due to the multi-purpose use of these surface water resources	increased awareness on sanitation, education w ^h in health and hygiene, promotion of pit latrine construction and use.	NATIONAL: Policy and strategy for sanitation. DISTRICT: Latrine promotion, hygiene and sanitation education. COMMUNITY: Construction and increased awareness about benefits of latrines.
Urban sanitation	An old network of sewers in Mbale town may cause contamination of the drinking water supply network due to leakages. Effluents from Mbale municipal waste water treatment works contaminate the Manafwa river, which is also used for domestic water supply	Efficient operation and maintenance of both water supply and sewer networks, Regulations for network control and maintenance procedures. Efficient operation of waste water treatment plants, Regulations for operation, monitoring and control of treatment efficiency and effluent quality.	NATIONAL: Policies, strategies and standards for wastewater treatment and discharges. DISTRICT: Regulations for network control and maintenance, Regulations for effluent control and treatment efficiency. COMMUNITY: None.
Industry pollution	One soap/oil industries, a textile industry (not operating) and an abattoir discharges waste water into the municipal sewer system of Mbale town. The organic wastes increase the loadings to the treatment plant which also treats domestic sewage from an increasing population. A rehabilitation of the ATM textile industry after privatisation will make this factory contribute with toxic chemicals to the sewer system and induce risk of affecting the treatment processes negatively. A soap/oil factory discharges wastes directly.	industrial effluent standards and regulations based on trade-offs between treatment costs, capacity of the municipal treatment plant, and environmental benefits. Monitoring and control of effluents, industrial environmental awareness building, legal means of interventions in case of violations. Economic incentives.	NATIONAL: Policies, strategies, effluent standards, guidelines for EIAs, regulations and intervention means, economic incentives. DISTRICT: EIAs, monitoring and control of effluents, environmental awareness building. COMMUNITY: None.
Fish ponds	Mbale District has more than three hundred fish ponds mainly located in central plain, and the activity is increasing as land owners become aware of the economic benefits from this activity. The ponds take in water from streams and rivers, and from time to time they are flushed releasing settled organic material to the receiving waters. Fish farmers are advised to increase and intensify the production by adding more organic inputs.	regulations for flushing procedures and assessment of trade-offs between stream water quality and fish production	NATIONAL: Policy and strategy for development of fish ponds. DISTRICT: Permits for water abstraction for ponds and impact assessments in case of intensive aquaculture. COMMUNITY: Awareness of possible environmental impacts of fish pond operation.

SURFACE WATER QUALITY (Mbale)

IMPACT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Deforestation cultivation	The intensive cultivation of mountain slopes as well as river banks is claimed to have increased the erosion severely causing silted rivers and streams.	regulatory control of land use. Incentives for use of alternative farming practices (more efficient food production), declaration of forest reserves, legal means of intervention.	<p>NATIONAL: Policy and legal framework for interventions regarding landuse.</p> <p>DISTRICT: Regulatory control and enforcement. Incentives for use of sound farming practices, declaration of forest reserves.</p> <p>COMMUNITY: Awareness of negative effects of soil erosion and sound farming practices.</p>
USER REQUIREMENT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Domestic use	<p>Due to scarcity of developed ground water sources in Mbale district, a substantial number of households depend on surface water for consumption (mostly rivers and streams). No direct monitoring of the surface water quality actually TAKES place, but it is well known (also among people in the district) that the quality of these sources often is questionable for drinking purposes. Often the source used for drinking water is also used for wastes, washing, cattle watering etc. High content of silt also hampers water intakes for domestic supply.</p> <p>A transboundary case exists in the district, where the Lwakaka River crosses the border from Kenya. The villagers on the Kenyan side drain the latrines directly to the river, which on the Ugandan side is used for drinking water.</p>	<p>coordination between upstream/downstream riparian use and that regulations and standards for effluents are enforced. Monitoring and control, effluent permits based on environmental impact assessments and legal means of intervention.</p> <p>In transboundary cases - government agreements on cooperation within river management and establishment of communication lines between Kenyan and Ugandan officials.</p>	<p>NATIONAL: Policies, regulations and standards for effluents, framework for enforcement.</p> <p>DISTRICT: Planning and coordination of upstream/downstream riparian use, monitoring and control, enforcement.</p> <p>COMMUNITY: Awareness of water quality-health relations.</p> <p>INTERNATIONAL: Government agreements on cooperation re pollution of transboundary rivers.</p>
Environment	Pollution and nutrient enrichment from eg. sewage outlets and industry effluents affect the ecological conditions of the receiving waters. Similarly, increased silt concentrations impacts the living conditions for e.g. the fish fauna.	Environmental policy and operational strategies, environmental impact assessments, ecological monitoring and regulatory means of intervention.	<p>NATIONAL: Environmental policy and strategies, legal intervention framework, EIAs for major projects.</p> <p>DISTRICT: Ecological monitoring, impact assessment, by-laws.</p> <p>COMMUNITY: Environmental awareness.</p>

Table 6.3 - Groundwater quantity

GROUND WATER QUANTITY (Mbale)			
IMPACT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
None			
USER REQUIREMENT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Domestic use	The domestic use of ground water in Mbale District is mainly limited by the progress of development of single sources (boreholes, shallow wells, protected springs etc.). Many old boreholes are out function.	Management requires demand driven planning of source development consistent with overall national policies. Management of maintenance aspects requires action at consumer group level, intermediate level and district level.	NATIONAL: Source development policy and strategies. DISTRICT: Promotion of demand driven source development. COMMUNITY: Participation

Table 6.4 - Groundwater quality

GROUND WATER QUALITY (Mbale)			
IMPACT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Sanitation	Location of pit latrines near water sources such as springs and wells impose risk of faecal contamination of the source, resulting in increased risk of spreading diseases.	Development of standards for location of latrines in relation to sources, adequate technical guidance for borehole and well construction and creation of awareness of sound hygiene and sanitation practices near boreholes and wells.	NATIONAL: Standards for latrine construction. DISTRICT: Enforcement of standards COMMUNITY: Awareness of sound hygienic behaviour near water points.
Solid waste	In the towns in Mbale district the collection system for solid wastes is not very developed. However there is a risk of contamination of the groundwater sources locally near dump sites.	A clear definition of institutional responsibility, guidelines for environmental assessment of solid waste disposal sites, regulatory means of rejecting proposed sites and guidelines for operation of solid waste deposits.	NATIONAL: Solid waste policy, strategy, allocation of institutional responsibility, guidelines for planning, design and O & M. DISTRICT: Site selection and EIA COMMUNITY: Awareness of need for solid waste management at household level.
USER REQUIREMENT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Domestic Use	In general the basic quality of the ground water resources in the district is adequate. However, a high number of non-protected springs are used. Saline boreholes have been reported, but the available information on ground water quality is scarce.	Management requires monitoring of groundwater quality and enforcement of standards by closure of boreholes with substandard water quality.	NATIONAL: Drinking water standards with appropriate flexibility. DISTRICT: Groundwater quality monitoring COMMUNITY: Awareness of sound hygienic behaviour near water points.

7 ASSESSMENT OF PRESENT MANAGEMENT

The existing institutions for district and community management were described briefly in Chapter 5, and the water resources issues and their related management functions were identified as they appeared in Mabale District in Chapter 6. In the following tables, water resources management in the district will be assessed with respect to significant potentials, as well as constraints, within the existing management system at district level.

The management functions are divided into three categories according to the character of the issues to be dealt with. These are:

- management issues concerning geographically localized water resources problems with relatively simple responsibility relations and management functions
- management issues concerning geographically scattered water resources problems (or causes) with unclear definitions of responsibility and complex cause/effect relationships
- management issues concerning the availability of water compared with the demand. The related management functions mainly include prioritization of funds to be used in water development projects.

It should be noted, however, that the major constraint affecting all the water management functions is financial. There are at present severe constraints on both national and district finances, with very few funds available for development purposes.

7.1 Geographically localized water resources issues

Table 7.1 - Wastewater from urban sewers, industry and aquaculture

MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS
Policy formulation for local water pollution	Political system in place (RC councils and district/sub-county water committees) Water Officer, Health Inspector and Medical Officer of Health in position as advisors	National water resources/environmental policy framework not in place Lack of guidelines for policy making Lack of local standards Not all water committees functional

MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS
Monitoring of surface water quality	Water Officer in position. Health Inspector (incl. extension service) in position. Municipal Officers of Health in position. System of local water committees initiated.	No formulated monitoring strategy. Inadequate knowledge on surface water quality. No qualified staff to dedicate for WQ monitoring. No monitoring equipment Inadequate transport. Inadequate budget for monitoring costs. Very limited access to laboratory facilities - no test kits.
Technical assessment of requirements and impacts	Water Officer in position. Health Inspector (incl. extension service) in position. Municipal Officers of Health in position	Low theoretical knowledge on WQ impact assessment. No guidelines for impact assessment. No national or local standards limited budgets
Issuing permits	Administrative system operational in district and municipalities	Unclear interface between District and municipality authorities.
Control of fulfilment of permit conditions	Water Officer, Health Inspector, Medical Officer of Health and Industry Inspectors (Ministry of Industry) in position	No formulated control strategy. Low knowledge on surface water quality. No qualified staff to dedicate to WQ discharge control. No monitoring equipment. Inadequate transport. Low budget for running costs. Very limited access to laboratory facilities. Unclear relation between ministries.
Enforcement of permit conditions	Court system (magistrate), police etc. functioning	Lack of specific legislation. Unclear responsibilities towards third parties

Table 7.2 - Pollution from solid waste disposal

MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS
Site selection based on Environmental Impact Assessment	Medical officer of Health in position in municipality	Low capacity for EIA
Implementation of disposal system	City engineer in position	Low capacity for collection and disposal

7.2 Geographically scattered water resources issues

Table 7.3 - Adverse impacts on hydrological regime

Management functions for:		Decreased minimum flow in rivers and siltation caused by deforestation (cultivation)
MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS
Local policy formulation and regulations for agricultural practices	Political system in place (RC councils) Forestry Officer and Agriculture Officer in position for advice	National water resources/environment/forestry policy framework not in place Lack of guidelines for local policy making No Environment Officer
Cross-sectorial coordination between water, agriculture and forestry incl. technical assessments of agriculture and forestry development related to impact on the water resources	Water Officer in position. Agriculture Officer (incl. extension service) in position. Forestry Officer in position (inc. extension service). District development committee in place. Extension Coordinator for Agriculture, Forestry and Fisheries in place	Low theoretical knowledge on water resources impacts from agriculture/forestry activities Lack of formalised coordination regarding water aspects of agriculture/forestry projects Economic pressure
Incentives for alternative agricultural practices	District development Officer (incl. extension service) in position. Forestry Officer (incl. extension service) in position. Agricultural Officer (incl. extension service) in position. RC's and Chiefs in place (as mobilizers). Terracing/band planting programme initiated	High population pressure. The demand of vegetables is high (Kampala market). Land ownership, land rights and land use policies need adjustment. Low public awareness.
Enforcement of regulations	Forestry police, Chiefs and local police in place. Court system functioning (RC and Magistrates).	Lack of specific legislation. Public and political pressure. Local bias in RC courts.

Table 7.4 - Sanitation impact

Management functions for:		Local contamination of surface and groundwater due to low sanitation levels
MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS
Latrine promotion, hygiene and sanitation education.	Health Inspector (incl. extension service) in position. Water Aid in operation - RUWASA project coming	Funding. Lack of awareness. Local beliefs and taboos. Soil conditions.
Establishment of communication lines to neighbouring district in Kenya	Collaboration between the two districts in place	Enforcement difficult

7.3 Issues concerning availability of water compared with demand

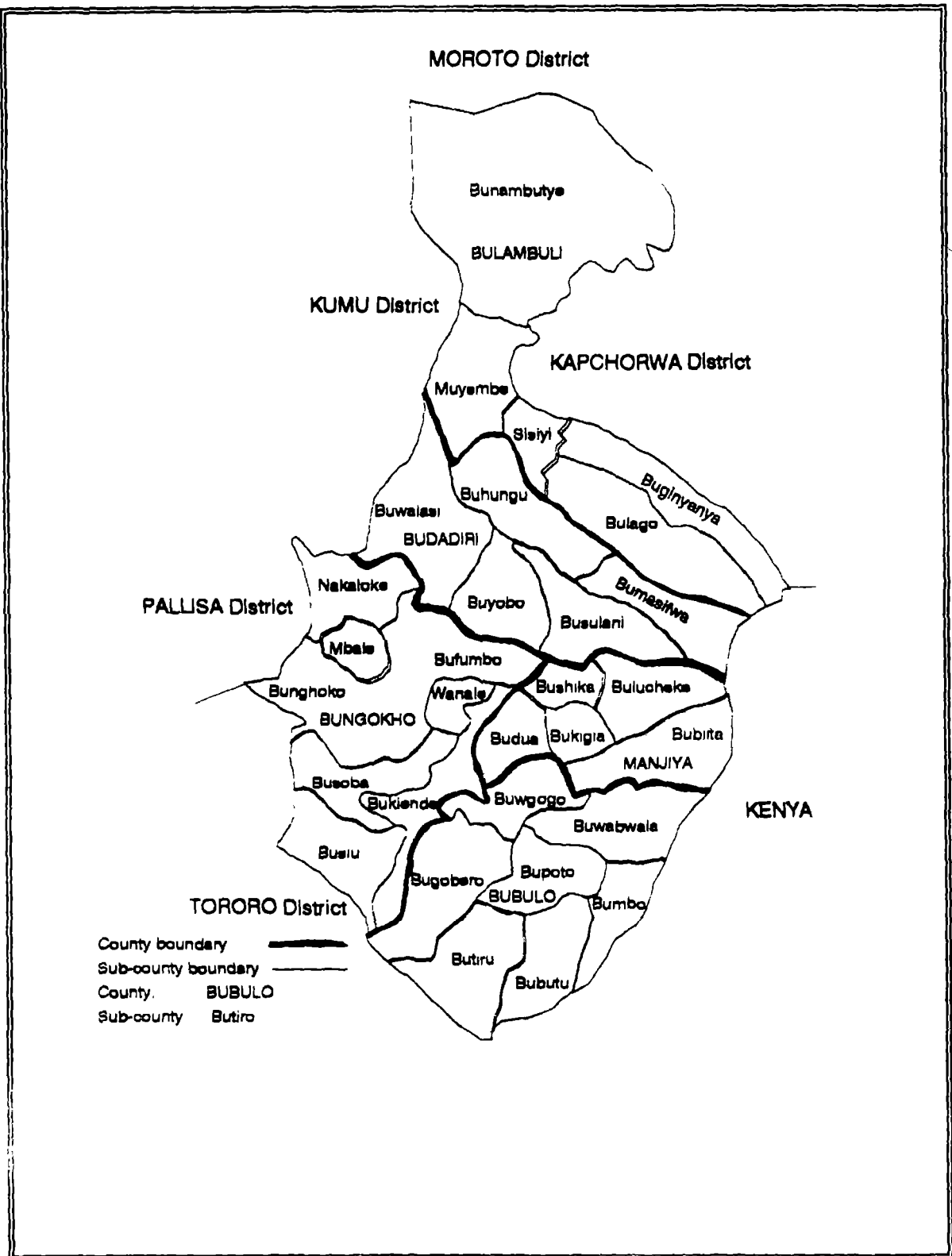
Management functions for: Scarcity of safe water sources		
MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS
Assessment of quantity and quality incl. spatial distribution of water sources and resources	Water Officer, Community Development Officer, Health Inspector (incl. extension service) in place. RC's and water committees in place. Water Aid operating - RUWASA project coming	Limited capacity. Inadequate transport. Limited budgets.
Policy/prioritization of development of domestic/livestock water supply	Political system in place (RC councils, district/sub-county water committees), assisted by Water Officer, Health Inspector, Veterinary Officer and Chiefs. Water Aid in operation - RUWASA coming	Weak coordination of priorities between DWD, District and projects High demand - local pressure
Development	Water Officer, District/Sub-county Water committees in place - RUWASA project coming in 1995	Relatively limited funds. Limited availability of equipment

APPENDICES

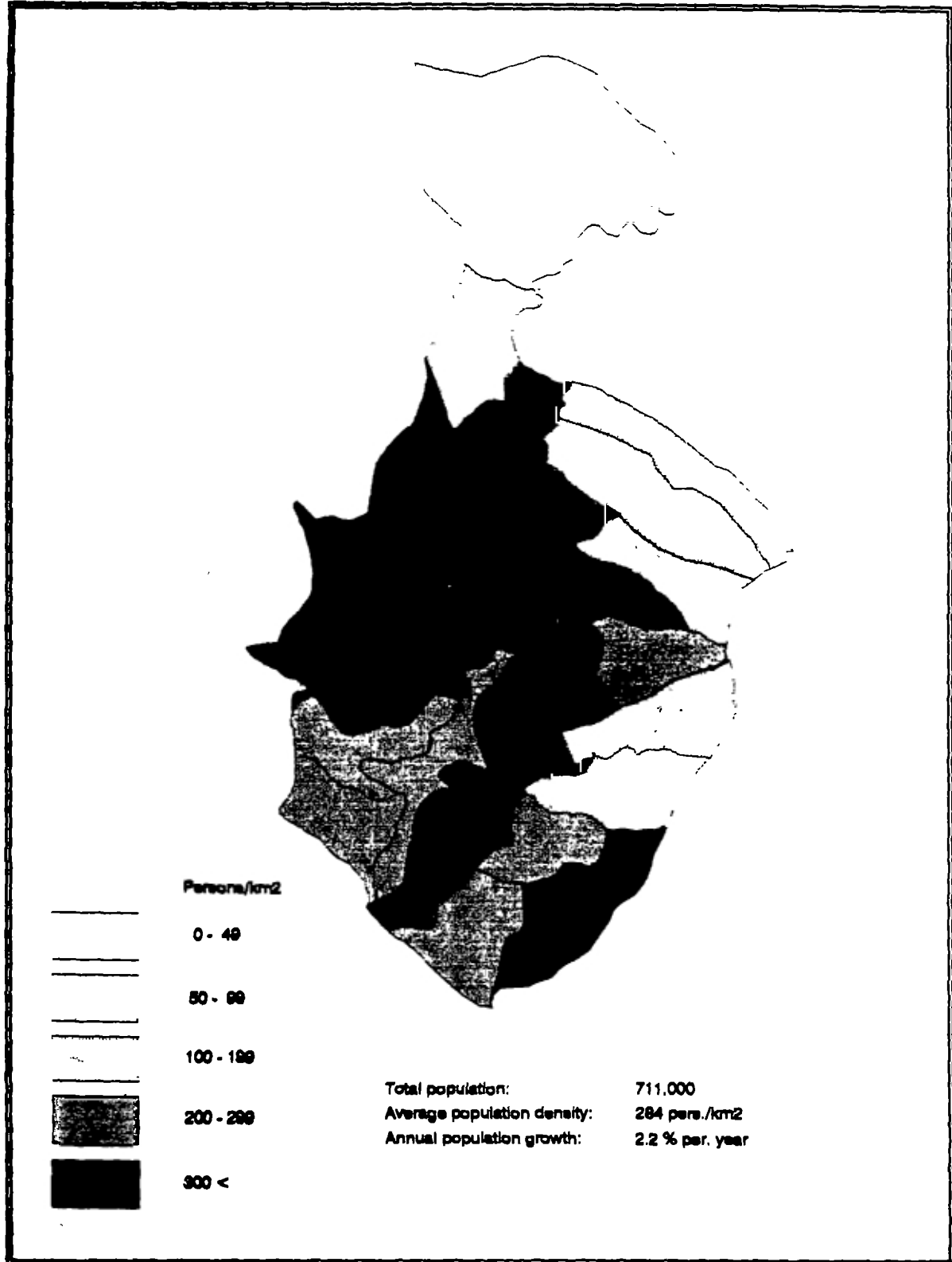
ANNEX 2

MBALE DISTRICT

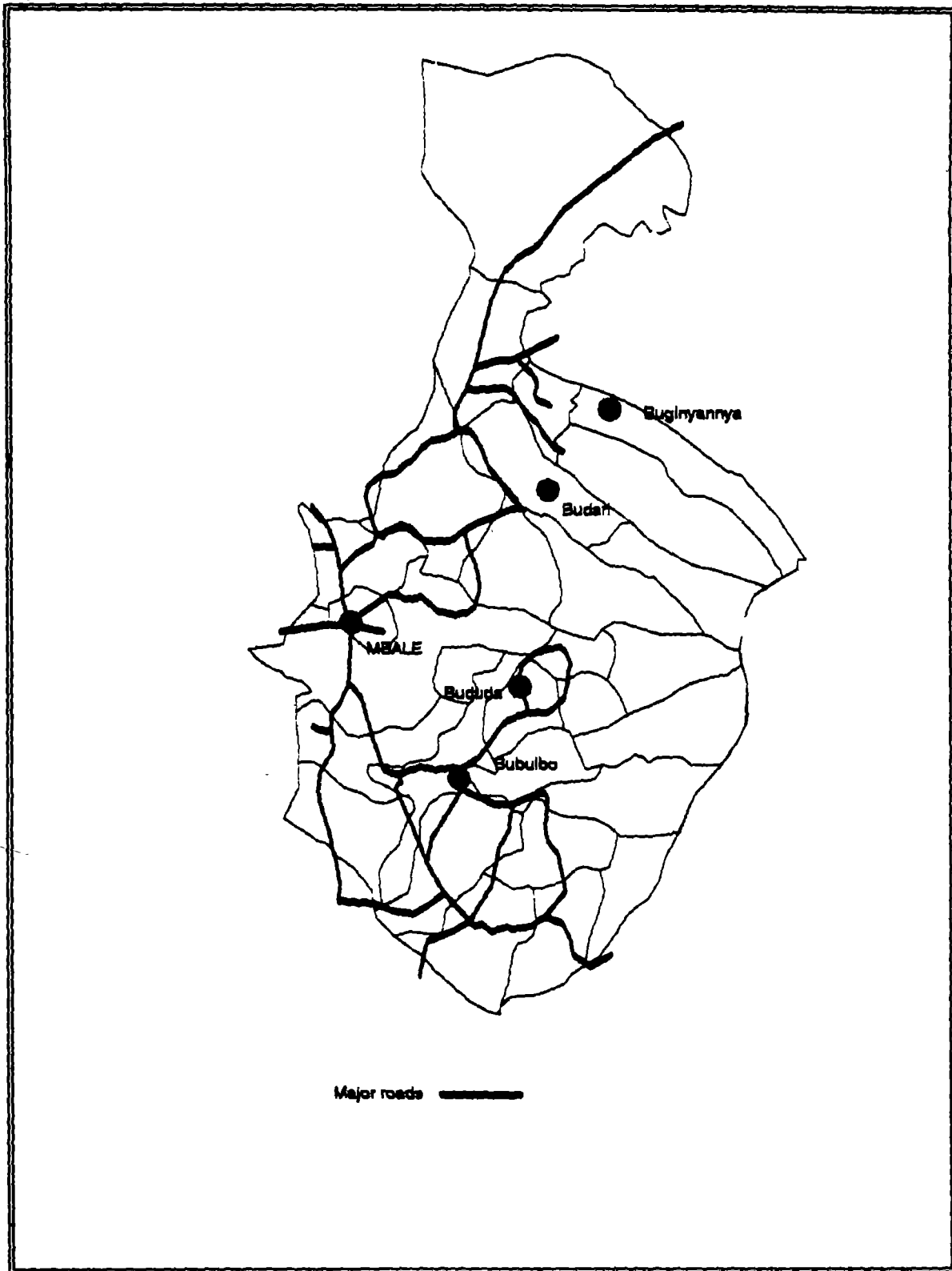
Mbale District



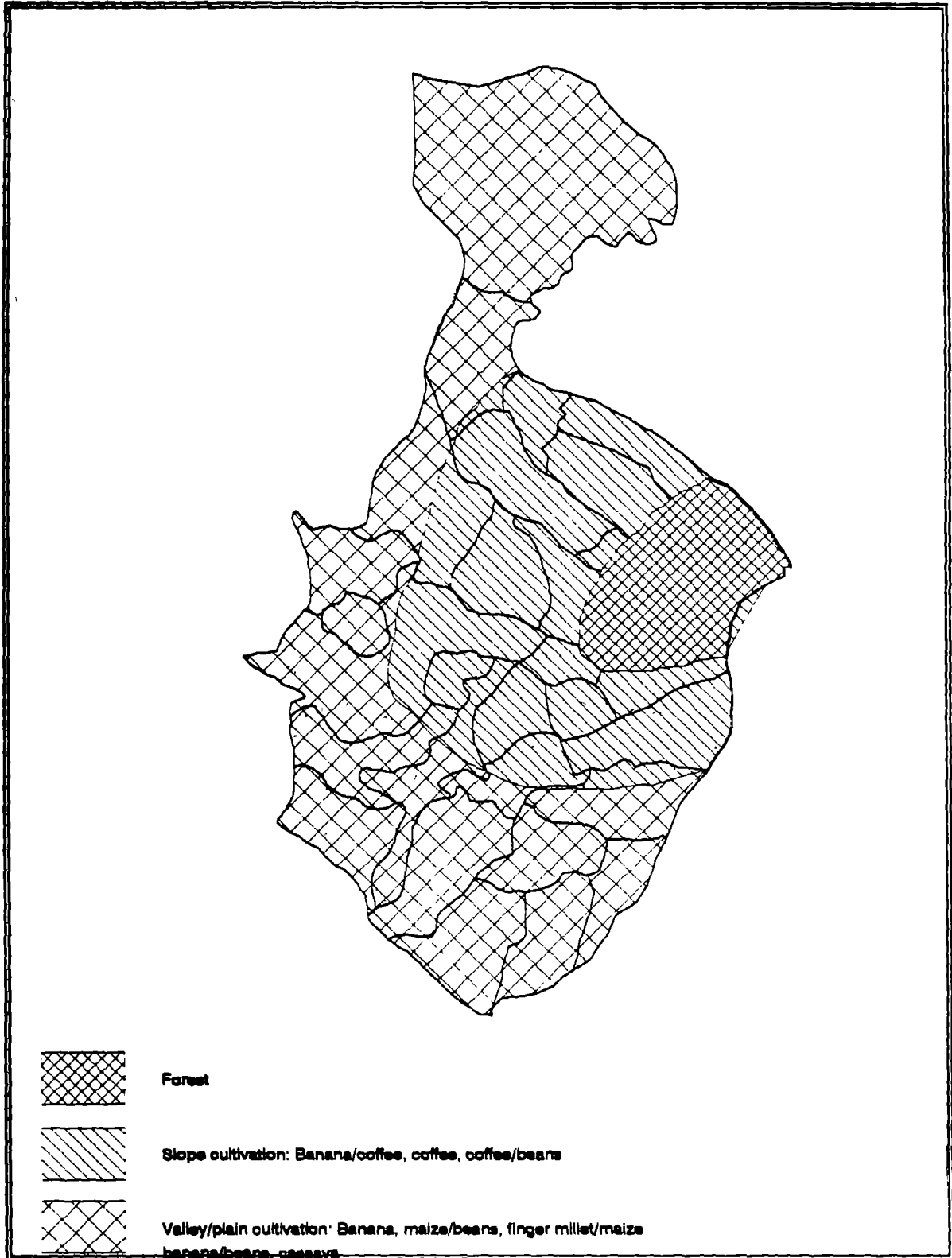
Population density



Infrastructure



Economic activities



1 GENERAL

The present land tenure situation in Uganda is a complex of various co-existing pre-colonial, colonial and post-colonial land tenure systems and land reforms. There are, also, some significant differences between what the law dictates and what goes on in practice.

2 LAND TENURE LAW

The 1975 Land Reform Decree No. 3 declared all land in Uganda to be public land - to be administrated by the Uganda Land Commission. All individual holdings were supposed to be converted into leaseholds. The lease period was meant to be 99 years for individuals and 199 years for public bodies. The 1975 Land Reform Decree No. 3 is the binding law on land tenure. However, various pre-colonial and colonial systems are still followed, both by the land administrators and by the landowners. These systems are:

- customary tenure
- mailo land
- freehold
- leasehold

3 CUSTOMARY LAND TENURE

These systems are pre-colonial, and they are the most widespread in the country. Specific regulations vary, of course, with each ethnic group and with certain localities. However, two major types of customary land tenure systems can be identified:

- specific permanent single holdings
- communal land with non-permanent holdings

The practice of having specific permanent single holdings is predominant in the southern and the eastern parts of Uganda. Each family has its own plot where it lives and cultivates the land. The head of the household decides on the use and transferability of the land. Access to land is gained through inheritance.

Communal land with non-permanent holdings is most common in the northern part of the country, but is also found in rangeland areas of the southern districts (Mbarara, Mubenda, Kiboga, Luwero, Rakai, Mukono, and Kamuli) and in the Lake Albert flats. Most of the traditional cattle are kept on communally held land. Where arable agriculture is dominant, areas of land are set aside for communal grazing and specific plots are allocated to families for homesteads and cultivation. There is no permanency in the system. Land is only retained as long as it is in use. The male elders decide who shall use a particular piece of land. Customary holders do not have any formal legal rights to the land according to the 1975 Land Reform Decree No.3.

4 MAILO LAND

The "mailo" system originates from the Buganda Agreement of 1900 between the Kabaka and the Protectorate Government. The Buganda land was divided between the Protectorate Government (Crown land and later public land) on the one hand and the Kabaka and his family and chiefs (mailo land) on the other. The mailo land was parcelled out into private and official estates. Later on, the land was surveyed and titles were given to the recipients. Customary holders became tenants of the mailo land owners. These tenants were required to pay mailo landlords for the use of the land. The system was officially abolished in 1967, and mailo land transformed into public land. In reality, the private mailo land remained as before. However, some of the mailo land has been transformed into leaseholds.

The mailo land owner enjoys full right of ownership and use of his land. Government has no access to mailo land, except in an advisory capacity. However, the mailo land owner is limited in his use of certain economic resources (minerals, for example) on his land. Government reserves the use of such to itself.

5 FREEHOLD

The term "freehold" refers to land owned by private individuals or organizations in perpetuity. By the Toro and Ankole Agreement of 1901, and the Bunyoro Agreement of 1933, the kings and their chiefs were granted land either as private or official estates. The rights to important resources remained with the Protectorate Government. Peasants on the land were transformed to tenants.

Another type of freehold land is crown land sold for development purposes. These freeholds were subject to development conditions and could be forfeited to the Colonial Governor if conditions remained unfulfilled. The 1969 Public Lands Act vested former Crown land occupied for Government purposes in the Uganda Land Commission as freehold. Crown land formerly occupied by public bodies was also vested in those bodies as freehold.

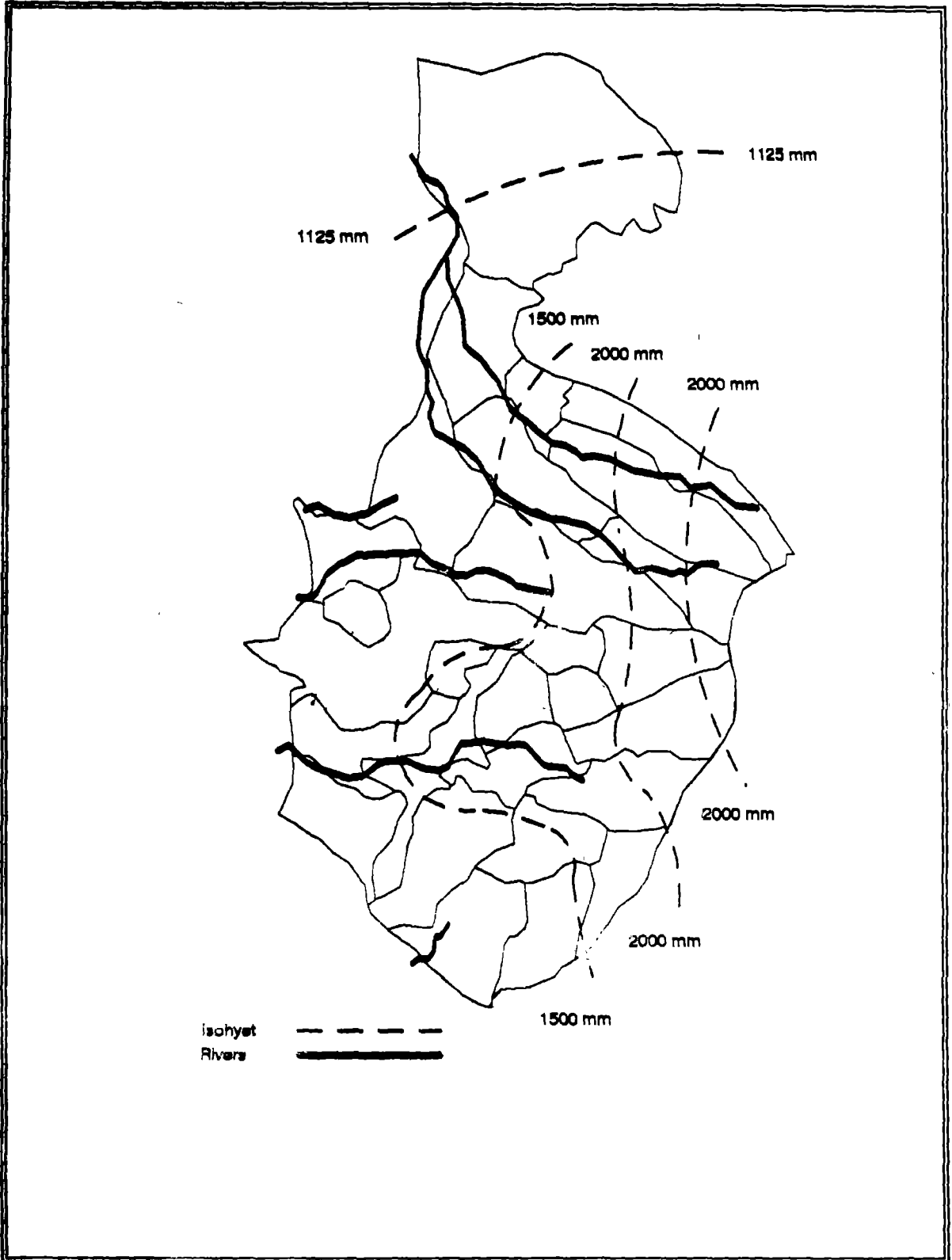
The leasehold system is based on an agreement (lease title) between the lessor (usually the Government) and the lessee (a developer). Land is leased out for development. It is more common in urban areas than in rural areas. The system originates from the 1975 Land Reform Decree.

There are three ways to obtain a lease:

- from the Uganda Land Commission
- from an urban authority on behalf of Uganda Land Commission
- from a private individual outside Government as a private lease.

Land gazetted for a specific purpose (eg. a forest reserve) cannot be leased. The Minister's approval is required for lands exceeding 200 ha or 500 acres.

Hydrology



1 GENERAL

The most distinctive and vital feature of politics in Uganda is the hierarchial system of Resistance Councils and Committees. This RC system was originally set up in the bush by the National Resistance Movement (NRM) during the civil war. The purpose then was to maintain links with the civilian population; after 1986 it has become the main mechanism through which local grievances can be expressed and officials, at all levels, can keep contact with the public.

2 THE RC STRUCTURES

2.1 Local level

All adults (those of 18 years and more) in a village or a sub-ward constitute the RC 1. The members of the Council elect the nine member RC 1 Executive Committee.

RC 1 committee members within a parish or a ward compose the RC 2, which elects the nine member RC 2 Executive Committee. The RC 3 at sub-county or town level is composed of members of the RC 2 committees. The members of the RC 3 elect the RC 3 Executive Committee. The process is continued at county or municipality level, the RC 4. (But the RC 4 is generally not active except in municipalities.) The RC 5, at district level, consists of two elected representatives from each RC 3 and one elected female representative from each RC 4. The RC 5 elects an Executive Committee from among its own members.

Each RC Executive Committee consists of a Chairman, Vice chairman, Secretary - and Secretaries for Finance, Security, Youth, Women, Information, Mobilization and Education. The total number of committee members in Uganda is over 350,000. The committees are elected every second year.

2.2 National level

The membership of the National Resistance Council is as shown in the following table.

Table 1.1 - Composition of the National Resistance Council

THE NATIONAL RESISTANCE COUNCIL	
NO. OF REPRESENTATIVES	ORIGIN OF REPRESENTATIVES
	The historical members (constituted in the bush during the resistance war)
1 from each county	Representatives elected from every county, by councillors of all RC 3 (sub-county) councils
10	The National Resistance Army (NRA)
1 from each district	Female representatives elected from every district by councillors of the RC 5 (District)
5	Youth representatives elected from the National Youth Organisation.
3	Workers' representatives, representing all the workers elected by the National Workers' Organisation
20	Presidential nominees
1 from each Division of Kampala	Representatives from each Division of the city of Kampala, elected by councillors of all wards in the division
1 from each municipality (2 from Jinja)	Representatives from each municipality

Policy is formally made by the National Executive Committee of the National Resistance Movement. The NEC comprises:

- the historical members of the NRC
- one representative from each district elected by the NRC, from among the RC 5 representatives.
- ten presidential nominees, from among the members of NRC.

3 POWERS AND RESPONSIBILITIES

The NRM has always tended to increase the authority of the RCs. They have been given powers to hear domestic and land disputes, try minor misdemeanours, maintain law and order, develop and maintain infrastructure. And they are encouraged to set up local defence units. All levels of the RC system can pass by-laws. The RC 3 and RC 5 have been given corporate legal status, so they can engage in economic as well as political activities (which means that they are entitled to sell services in competition with the private sector). They are also used as implementing agencies by donors and NGOs. In performing their judicial, service delivery and development roles, the RCs coexist with the administrative system.

3.1 RC Courts

Resistance Committee Courts are courts established by the Resistance Committee (Judicial Powers) Statute of 1988. The RC Courts comprise the nine members of the RC Executive Committee. RC Courts exist at RC 1, RC 2 and RC 3 levels.

The jurisdiction of the RC Courts is within civil cases and customary law. They are supposed to deal with cases concerning, for example, debts, contracts, trespass, land disputes relating to customary tenure, marital disputes. The RC Courts have no powers to try criminal cases, though they may arrest an offender and hand the offender to the police. Every suit should be instituted in a court within the local limits. Where a defendant objects to the jurisdiction of the court, the case should, if the objection is upheld, be referred to a higher court.

Court proceedings are held in an open place, where members of the public can enter and listen to the proceedings. Every question arising before court should be determined by consensus; in default of a consensus, it is determined by a majority vote of the members sitting - provided that, where decisions are made by voting, the chairman does not have an original vote, but, in cases of equal votes, he has a casting vote.

In cases of infringement of by-laws, the RC Court can impose a fine or any other penalty authorised by the particular by-law. All cases brought before the RC 1 Court have rights of appeal to RC 2 and RC 3 levels. If a case is not settled satisfactory at the RC 3 level, it can, in certain circumstances, be brought to the Magistrates Court, Grade I.

3.2 Water committees

Initially, the RC system did not contain any special institutional arrangements for the management of water resources. Now, however, there are many groups and committees set up for the management of water sources and facilities.

3.2.1 RC 1 Village Water Committees

Two responsible residents in the village, a man and a woman, living near the water source (borehole, spring, well, etc.) are charged with the responsibility for the day-to-day care of the utility. These two belong to a larger "Users' Committee", but they have specific assignments, such as keeping order at the point source and collecting users' fees. The Users' Committee acts as a sub-committee of the Village Water Committee within the RC 1, and it is responsible to the RC 1 Committee. The caretakers should normally report to the RC 1 Committee. In areas where the RUWASA project is operating, the Users Committees are permitted to report directly to the RC 3 Water and Health Committees.

3.2.2 RC 3 Sub-county Water and Sanitation Committees

These are sub-committees of the RC 3, in charge of water and sanitation. Their main functions are to coordinate and supervise the work of the Users Committees - to receive progress reports from these committees and to take appropriate action. They can organize meetings for disseminating information to the community or for training committee members and water facility attendants.

3.2.3 RC 5 District Water and Sanitation Committees

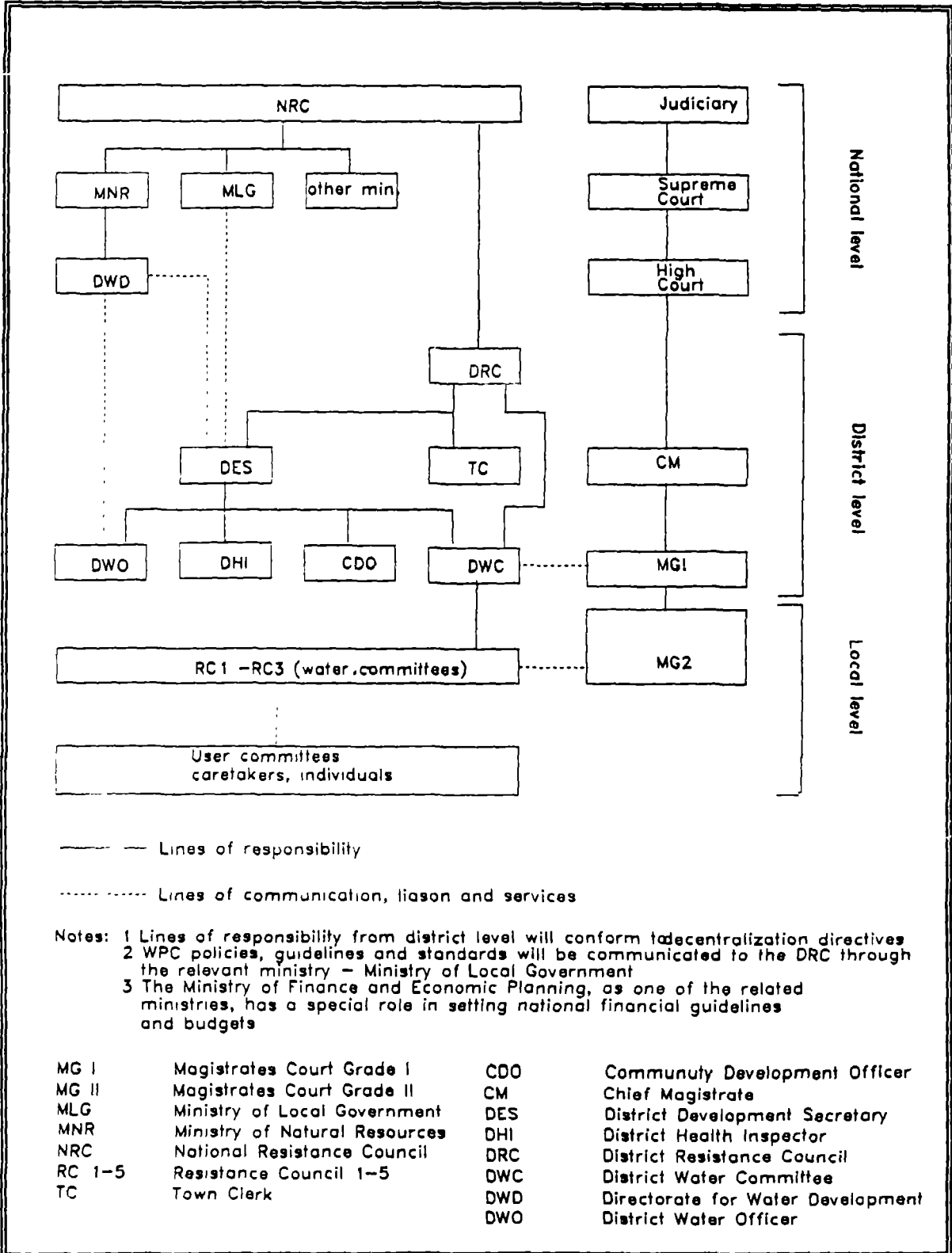
These committees are sub-committees of the District Resistance Councils charged with the overall policy formulation and guidance in matters relating to water supply and sanitation within the district. They register, monitor and coordinate NGOs who are active in the water and health sector. They report to the RC 5, which, as the district parliament, debates policies, designs strategies, passes budgets and approves programmes.

4 LINKS TO THE ADMINISTRATIVE SYSTEM

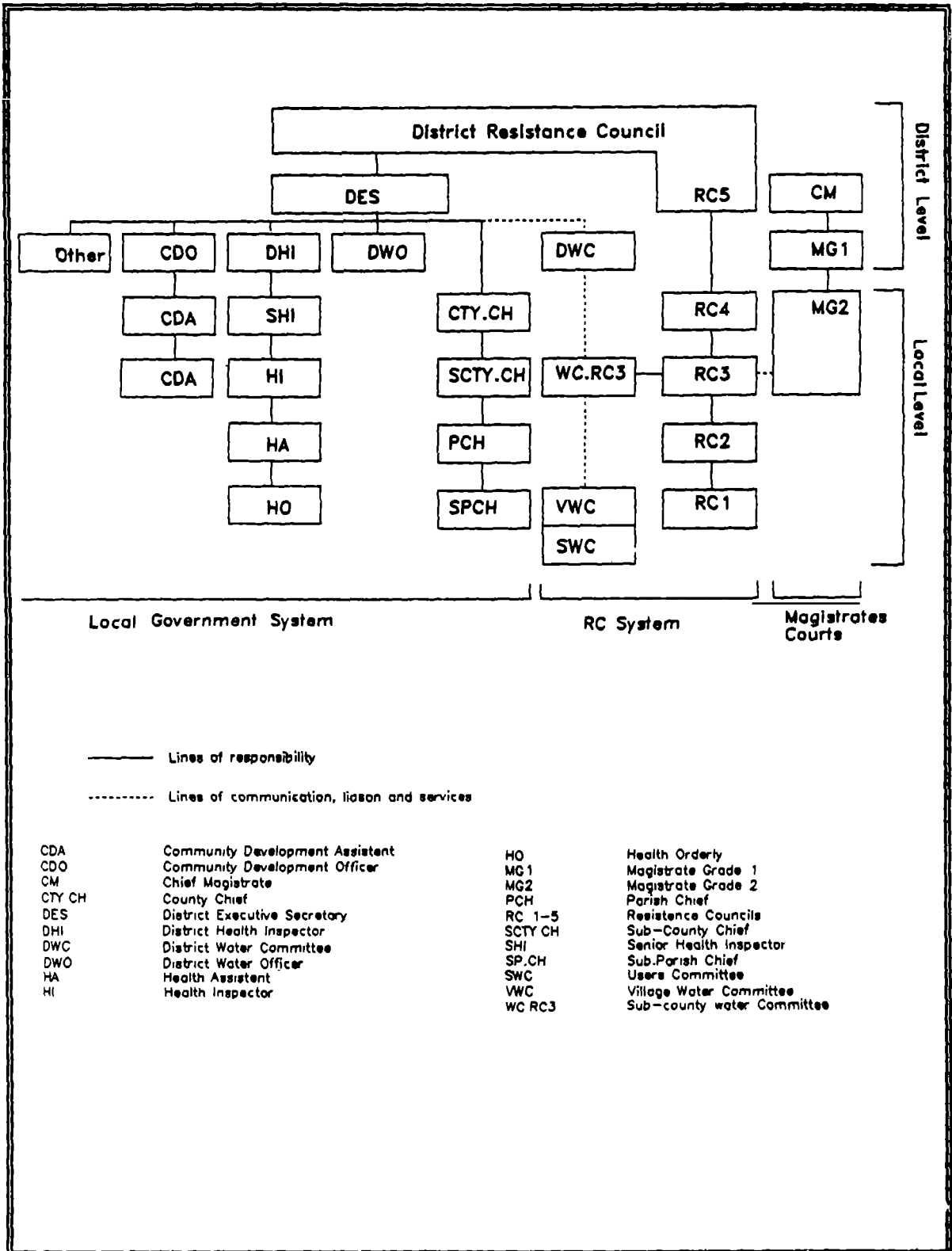
The RC system has always co-existed with the administrative system, but, sometimes, there have been uncertainties concerning the demarcation of tasks. The ongoing decentralization programme is expected to eliminate any such "boundary" issues.

The Resistance Councils have acted as legislative bodies, while the Local Government Administrations have assumed the executive role. Now, the Chairman of the RC 5 will replace the appointed DA as the political head of the district. All locally-based Ministry staff will become accountable to the DES, who is the administrative head of the district - responsible to the Council rather than to the Ministry of Local Government. The DA remains, but becomes a "Representative of the Central Government" - with a responsibility for overall security and defence.

Administrative levels



District level and local level institutions



ANNEX 4

DISTRICT STUDY - MOROTO

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APPENDIX 5.3	District level and local level institutions

LIST OF ABBREVIATIONS

ACAV	Associazione Centro Aiuti Voluntari
AMREF	African Medical Research and Education Foundation
ATM	African Textile Mill, Mbale
BOD	Biochemical Oxygen Demand
CDO	Community Development Officer
CIDA	Canadian International Development Agency
DA	District Administrator
Danida	Danish International Development Assistance
DAO	District Agricultural Officer
DDC	District Development Committee
DES	District Executive Secretary
DHC	District Health Committee
DHEO	District Health Education Officer
DHI	District Health Inspector
DMC	District Water and Health Management Committee
DMO	District Medical Officer
DRC	District Water Engineer
DRC	District Resistance Council
DWD	Directorate of Water Development
DWO	District Water Officer
EIA	Environmental Impact Assessment
FHh	Female-headed household
HYDROMET	Hydrometeorological Survey of the Catchments of Lakes Victoria, Kyoga and Albert
IDA	International Development Agency
KDA	Karamoja Development Agency
LMNP	Lake Mbuho National Park
LWF	Lutheran World Federation
MLG	Ministry of Local Government
MOH	Municipal Medical Officer
NEAP	National Environmental Action Plan
NEC	National Executive Committee of the
NGO	Non-Governmental Organization
NRM	National Resistance Movement
NWSC	National water and Sewerage Corporation
NYTIL	Nyanza Textile Industry Limited
RC	Resistance Council
RUWASA	Rural Water and Sanitation (East Uganda Project)
SCOUL	Sugar Corporation of Uganda Limited
SIDA	Swedish International Development Authority
SWIP	South-West Integrated Health and Water Programme

UNICEF	United Nations Childrens Fund
UWE	Urban Water Engineer
WAP	Water Action Plan
WATSAN	National Water and Sanitation Programme (a UNICEF programme)
WDD	Water Development Department (former name of DWD)
WFP	World Food Programme
WID	Ministry of Women in Development
WPC	Water Policy Committee

1 INTRODUCTION

1.1 Background

A first phase of the "Water Action Plan for Water Resources Development and Management" (WATER ACTION PLAN PHASE I) was prepared from February to May 1993. The major components were:

- draft water resources policy
- draft rapid water resources assessment
- draft institutional & management study
- international study

In the period from June to November 1993, follow-up work was carried out during the "Consolidation Phase I", which also comprised preparatory activities for Phase II. These activities were preliminary data collection and information gathering in five districts selected as pilot areas for studies to be undertaken under Phase II. The Consolidation Phase I activities were undertaken by the project counterpart staff.

The Project Document entitled "Water Action Plan for Water Resources Development and Management" (WATER ACTION PLAN PHASE II) describes the second phase of the project to develop a Water Action Plan for Uganda. The work on the Phase II started in November 1993. The second phase will produce among other items:

- an outline proposal for appropriate local water resources management levels based on district studies
- an outline proposal for management procedures providing the administrative machinery at national and district levels with guidelines for sustainable water resources management

District studies to support such proposals were carried out in each of five selected pilot districts: Arua, Mbarara, Mukono, Mbale and Moroto. These studies comprise reconnaissance level evaluations of sociological and economic conditions which combine to give the background for assessments of water uses and demands. These uses and demands are compared to available water resources in terms of quantity and quality.

An unequal distribution of demands and resources leads to the identification of a number of water resource issues and cases which require management strategies and capabilities at different levels (national, district, and community). Based on the existing institutional and judicial framework, management potentials and constraints are identified and evaluated.

1.2 District studies

The objective of the district studies is to gain knowledge adequate to recommend which aspects of local water resources management can be generalized throughout the country and which aspects are area specific and require some adaptation of the general principles. Further, the objective is to support the preparation of guiding principles for the distribution of management responsibilities between national and local levels.

The tasks undertaken in fulfilling these objectives were:

- data reviews and brief reconnaissance
- identification of water resources issues
- review of the role of formal and informal institutions in water resources management
- identification of necessary management functions
- preliminary assessment of water resources management capacity in relation to the management functions and responsibilities
- assessment of the role of women

The 5 pilot district studies were supplemented by short visits to other districts where particular issues are dominant features (wetland cultivation, aquaculture, soil erosion etc.)

Thus, the district studies do not describe the characteristics of a district in detail, giving a comprehensive geographical profile. The focus is on management of water resources and on the issues that are related to water resources. Further, it will become apparent that it is not the intention of the studies to propose solutions, but rather to identify the present and possible problems in order to recommend a framework within which such problems can be approached.

1.3 Mbarara District visit

Mbarara District was visited by the study team during the period from 31 January to 4 February 1994. Two days were used for interviews and discussions, as well as for the collection of statistics from the District Administration Headquarters in Mbarara Town.

After the meetings in the district centre, the team made a number of visits to local administration offices and sites, including:

- meetings with representatives from the town council in Mbarara
- meetings with representatives from some selected sub-county councils and water committees
- meeting with SWIP
- visits to various sites (water sources, gravity schemes, wastewater treatment plants)

During the visit, the team was accompanied by officers from the district administration, who acted as resource persons as well as guides.

The summaries and results from this district study are presented in the following chapters. Chapter 2 summarizes in a tabular form the main characteristics of Mbarara District - in terms of physical features, population, economic activities, health and sanitation. The water resources, their use and availability, are described briefly in Chapter 3; while Chapter 4 gives an overview of the consumer categories, the use of water in the district, and the demands. Chapters 1 to 4 all lead up to the description of the present institutions involved in water management in Chapter 5, and to the identification of issues and management functions and levels in Chapter 6. Chapter 7 gives an assessment of the present management capacities, related to the identified management functions.

General material on, for instance, the RC system and on land tenure systems is given in appendices.

2 DISTRICT SUMMARY

Table 2.1 - Physical features of Mbarara District

PHYSICAL FEATURES	
Location	Mbarara District in the western part of Uganda, borders the districts of Bushenyi to the west, Masaka and Kabarole to the north, Rakai to the east and in the south the Republics of Tanzania and Rwanda. (Ref. Appendix 2.1 and 2.3)
Area	10,839 km ²
Relief	The district is divided into two distinct areas: the low relief eastern part covering half the district, and the mountainous western parts. Altitudes vary from 1300 to over 2000 m above sea level.
Climate	<p>Rainfall:</p> <p>Mountains ranges (west): up to 1200 mm/year</p> <p>Low plains (east): average 500-1000 mm/year</p> <p>Bukanga and Kazo are the driest counties.</p> <p>Mean annual max. temperature: 25-27.5 C</p> <p>Mean annual min. temperature: 15-17.5 C</p>
Soils	<p>Low plains (east): sandy clay loam soils with low to medium productivity</p> <p>Mountains (west): in the well-drained sub-humid regions there are latosolic red friable soils.</p>
Landcover	<p>Low plains (east): dry acacia/grassland savanna</p> <p>Mountains (west): earlier extensive tree coverage on hills and ranges, now replaced by grassland savanna.</p> <p>total forest cover: 146 km²</p> <p>open water and swamps: 52 km²</p> <p>Estimated area of agricultural land:</p> <p>Cultivable land area: 9,447 km²</p> <p>Area under cultivation: 1,605 km² (17%)</p> <p>Potentially cultivable land is often used for grazing.</p>

Table 2.2 - Key population characteristics of Mbarara District

POPULATION	
Total	1991: 930,772 persons
Population growth	1969-80: 4.1% per year 1980-91: 2.7% per year Uganda 1980-91: 2.5% per year
Population density	1980: 65 persons/km2 1991: 86 persons/km2 Uganda 1991: 85 persons/km2 (Ref. Appendix 2.2)
Ratios	Urban population: 46,616 5% Rural population: 884,156 95% Uganda urban pop: 11.3% Uganda rural pop: 88.7% Males: 458,257 Females: 472,515 Sex ratio M/F: 97.0% Uganda sex ratio M/F: 96.5% Age structure: 0-15 years: 47.2% 15-64 years: 48.9% over 64 years: 3.4% Total no of Hhs: 170,676
Ethnic groups and languages	The district is populated mostly by Bantu groups, Banyankore and Bakiga. Their languages are Ruyankore and Rukiga, respectively. Banyankore society was traditionally stratified into pastoralists and agriculturalists. The Bakiga were mainly agriculturalists.
Patterns of migration	Due to increasing population in neighbouring districts (e.g. Kabale), the Bakiga have immigrated and settled in the hills of Ruhama, Ruwampara and Ibanda counties. Annual migration of livestock holders in search of water and pasture for their cattle, takes place mainly from Bukanga and Isingiro counties.

Table 2.3 - Main economic activities in Mbarara District (table continues)

ECONOMIC ACTIVITIES	
Occupation	In the eastern parts of the district most of the population are engaged in livestock/dairy farming and in the western, more densely populated mountainous parts, most people are engaged in agricultural activities.
Sources of income	<p>Agriculture is the most important source of income for a majority of the population - followed by livestock/dairy farming. Processing of agro produce (coffee) and industrial manufacturing provide employment opportunities.</p> <p>Common household-based activities include: brick making, charcoal burning and brewing of banana beer and alcohol. (Ref. Appendix 2.4)</p>
Agriculture	<p>Most agricultural households in the district are practising subsistence farming. Farming includes growing of bananas, coffee and beans. Food crops include: sorghum, finger millet, maize, cassava and sweet potatoes. Coffee is the most important cash crop.</p> <p>The customary land tenure system provides for individual holdings. 97% of all holdings are "Kibanja", a system without ownership title and without lease payment, while legal right of land use is retained. Average size of farm holdings is presently 1.1 ha, with increasing land fragmentation taking place due to population growth. 47% of all holdings in the district are less than 1 ha. (Ref. Appendix 2.5)</p> <p>In the humid western parts, farmers practise intensive cultivation on terraces. Agricultural crops are mostly rain fed. There is no significant irrigation in the district.</p> <p>Wetlands are increasingly being reclaimed for crop cultivation and pasture. By-laws to protect against drainage of swamps are not enforced, and the RCs are sometimes requested to take due action.</p> <p>Deforestation, soil degradation and erosion are found in the hilly, populous and humid areas in the west. Increasing population growth and pressure on land leads to farming practices harmful to maintenance of soil fertility (e.g. inadequate or no fallow periods).</p> <p>A pilot soil conservation project has started awareness-raising before conservation methods are introduced (e.g. bunds, grass strips, fodder cultivation).</p>

ECONOMIC ACTIVITIES			
Livestock	Livestock type	Nos.	Households with livestock (% of total)
	Cattle	607,396	24
	Goats	478,365	62
	Sheep	68,558	14
	Pigs	14,825	6
	Chickens	370,186	48
	<p>During wet seasons the cattle are moved 3-5 km daily in search of water and pasture, while in the dry seasons (annual) migration to water and pasture areas in Tanzania cover distances of 20-40 km or more and last for 3-4 months. Prolonged drought/water scarcity force many cattle owning holders to migrate for several years in a row.</p> <p>Customary rights on private holdings requires permission to graze and water the animals, and a fee to be paid. A by-law stating the need for permission to move the livestock was said not to be duly followed. The customary rights to water and pasture apply also across the border to Tanzania.</p> <p>In rangeland areas in the southern parts of the district, communal landownership is practised, which may lead to overstocking.</p> <p>Maintenance of tanks and dams on public land is poor to non-existent, as people do not perceive ownership of and subsequent responsibility for the water supply facilities.</p>		
Fisheries and aquaculture	This sub-sector plays presently only a minor role in the economy. Fish farming is developing as a viable economic activity		
Energy	<p>20% of all households are reported to have woodlots.</p> <p>Deforestation in the district has taken place over many decades. In terms of harvestable biomass potential, the district is by now a clear deficit area. Population growth (both human and livestock), the use of bush fires to open new agricultural land and the increased need of fuelwood and charcoal are the main causes.</p> <p>Efforts are made to establish woodlots, private nurseries etc, to meet present household energy demands. The effects are, however, small in relation to demands.</p>		
Brick making	Brick and tile making takes place along roads leading to major markets (Mbarara town, Masaka, Kampala, etc.).		

Table 2.4 - Key health and sanitation characteristics for Mbarara District

HEALTH AND SANITATION			
Common diseases	The most common diseases in the area are malaria, intestinal worms, upper respiratory infections, diarrhoea and skin diseases. Most of these illnesses are related to poor sanitation practices, quality of water and housing conditions, especially in the rural areas of the district.		
Sanitation	Type of facility	Persons served	Persons (% of total)
	Water borne not shared	3,425	0.4
	Water borne shared	3,193	0.3
	Pit latrine not shared	624,092	67.7
	Pit latrine shared	180,171	19.5
	None	105,831	11.5
	Other	626	0.1
	Not stated	5,070	0.5
	Total	922,408	100.0

3 WATER RESOURCES

3.1 Water resources availability

The quantity of water resources in Mbarara district varies from east to west - corresponding mainly to the distribution of the rainfall pattern, and, to a lesser extent, the local topography. The mean annual rainfall varies from 700 mm in the east to 1100 mm in the west, and the minimum annual rainfall from below 500 - 800 mm following the same pattern. Locally, in the hilly areas parts of Isingiro, Rwampara and Ibanda counties rainfall is higher than average.

During the Rapid Water Resources Assessment, the climate was classified as semi-arid in the east, to dry sub-humid in the west.

The seasonal rainfall pattern is bimodal, with short rains in March to April and long rains between August and November. The rest of the months are dry, with the longest normal dry season of 5 months. Currently, the area is experiencing drought conditions with the second rains having failed. However, this seems to be a recurrent event in the area with extended droughts of 7 - 12 months reported in the past (1938-42, 1965-68, 1974, 1981-84, 1991-92) though the droughts seem to be becoming more recurrent and with extended periods.

Surface water courses in the east are mostly seasonal, corresponding to the rainfall seasons and, therefore, severely affected by the recurrent drought. The only permanent water bodies are River Katonga to the northern border, River Ruizi and the Koki lakes at the centre and River Kagera to the southern border. Due to the severe shortage of surface water (the main source of livestock water supply) the inhabitant pastoralists seasonally migrate for long distances (up to 50 km) to cope with the shortages. The historical water points for the pastoralists to the north seem to be the Koki lakes and River Ruizi which are surrounded by Lake Mburo National Park. This is a source of persistent conflict with the Park authorities. It was also reported that some pastoralists migrate to the other districts and across the border to Tanzania.

In the west, especially in the hilly areas, water resources are abundant with many permanent streams (tributaries of R. Ruizi) and springs.

Borehole logs indicate that groundwater is deep seated (average total depth varying between 80-100 m and the static water level between 20-30 m), the regolith is thick varying between 40-60 m, indicating good prospects. However, most of the boreholes are unexpectedly low-yielding: averaging 1000-2000 l/hr. Few moderate-high yields (2000-over 3000 l/hr) were noted, especially in Kazo county.

However, these high-moderate yielding boreholes are installed with handpumps (limited capacity) and not significantly used to supplying the high water demand for livestock. A matter for water supply development that has been noted is that boreholes with less than 300 l/hr were also installed with pumps when, practically, they should have been abandoned as unsuccessful.

In general, deep groundwater potential seems to be distributed throughout the district, but are more dependent and developed in the dry area of the east which have no spring or shallow well potential.

Most of the permanent lakes and rivers were gauged up to 1979, when the gauges were destroyed by the war. Gauging resumed on a few stations in 1987, but the quality of the data collected is doubtful due to lack of logistics and finance for supervision and discharge measurements. Based on the historical data, the following are the flow characteristics of the main water bodies:

Stat. No	Name	Area km ²	Storage (Mm ²)			Discharge (m ³ /s)			
			Month Max	Month Mean	Monthly Min.	Max	Mean	Min	:5 year Low flow
813151	R. Kakinga	996	1968-78				186.0	4.92	0.01
813242	R. Ruzi	2070	1954-79,87				48 557	7.75	1 5332
813333	R. Kibale	4215	1965-80				28 045	2.775	0.2244
813594	R. Katonga	13936	1985-82				13 180	2.67	0.0854
813225	R. Kagera		1950-87 (- 7081)				650.79	227.57	124.152
814388	L. Mburu		1959-80	196.93	94.56	30.11			
814597	L. Kachera		1959-80	133.35	84.13	38.86			
815358	L. Nakivale		1963-88	208.40	66.36	12.63			
815349	L. Kijambalala		1958-80	383.15	239.04	148.68			

In the eastern part of the district (represented by Kakinga catchment) the average annual run-off is about 7 mm/year, and the dependable yield (one in five year minimum monthly flow) is zero. In the wetter west (represented by catchment of River Ruizi at Mbarara) the average annual run-off is 119 mm/year and the minimum dependable yield is over 0.7 l/sec/km².

In conclusion, the following are the main issues related to water resources quantity in Mbarara district:

- severe shortage of surface water resources in the eastern part of the district in the dry seasons leading to shortage of livestock water supply and encroachment on LMNP and the neighbouring districts/areas
- recurrent droughts which seem to be becoming more frequent and severe leading to decline/failure of crop yields and severe shortage of livestock water supply (in the east)

- under-utilisation of the few high-moderate yielding boreholes for livestock water supply
- lack of current water resources monitoring data

3.2 Water quality

The availability of information on ground water quality in Mbarara is generally scarce, and water quality test results from the SWIP project were not available in a compiled form at the time of the district studies. The team was, however, informed that boreholes with hard water and high concentrations of salt or iron are reported from Rwampara, Bukanga and Ishingiro, and that high fluoride concentrations are found in Kabuyana and Nyakitunde.

More than 45% of the population is served by open wells or unprotected springs (mainly in the Western parts of the district) - implying that many people are likely to be exposed to contaminated drinking water.

In Mbarara Town, the collection systems for solid waste are not very developed. However, some collection of solid waste is done and indiscriminate dumping of these wastes take place. Thus, there is a risk of contamination of the groundwater sources locally near the dump sites.

The general quality of surface water resources (rivers, streams, lakes and valley dams) is similarly not documented by actual measurements, but except for widespread siltation (the intensive use of hill slopes for cattle pasture is claimed to have increased the erosion severely causing silted rivers) there is no evidence of general water quality problems. However, there are a number of locations where the water quality is not likely to meet the requirements of the actual use of the water - some examples are given below:

- An abattoir discharges waste water into the River Ruizi in Mbarara town - a milk station, a soap factory, a meat processing industry and tannery discharge to a low lying swamp land at Kakoba. The organic and chemical wastes pollute the river/swamp (the river is also used for domestic water supply). Several companies are applying for new industry licences (Pepsi Cola, for example), and the Mbarara Town Council has planned to develop an industrial area along the river side. This could lead to further pollution and cause problems for the water supply authority.

- During the district visit under the consolidation phase, it was reported that the water supply authority is experiencing problems of high silt loads and bacterial pollution during the floods. For example, during the floods of May 1993 the intake was completely silted and supply disrupted. The bacterial contamination (E.Coli) is associated with large numbers of livestock in the upstream catchments.
- Effluent from Mbarara municipal waste water treatment works may contaminate the Ruizi river, which is also used for domestic water supply (at the moment however, there is no out-flow from the treatment ponds).
- In the eastern dry belt - counties of Kazo, Nyabushozi, Bukanga and parts of Isingiro - there is severe shortage of livestock and domestic water supply. During the rainy season and the early months of the dry season, the cattle are watered on private farm ponds, communal dams and valley tanks and these sources are used for domestic purposes as well.
- The district has a high amount of livestock which is treated against ticks partly by the use of cattle dips. If the dips are drained to surface water resources, the acaricide used eventually contaminates these waters.

During the last 5 years, the Kagera River has been infested by the non-native water hyacinth Eichornia. This floating weed proliferates fast and has now reached a level where large areas of the water surface periodically is totally covered. This infestation adds another dimension to the eutrophication phenomena since nutrient loadings (nitrogen and phosphorus) are rapidly converted into huge amounts of biomass. Some direct impacts of this infestation can be oxygen depletion (and release of hydrogen sulphide) below the vegetation mats as well as severe obstruction of navigation on the river and eventually on Lake Victoria. In Mbarara district the water hyacinth is now also found in Lake Nakivale.

4 CONSUMER CATEGORIES, WATER USES AND DEMANDS

4.1 General

The main consumptive demands in Mbarara district are for domestic water (rural and urban) and for livestock water supply; while water for aquaculture is a non-consumptive demand related to small scale fisheries. There is also a consumptive demand for cultivation in the wetlands.

4.2 Rural domestic water use

The overall safe and accessible (maximum walking distance of 1.5 km) rural water supply coverage in the district is estimated at 30% (1993), attributed mostly to the SWIP programme. However, the coverage varies from sub-county to sub-county, depending mainly on the availability of resources and settlement patterns.

In the eastern counties of Kazo, Nyabushozi, Bukanga and parts of Isingiro where the resource is scarce and expensive to develop, the settlement pattern is scattered and the coverage is much lower. The only reliable sources of supply here are boreholes. Furthermore, owing to the semi-nomadic lifestyle of the pastoralists who migrate to look for pasture and water for livestock during the dry season, boreholes are abandoned during the dry season and the pastoralists depend on the same sources of water as their cattle.

In the western part of the district with high spring potential - especially in the hilly counties of Rwampara and Ibanda - the coverage is higher, with average walking distances of less than 1 km in some sub-counties. Sources of supply include springs, boreholes and gravity-flow systems - in that order of coverage.

4.3 Urban domestic water use

The only major urban centre in the district with a central water supply system is Mbarara town, which has a population of 43,759 (1991). The coverage is estimated at 85% and the system is owned and managed by NWSC. The piped supply is based on treated surface water from River Ruizi, and most of the consumers have house connections. Where consumers depend on communal standpipes, the maximum walking distance does not exceed 400 m.

During the district visit under the consolidation phase, it was reported that the water supply authority is experiencing problems of high silt loads and bacterial pollution during the floods. For example during the floods of May 1993 the intake was completely silted and supply disrupted. The bacterial contamination (E. Coli) is associated to large numbers of livestock in the upstream catchments.

It was also learnt that the area along the river has been gazetted by the Municipal Council as the future industrial area. This could, of course, lead to further pollution and cause problems for the water supply authority.

The other town with a piped water supply is Ibanda with a gravity-flow system under development - expected to serve 20,000 people. At present, 80 households have house connections and 10 communal standpipes were constructed but have been vandalised. It is surmised that the tap stands could have been maliciously destroyed so that the people with house connections could continue to sell water to the majority disadvantaged consumers who do not have house connections.

The remaining small towns and rural growth centres (estimated to be at least one per sub-county) have a service level comparable to the surrounding rural areas. The point sources are often crowded and scuffles occur.

The total coverage of domestic (rural and urban) water supply in the district is shown in the table below. It is estimated that for 100% coverage the present demand would be 8.5 million m³/year.

Table 4.1 Water source use

TYPE OF SUPPLY	POP.	POP%
Piped water inside	3943	0.4
Piped water outside	15891	2.8
Borehole	50824	5.5
Protected well/spring	79188	8.6
Unprotected well/spring	416907	45.2
Stream/river	179741	19.5
Lake/pond/dam	159327	17.3
Other	1033	0.1
Not stated	5554	0.6
Total	922408	100.0

Source: Population and Housing Census, 1991

4.4 Industrial consumers

There are only three micro industries which consume water in Mbarara town (abattoir, dairy plant and tannery) all of which get their supply from NWSC. The water quality and quantity requirements for these industries can adequately be met.

More industries are reported to be planned for the town - the most prominent being a Pepsi Cola plant. This would be sensitive to water quality, since water is an ingredient in the product. They will probably treat their own water supply.

At present, the waste discharge from the existing industries is not significant, but the planned development of a Pepsi Cola industry could discharge substantial food waste into

the system and it would need to be regulated and monitored. The gazetted development of industries along the River Ruizi could pose a serious pollution problem for the river - and plans for treatment and studies of the interaction with the water supply will have to be made.

4.5 Livestock water consumption

The consumption of water by livestock in Mbarara District is the most dominant and critical demand, especially in the eastern part which has the majority of the over 1 million head of cattle in the district and where surface water resources are ephemeral.

In the eastern dry belt - the counties of Kazo, Nyabushozi, Bukanga and parts of Isingiro - there is a severe shortage of water for livestock. During the rainy season and the early months of the dry season, the cattle are watered on private farm ponds, communal dams and valley tanks. However, as the dry season progresses, these ponds, the communal valley tanks, and most of the communal dams dry out. To cope with the seasonal shortage of the water supply, most of the herdsman lead nomadic lives, seasonally migrating to the perennial sources: the few dams, Rivers Ruizi, Katonga and Kagera, and the Koki Lakes - especially Lake Mburo. The maximum walking distance may exceed 80 km.

Conflicts over access to these sources and to private sources were reported. The recent trouble between the squatters and the ranchers in Ankole Ranching Scheme is said to be partially attributed to lack of water outside the ranches. The most recurrent conflict is between the pastoralists and the Lake Mburo National Park (LMNP), which covers the lower part of River Ruizi and Lake Mburo and blocks the access, for the pastoralists from the north, to the other Koki Lakes and River Kagera. This area was traditionally regarded as the watering and grazing area during the dry season. Provision of an adequate quantity of water for livestock in the eastern part of the district is considered a high priority by the livestock owners - perhaps even preferred to domestic water supply.

In the remaining part of the district, the surface water resource potential is fairly high and livestock water supply can be adequately effected.

The distribution of cattle by water source in the district is shown in the table below. The total number of cattle reported is grossly underestimated and the watering seems to reflect the wet season pattern. For example, in the eastern dry belt, where most of the cattle are found, there is no spring or well potential - all the farm ponds, valley tanks and the dams are seasonal. The only reliable sources during the dry season are the distant rivers and lakes.

It is significant to note, though, that there are a few boreholes with high yield adequate to supply livestock. They could provide reliable supplies during periods of drought, but

boreholes are not used for livestock water supply because they have been installed with UH/III pumps which have limited capacity for supplying the large herds of cattle. Integration of livestock water supply with domestic supply is considered crucial to the pattern of life.

Table 4.2 - Livestock water source use

	BOREHOLES	VALLEY DAMS	SWAMPS	WELL/SPRING	RIVER/LAKE	TOTAL
No. of Cattle	0	267043	39633	273233	27487	607396
% of total	0.0	44.0	6.5	45.0	4.5	
Tot. m ³ /year	0	2436767	361651	2493251	250819	5542489

Source: Agricultural Census, 1992

4.6 Water for agriculture

Agriculture in the district is rainfed and concentrated in the western part - Ibanda, Kashari, Rwampara and northern Isingiro - where rainfall is highest and more reliable. The current drought is reported to have affected the yields.

In the semi-arid eastern part of the district, a few households - especially those without or with few herds of cattle - depend on rainfed agriculture, but the acreage and the yields are often affected by the unreliable rainfall, vermin and cattle destroying their fields. This is a source of conflict with the pastoralists. Increasingly, though, pastoralists are also taking up farming - especially around their homesteads.

There is no significant irrigation in the district. Planned irrigation in the Orichinga Valley, based on water supply from the Koki Lakes, was not implemented. However, cultivation in the swamps - mostly horticultural crops during the dry season - was noted to be emerging, and problems of encroachment may become significant in the near future. The swamps under cultivation are the upstream valleys of River Ruizi in Rwampara.

4.7 Fisheries and aquaculture

There is no significant fishing in the district except in Lakes Mburo, Kachera and Nakivale. Problems of floating papyrus islands, low catches, low lake levels during periods of drought, and lack of gazetted fish landings were noted. In Lake Mburo, which is inside Lake Mburo National Park, fishing is considered illegal and the fishermen are seen as squatters.

There are 40 registered fish farmers in the district with private ponds, with sizes ranging from 100 - 6000 m², and the demand is increasing with the improved extension service.

Over 30 of the communal dams and valley tanks were reported to be stocked with fish. The availability of water, especially in the semi-arid eastern part of the district - where surface water resources are seasonal - is limiting the growth, and the water quality could be impaired by fish farming activities. However, the benefits of dams and valley tanks constructed for livestock water supply could be maximised by introducing fish - notwithstanding the social taboo of the pastoralists with regard to fish.

5 AGENCIES INVOLVED IN WATER RESOURCES MANAGEMENT

5.1 Introduction

This chapter identifies the institutions involved in the management of water resources in Mbarara District, and it describes their present functions. In this context, the term "institution" should be taken to have a broad meaning: it includes any formal or informal agency which does, or might, make decisions related to water resources.

In the following sections an attempt has been made to distinguish between institutions involved in policy making, administration, enforcement, and conflict resolution - even though these functions are not always clearly separated in the present system. In subsequent sections, other types of institution which play a role in water management are identified: parastatals, development projects, private enterprises, etc. Finally, the role of the Ministry Women in Development, Culture and Youth is described.

5.2 Water committees

In Mbarara, though the RC system is well established, the committees related to water management at the different levels (ref. Appendix 5.1) appear not to be fully functioning. The committees were formed late in the implementation phase of the SWIP project, hurriedly and without adequate training or mobilisation. Unfortunately, the project implementation in Mbarara has almost come to the end - without adequate assessment of the efficiency of the committees.

5.2.1 Users Committees (RC 1)

Two responsible residents who live near to a source are charged with the day-to-day responsibility of looking after the utility, whether a borehole, spring or well. These two are members of a larger Users Committee, but they have specific assignments, such as keeping order at the collection points and collecting. The Users Committee acts as a sub-committee of the RC 1, partly responsible to the, village level, RC 1 Executive Committee.

5.2.2 Sub-county Water and Sanitation Committee (RC 3)

This is a sub-committee of the RC 3. Its main function is to coordinate and supervise the work of the government extension staff and community workers; receive progress reports from the users committees, review workplans, mobilise the community, oversee community financing. It also organises seminars and training.

5.2.3 District Water and Health Management Committee (DMC)

The DMC is created under the SWIP project, and it is composed of the DA, DES, RC 5 Chairman, representatives of the Health Department, Community Development Department, Water Development, etc. This committee, at district level (RC 5), is charged with overall policy formulation and guidance in matters related to water and health management. It is convened once a month and reports directly to the SWIP Project Management Committee. In Mbarara, the DES acts as chairman of the Water and Health Committee, on behalf of the RC Secretary for Mass Mobilization. An Assistant DES is permanently charged with the routine coordination of water-related activities as a kind of "water desk officer".

5.3 District Administration

Mbarara is one of 13 pilot districts where the decentralization policy - the devolution of powers and functions from central government - is currently being implemented. The new system is based on the district as an administrative unit, and measures have been taken to enable the district to plan, initiate and execute policies in respect of all matters affecting the people within their jurisdiction - including water development. The departments of central government operating at local level have thus become constituent units of the District Resistance Council. They operate under the control and supervision of the DES, who, as head of administration, is now responsible for their performance.

5.3.1 District Water Officer

The management of water resources within the district is a function of the District Water Officer (DWO). His duties include:

- identifying water projects
- making demand forecasts
- collecting hydrological data
- siting and drilling boreholes
- protecting springs
- promoting an extension service related to operation and maintenance
- collecting and analysing data on water quality

- preparing a district water budget
- supervising the implementation of water schemes (with or without consultants or contractors)
- supervising NGO water programmes
- monitoring and evaluating water programmes

Under the SWIP project, the DWO links with the SWIP District Water Development Officer in offering technical assistance, water source development construction, training and supervision, consultation with specialised water agencies, and so on. The various water committees do not report to the DWO, but to the DMO through the DHI. It is, therefore, difficult - if not impossible - for the DWO to enforce coherent procedures, regulations or by-laws related to land and water management. Also, the DWO is not able to integrate water-related environmental messages within the district's health and agricultural extension services.

5.3.2 District Medical Officer

In addition to his normal duties, the District Medical Officer (DMO) is the main district programme manager for SWIP. He is the Community-Based Health Coordinator, technical advisor for health, responsible for training extension workers. All the sub-county health committees report to him through the DHI.

5.3.3 Municipal Medical Officer of Health

The office of the Municipal Officer of Health (MOH) is a structure parallel to the DMO's, and he handles public health issues within the municipality. These comprise: the inspection of industries according to the Public Health Act - and the related issuing of annual licences. He plays an advisory and inspection role in relation to NWSC (treatment processes, pipeline leakages. etc). The MOH uses the government chemist in Kampala (Ministry of Internal Affairs) to monitor effluent quality, food standards and water supply.

5.3.4 District Health Inspector

The office of the District Health Inspector (DHI) is directly responsible to the DMO, and the functions of rural water development are undertaken here. Those functions are, for instance, supporting water and sanitation committees, identifying and protecting springs and shallow wells, training and equipping artisans - masons, for example, and handpump mechanics.

The DHI in Mbarara has extension staff who reach right down to the grass roots level. In addition to the formally trained Health Inspectors and Health Assistants, there are the Health Orderlies at sub-county level, the Community Change Agents, Community Health Workers and the Traditional Birth Attendant, all working together at the community or village level. This network of agents enables the DHI to run an integrated health and sanitation extension service.

5.3.5 District Forest Officer

Mbarara District is significantly affected by deforestation and overgrazing. Therefore the major activities under this office include conserving forest reserves, mobilising and training people from selected pilot parishes in safe and profitable agricultural practices (fodder, fish, fruit trees, terracing and bunds) and tree planting (woodlots) at the household level to stop further environmental degradation.

5.3.6 Chiefs

The Local Government Administration is relying on a hierarchy of salaried officers, the Chiefs, who administer well established units: the Saza Chief at county level, the Gombolola Chief at sub-county level, the Muluka Chief at the parish level and the Mutongole Chief at the sub-parish level. These are corresponding and parallel to RC 4, RC 3, RC 2 and RC 1 levels. The office holders need not be residents of the particular area.

In addition to collecting government revenue, the chiefs are instrumental in keeping law and order, by controlling the local police (the enforcement officers) and are effectively an arm of central government. While implementing government decisions, they also mobilise community participation. The chiefs are, furthermore, involved in conflict resolution. (Ref. Sub-section 5.4.3)

5.4 Judicial institutions

There are a number of complementary institutions engaged in conflict resolution at various levels. These are: the RC Courts, the Magistrates Courts, the Chiefs and the Elders.

5.4.1 The RC Courts

The extent of judicial power for the Resistance Council Courts has been clearly defined by the Resistance Committees (Judicial Powers) Statute, 1987. This statute establishes the RCs as Courts and outlines their proceedings. Civil disputes governed by customary law that can be handled by the RC Courts include water and land disputes relating to customary tenure.

RC Courts help to settle disputes on any violation of local by-laws or offence to traditional ethics - with regard to water and land management. Such disputes could relate to trespassing, for example, access to domestic and livestock water points, and livestock watering at water sources on privately owned lands. (Ref. Appendix 5.1)

Trespassing is a serious offence due to population and livestock pressure, and any intentions or approaches to protect water sources must be channelled through and sanctioned by the elders and chiefs.

5.4.2 Magistrates Courts

Magistrates Courts exist at sub-county level (Grade II), at the district level (Grade I).

Some cases go direct to the Magistrates Courts; others are referred from RC 3 Courts - for example, cases of trespassing, land ownership, assaults at watering points. Most of the water-related conflicts are solved at RC 3 or lower levels - very few reach the Magistrates Courts. Most cases referred to these courts are land related. In civil cases, people can chose to have their case tried at the Magistrates Court directly, without passing through the RC court system. The magistrates in Mbarara District organize and conduct seminars for RC members to enlighten them further on the law, to assist them in keeping records and to develop routines for referral cases. The two institutions are complementary and function effectively in the district.

5.4.3 Chiefs

The Local Administration's Chiefs play an important part in conflict resolution over matters related to the management of water and land. Such matters include:

- being in arrears or refusing to pay debts (water contributions, by-laws)
- refusing to construct pit latrines (for improved common environmental sanitation)
- causing land problems (squatting, trespassing, blocking access to water sources, etc.)
- breaking by-laws regulating water use

Decisions of the Chiefs do not need the backing of a committee consensus, but they often consult with or refer to the RC Committees - particularly when more facts or evidence are required. This joint consultation is regarded as a kind of appeal court, whose legitimacy

is upheld and whose decisions are more respected than those arrived at by either of the institutions alone.

5.4.4 The role of the Elders

The role of Elders and traditional cultural heads is important in Mbarara District. Their power is deeply embedded in local beliefs and traditional practices that quite clearly legitimize their involvement in the arbitration of disputes - arising especially from the complicated land tenure system operating in the area. The land is privately owned, with or without land titles (under the customary land tenure system). That there are many conflicts over land is shown by the number of appeal cases going to the Chief Magistrates Court.

5.5 Parastatals

Mbarara Municipal Water Supply was operated by DWD until 1988, when it was handed over to the National Water and Sewerage Corporation (NWSC) after full rehabilitation. It was deemed viable to be operated on a profitable basis. DWL now deals with rural water supply and smaller urban centres. NWSC only deals with water supply and sewerage in the Municipality. The organisation works on a commercial basis.

The raw water comes from a seasonally heavily silted lowland river (Ruizi) source which is also receiving waste water from the township. The treatment takes place within the municipality and distribution is by gravity.

The corporation faces a lot of difficulties in collecting water bills and as a result cannot break even - but it is rather heavily subsidised by operations elsewhere - in Kampala particularly.

5.6 Water development projects

Much of the water supply, planning and management - and, thus, to a certain degree also the water resource management - in Mbarara is influenced by development projects, and in particular SWIP.

5.6.1 SWIP

The Government of Uganda, UNICEF, CIDA and SIDA provide funding for the SWIP project, which covers 10 districts, including Mbarara. The entire project is controlled by an inter-ministerial committee. At the district level, the District Health Committee gives overall direction: establishes policy, issues guidelines, defines targets, approves plans and budgets, and reviews progress.

The activities include hydrogeological investigations and borehole drilling, handpump installation or rehabilitation, spring protection and gravity flow development, shallow well development, water quality monitoring, community mobilization, community based health care, AIDS and health education, sanitation and nutrition, training and institutional support (capacity building).

The allocation of water supply schemes is based on the population size and density at district and sub-county levels. The main target was to raise coverage from 7% to 70% for both water and sanitation (design population is equal to 70% of the population in a target area - that is 929,600 for Mbarara and 4,222,800 for the entire project area. The service standard chosen is that 300 people should share one water supply unit (one borehole or two springs). The number of water supply units allocated to an area is calculated by dividing the design population by 300. The villagers decide where in the village the water supply units should be located. Their decision is followed if it is technically feasible.

The formation of water committees responsible for operation and maintenance has taken place but the effectiveness has yet to be proven. The objectives of this integrated project makes it essentially a community-based health care package. Water resources planning, development and management do not have a prominent place among the project activities.

5.7 The private sector

The private sector is an emerging stakeholder in water resource management. The private enterprises involved can roughly be divided into two major groups: private water suppliers and private water consumers each having an impact on the water resources situation.

5.7.1 Private water suppliers

Development and management of water resources - especially the provision of potable domestic water supply in the District - have been considered exclusive functions of the central government. However, a number of private initiatives have emerged primarily because of gaps in public supply, especially in the dry east:

- in this predominantly livestock area, the few operational valley tanks and dams (stretching from Kazo in the NE to Bukanga in the SE) are privately owned and developed primarily for livestock. They are utilized by both livestock and people, especially in the dry season - by the public on mutual arrangement with the owners at a cost (direct labour, in kind, or cash).
- rainwater harvesting is practised in Ngarama sub-county at the top of the ridge (Ngarama Hills) that separate Lake Nakivale and Kagera River drainage systems. Water is collected in concrete or rock tanks and sold to consumers at rates ranging between 10/- to 20/- per litre.

- Ibanda gravity scheme, a private water supply, is providing for 80 house connections (these pay 1500/- per month to a water board) who in turn sell this water to local consumers at 10/- per litre.

The above initiatives are in line with the new government policy of encouraging private sector involvement. The quality of water supplied for domestic use to the public is however doubtful. Though the developers are tacitly accepted, it is apparent that technical expertise is lacking, "treatment works" are deficient and the developers' activities and deliveries are neither being monitored nor regulated.

5.7.2 Private consumers.

Livestock

In the dry areas, water for animals is the major demand and private agreements are negotiated with no formal government body involved. However, the RC Courts and Elders may be approached to solve conflicts that may arise; e.g the source of water drying up before the stipulated period or rains coming earlier than expected - when refunds might be demanded. The charges are in the range between 100,000/- per month for watering about 100 animals. Up to 10% of the herd is paid in kind in a severe dry spell.

Aquaculture

There are 40 registered fish farmers with pond sizes ranging from 100m² to 6000m² and also 30 communal dams and valley tanks have been stocked with fish.

5.8 Informal structures

The new systems of managing domestic water sources through committees do, in fact, draw on some long established practices. In traditional societies, it was common, for example, to appoint a caretaker who lived near the source - though sometimes the responsibility was handed down within certain families, through the generations.

Heads of households used to take great pride in protecting ancestral wells - some of which had been a clan responsibility for centuries. Sometimes they imposed a ban on cutting trees near these wells, for example. Occasionally, these traditional taboos run counter to the modern processes of protecting the wells or springs.

There are some customary concepts regarding ownership, access to and control of communal water sources and swamps, that impinge on current objectives of water resource management. One is that water is a "God given gift", to which everybody has a right - irrespective of where it is located or who developed it. This perception cuts across the notion that water is an economic good - which should be utilized in a careful and economic manner.

5.9 Ministry of Women In Development Culture and Youth

The Ministry has seconded staff to districts and sub-counties with the purposes of stimulating women's participation in the management of development activities. The involvement of women in point water source management is well established in Mbarara. Each point water source under the SWIP project has one woman and one man as caretakers. In the RC system, each executive committee has one guaranteed post of Secretary for Women. The remaining eight posts are equally open to men and women. So far, however, most executive posts are held by men. In spite of the opportunities recently made available to the women of Mbarara, many of them, even if duly elected, choose not to take up the challenge. These are some of the reasons that have been put forward to explain this reluctance:

- lack of support from other women
- lack of adequate formal education
- family responsibilities
- shyness
- lack of management experience
- lack of support from men

6 ISSUES, MANAGEMENT FUNCTIONS AND RESPONSIBILITIES

6.1 Introduction

Based on the findings from the visits to the districts a number of water related key issues have been identified. The issues fall into two categories:

- impact issues
- user requirement issues

The impact issues are derived from human activities affecting the water resources negatively with regard to quantity or quality. The negative effects can either concern other direct uses or relate to environmental degradation.

The user requirement issues are derived from inadequate matching of user requirements and the available water resources (quantity and/or quality).

Such situations require interventions, based on rational decisions and operational management functions, in order to obtain a stable and sustainable beneficial use of the water resource. The process is shown in Fig 6.1 below.

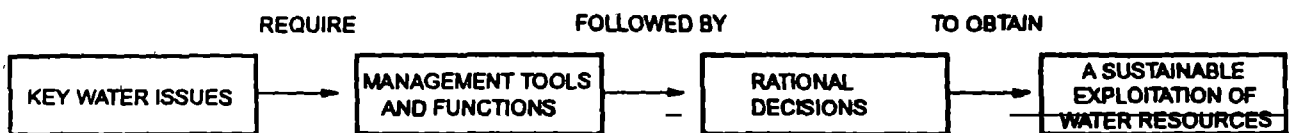


Figure 6.1 - Water resources issues management process

The present chapter describes the issues that have been identified as well as the rationale behind the selection. Management functions necessary to approach and tackle the issues, and tools for intervention in the district is also briefly described here.

The identified issues have been grouped under the following headings:

- surface water quantity
- surface water quality
- groundwater quantity
- groundwater quality

wetlands

Wetlands should strictly speaking be regarded as a part of the surface water resources. However, issues related to this resource have been grouped under their own heading. The complex and unique nature of wetland processes has traditionally made it convenient to regard those areas as a confined water resources entity.

The issues identified may not all be perceived by the district population as being critical issues for which interventions are required. Some of the problems, for instance those related to water quality and environment, are in many cases not possible to observe directly but require specialized investigations for exact identification and description. They can, however, be just as potentially damaging as those which are obvious to the observer.

An overview of the issues identified in the general district context is given in Fig 6.2, while details of issues are given in the tables below. For each issue identified the rationale behind its inclusion as an issue is given. Further, a tentative listing of management functions necessary to approach the issue is given and finally the functions are distributed as responsibilities at different management levels (national, district or community level).

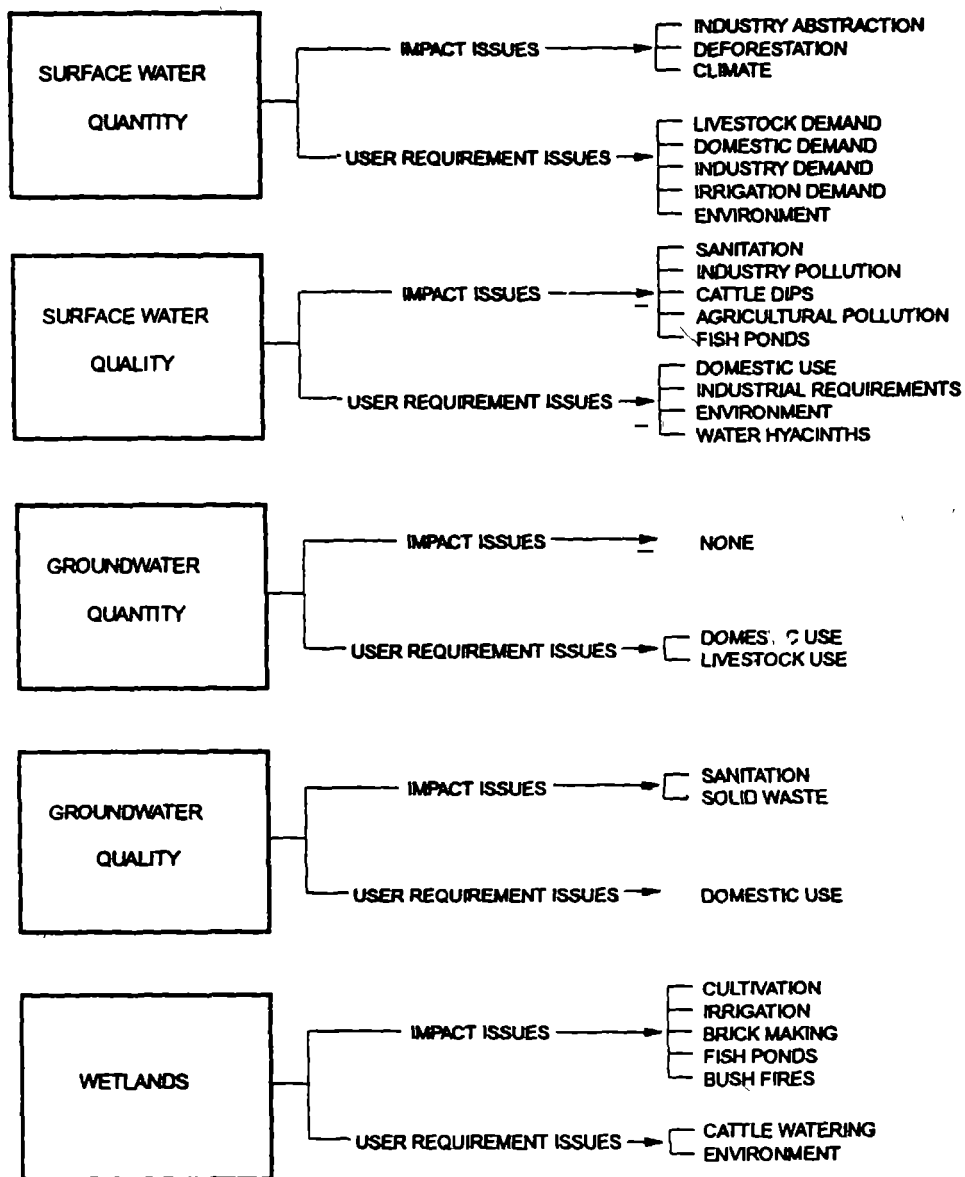


Figure 6.2 - Overview of general district issues identified

Table 6.1 - Surface water quantity

SURFACE WATER QUANTITY (Mbarara)			
IMPACT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Deforestation	Deforestation mainly due to clearing for pasture is claimed to reduce minimum flow in streams	Regulatory control of land use, incentives for use of alternative farming or ranching practices (more efficient food production), declaration of forest reserves, legal means of intervention.	NATIONAL: Framework for regulatory control of biomass use, declaration of forest reserves, legal means of intervention. DISTRICT: By-laws and incentives for proper use of hill slopes. COMMUNITY: Incentives and awareness raising, by-laws and community self-control.
Climate	Declining rainfall is claimed to reduce the surface water availability (e.g. the surface area of Nakivali Lake has been reduced significantly since the early sixties)	Landuse regulation and control in particular relating to forests, general environmental protection and protection of water catchment areas.	NATIONAL: Framework for landuse planning, regulation, control and legal intervention. DISTRICT: By-laws relating to wetland use, forestry, water catchments and environment. COMMUNITY: Tree planting, community forestry, wetland conservation, environmental awareness.
USER REQUIREMENT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Livestock demand	The availability of surface water in Kazo, Nyabushozi and Bukanga counties do not match the livestock demand for watering. This is due to drying up of streams, swamps as well as insufficient valley dam capacity during dry season. The issue is causing migration within, and out, of the district during dry season (e.g. to Tanzania (from Bukanga and Nyabushozi). Furthermore, the water scarcity forces livestock holders to water their herds in the Lake Mburu National Park.	Regulation of ownership of water sources and access in pastoral areas and areas with settled agriculture. Conflict resolution capacity and capability required locally. Policy and operational strategies for provision of water for livestock. Enforcement of natural reserve regulations.	NATIONAL: Policy/strategy for provision of water for livestock, regulations for ownership and access to water sources. DISTRICT: By-laws for ownership and access. COMMUNITY: Conflict resolution capacity and capability.
Environment	Reduction of minimum flows in rivers and streams affects the ecological base conditions for plant and animal life	Environmental policy and operational strategies, environmental impact assessments, ecological monitoring and regulatory means of intervention.	NATIONAL: Environmental policy and strategies, legal intervention framework, major EIAs. DISTRICT: Ecological monitoring, impact assessments, by-laws. COMMUNITY: Environmental awareness

Table 6.2 - Surface water quality

SURFACE WATER QUALITY (Mbarara)			
IMPACT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Rural/semi urban sanitation	Low sanitation levels in areas near rivers and streams increase the risk of spreading water borne diseases due to the multi-purpose use of these surface water resources	Increased awareness on sanitation, education within health and hygiene. Promotion of pit latrine construction and use.	NATIONAL: Policy and strategy for sanitation. DISTRICT: Latrine promotion, hygiene and sanitation education. COMMUNITY: Construction and increased awareness about benefits of latrines.
Urban sanitation	The network of sewers in Mbarara town may cause contamination of the drinking water supply network due to leakages. Effluents from Mbarara municipal waste water treatment works may contaminate the Ruizi river, which is also used for domestic water supply (at the moment, however, there is no out-flow from the treatment ponds).	Efficient operation and maintenance of both water supply and sewer networks. Regulations for network control and maintenance procedures. Efficient operation of waste water treatment plants. Regulations for operation, monitoring and control of treatment efficiency and effluent quality.	NATIONAL: Policy and strategy for urban sanitation, guidelines for monitoring and control. MUNICIPALITY: By-laws, organisation for monitoring and control. COMMUNITY: Awareness about risks of drinking water contamination and pollution.
Industry pollution	An abattoir discharges waste water into the River Ruizi in Mbarara town - a milk station, a soap factory, a meat processing industry and tannery discharge to a low lying swamp land at Kakoba. The organic and chemical wastes pollutes the river/swamp (the river is also used for domestic water supply). Several companies are applying for new industry licences (e.g. Pepsi Cola), and the Mbarara Town Council has planned to develop an industrial area along the river side.	Industrial effluent standards and regulations based on trade-offs between treatment costs, capacity of the municipal treatment plant, and environmental benefits. Monitoring and control of effluents. Industrial environmental awareness building, legal means of interventions in case of violations. Economic incentives.	NATIONAL: Policies, strategies, effluent standards, guidelines for EIAs, regulations and intervention means, economic incentives. DISTRICT: EIAs, monitoring and control of effluents, environmental awareness building. COMMUNITY: Awareness about pollution
Cattle dips	The district has a high amount of livestock which is treated against ticks partly by the use of cattle dips. If the dips are drained to surface water resources, the acaricides used eventually contaminates these waters.	Education on efficient use of chemicals and discharge to low priority streams or to seepage pits. Planning of location of dips in relation to sensitive recipients or downstream users is required.	NATIONAL: Guidelines for construction of cattle dips DISTRICT: Extension/education on environment conscious use and discharge of chemicals, on planning of location of cattle dips and on discharge from same. COMMUNITY: Environment consciousness/awareness in use of cattle dips

SURFACE WATER QUALITY (Mbarara)

IMPACT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Fish ponds	Mbarara District has around a hundred fish ponds drawing water from rivers. From time to time the ponds are flushed releasing settled organic material to the receiving waters. Fish farmers add organic inputs to the ponds to increase the production.	Regulations for flushing procedures and assessment of trade-offs between stream water quality and fish production	<p>NATIONAL: Policy and strategy for development of fish ponds.</p> <p>DISTRICT: Permits for water abstraction for ponds and impact assessments in case of intensive aquaculture.</p> <p>COMMUNITY: Awareness of possible environmental impacts of fish pond operation.</p>
Deforestation landuse	The intensive use of hill slopes for cattle pasture is claimed to have increased the erosion severely causing silted rivers.	Management requires regulatory control of land use. Incentives for use of alternative farming practises (more efficient food production), declaration of forest reserves, legal means of intervention.	<p>NATIONAL: Framework for regulatory control of biomass use. Declaration of forest reserves, legal means of intervention.</p> <p>DISTRICT: By-laws and incentives for use of hill slopes.</p> <p>COMMUNITY: Incentives and awareness raising, by-laws and community self-control.</p>
USER REQUIREMENT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Domestic use	Due to scarcity of developed ground water sources in large parts of Mbarara District, a substantial number of households depend on surface water for consumption (mostly rivers and valley dams). No direct monitoring of the surface water quality actually takes place, but it is obvious that the quality of these sources is questionable for drinking purposes. Often the source used for drinking water is also used for wastes, washing, cattle watering etc. High content of silt also hampers water intakes for domestic supply.	Coordination between upstream/downstream riparian use and that regulations and standards for effluents are enforced. Monitoring and control, effluent permits based on environmental impact assessments and legal means of intervention are also required.	<p>NATIONAL: Effluent standards and wastewater regulations, legal means of enforcement, guidelines for construction and use of valley tanks and dams.</p> <p>DISTRICT: Planning of water intake and wastewater discharge locations, supervision of use of valley tanks and dams, monitoring and control.</p> <p>COMMUNITY: Awareness of water quality of sources</p>
Environment	Pollution and nutrient enrichment from eg. sewage outlets and industry effluents affect the ecological conditions of the receiving waters. Similarly, increased silt concentrations impacts the living conditions for e.g. the fish fauna.	Environmental policy and operational strategies, environmental impact assessments, ecological monitoring and regulatory means of intervention.	<p>NATIONAL: Environmental policy and strategies, legal intervention framework, EIAs for major projects.</p> <p>DISTRICT: Ecological monitoring, impact assessment, by-laws.</p> <p>COMMUNITY: Environmental awareness.</p>

SURFACE WATER QUALITY (Mbarara)

USER REQUIREMENT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Water hyacinth	During the last 5 years the Kagera River has been infested by the non-native water hyacinth <i>Eichornia</i> . This floating weed proliferates fast and has now reached a level where large areas of the water surface periodically is totally covered. This infestation adds another dimension to the eutrophication phenomena since nutrient loadings (nitrogen and phosphorus) are rapidly converted into huge amounts of biomass. Some direct impacts from this infestation can be oxygen depletion (and release of hydrogen sulphide) below the vegetation mats as well as severe obstruction of navigation on the rivers and eventually on Lake Victoria. In Mbarara district the water hyacinth is now also found in Lake Nakivale.	Management strategies are not yet available for East African conditions and only pilot tests aiming at restricting the growth of the water hyacinth have been made.	NATIONAL: Eradication policy, strategy and actions coordinated internationally with upstream countries. DISTRICT: Support to national actions. COMMUNITY: None.

Table 6.3 - Groundwater quantity

GROUND WATER QUANTITY (Mbarara)

IMPACT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
None			
USER REQUIREMENT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Domestic use	The domestic use of ground water in Mbarara District is mainly limited by the progress of development of single sources (boreholes, shallow wells, protected springs etc.). Many old boreholes are not functioning or low yielding.	Demand driven planning of source development consistent with overall national policies. Management of maintenance action at consumer group level, intermediate level and district level.	NATIONAL: Source development policy and strategies. DISTRICT: Promotion of demand driven source development. COMMUNITY: Participation

6.4 - Groundwater quality

GROUND WATER QUALITY (Mbarara)			
IMPACT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Sanitation	Location of pit latrines near water sources such as springs and wells impose risk of faecal contamination of the source, resulting in increased risk for spreading of diseases.	Development of standards for location of latrines in relation to sources, adequate technical guidance for borehole and well construction and creation of awareness of sound hygiene and sanitation practices near boreholes and wells.	NATIONAL: Standards for latrine construction. DISTRICT: Enforcement of standards. COMMUNITY: Awareness of sound hygienic behaviour near water points.
(Solid waste)	In the towns in Mbarara district the collection systems for solid wastes is not very developed. However there is a risk of contamination of the groundwater sources locally near dump sites.	A clear definition of institutional responsibility, guidelines for environmental assessment of solid waste disposal sites, regulatory means of rejecting proposed sites and guidelines for operation of solid waste deposits.	NATIONAL: Solid waste policy, strategy, allocation of institutional responsibility, guidelines for planning, design and O & M. DISTRICT: Site selection and EIA COMMUNITY: Awareness of need for solid waste management at household level.
USER REQUIREMENT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Domestic Use	The available information on ground water quality in Mbarara is scarce. However, more than 45 % of the population is served by open wells or springs. Boreholes with hard water and high concentrations of salt or iron are reported from Rwampara, Bukanga and Ishingiro. High fluoride concentrations are found in Kabuyana and Nyakitunde.	Monitoring of ground water quality and enforcement of standards by closure of boreholes with substandard water quality.	NATIONAL: Drinking water standards with appropriate flexibility. STRICT: Groundwater quality monitoring COMMUNITY: Awareness of sound hygienic behaviour near water points

Table 6.5 - Wetlands

WETLANDS			
IMPACT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Encroachment	The wetlands in Mbarara District are increasingly encroached for cultivation of various food crops as well as for pasture. These activities lower the water table in the swamps, and the swamps become dry more often in the dry season.	An overall policy for balancing conservation and development. Further, institutional responsibilities have to be defined, guidelines for development prepared, development permits introduced and legal enforcement procedures prepared.	NATIONAL: Wetland policy and strategies, allocation of institutional responsibilities, guidelines for development and legal framework for enforcement. DISTRICT: By-laws and development permits. COMMUNITY: Awareness of wetland development requirements.
Bush fires	Bush fires are commonly used in Mbarara District to obtain green pastures for cattle in wetland areas. This practice has a strong impact on all plant and animal life in the wetland.	Regulations, awareness building for cattle farmers and means of enforcement.	NATIONAL: Inclusion of bush fire prevention in wetland policy and guidelines and legal framework for enforcement. DISTRICT: Control and enforcement COMMUNITY: Environmental awareness
USER REQUIREMENT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Cattle watering	The wetlands in Mbarara are an important source for cattle watering, especially in the south eastern part of the district where the wetlands periodically are the only available source for this use.	The balancing of the interests of cultivators and cattle farmers through an integrated wetland development plan and conservation measures and a follow-up and control of the developments.	NATIONAL: Balanced wetland development planning. DISTRICT: Follow-up on adherence to planned development. COMMUNITY: Environmental conscious development activities.
Environment	Intact wetland ecosystems, which to a large extent are still found in Mbarara District, constitute a resource of significant environmental value - including regulation of flow, purification of water and the function as habitat to various plant and animal species. The main threat to the existence of this resource results from increasing land reclamation for livestock and cultivation purposes.	The balancing of conservation requirements and development needs, identifying a sustainable wetlands development policy. Further, institutional responsibilities have to be defined, guidelines for development prepared, development permits introduced and legal enforcement procedures prepared.	NATIONAL: Wetland policy and strategies, allocation of institutional responsibilities, guidelines for development and legal framework for enforcement. DISTRICT: By-laws and development permits. COMMUNITY: Awareness of wetland development requirements.

7 ASSESSMENT OF PRESENT MANAGEMENT

The existing institutions for district and community management were described briefly in Chapter 5, and the water resources issues and their related management functions were identified as they appeared in Mbarara District in Chapter 6. In the following tables, water resources management in the district will be assessed with respect to significant potentials, as well as constraints, within the existing management system at district level.

The management functions are divided into three categories according to the character of the issues to be dealt with. These are:

- management issues concerning geographically localized water resources problems with relatively simple responsibility relations and management functions
- management issues concerning geographically scattered water resources problems (or causes) with unclear definitions of responsibility and complex cause/effect relationships
- management issues concerning the availability of water compared with the demand. The related management functions mainly include prioritization of funds to be used in water development projects.

It should be noted, however, that the major constraint affecting all the water management functions is financial. There are at present severe constraints on both national and district finances, with very few funds available for development purposes.

7.1 Geographically localized water resources issues

Table 7.1 - Water pollution from urban sewers, industry and aquaculture

MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS
Policy formulation for local water pollution	Political system in place (RC councils and water committees) Water Officer, Health Inspector and Medical Officer of Health in position as advisors	National water resources/environmental policy framework not in place Lack of guidelines for policy making Lack of local standards
Monitoring of surface water quality	Water Officer in position. Health Inspector (incl. extension service) in position. Municipal Officers of Health in position System of local water committees in place	No formulated monitoring strategy. Inadequate knowledge on surface water quality. No qualified staff to dedicate to WQ monitoring. No monitoring equipment. Inadequate transport. Inadequate budget for monitoring costs. Very limited access to laboratory facilities - no test kits

MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS
Technical assessment of requirements and impacts	Water Officer in position. Health Inspector (incl. extension service) in position. Municipal Officers of Health in position	Low theoretical knowledge on WQ impact assessment. No guidelines for impact assessment. No national or local standards. Limited budgets.
Issuing permits	Administrative system operational in district and municipalities	Unclear interface between District and municipality authorities.
Control of fulfilment of permit conditions	Water Officer, Health Inspector, Medical Officer of Health and Industry Inspectors (Ministry of Industry) in position	No formulated control strategy. Low knowledge on surface water quality. No qualified staff to dedicate to WQ discharge control. No monitoring equipment. Inadequate transport. Low budget for running costs. Very limited access to laboratory facilities. Unclear relation between ministries.
Enforcement of permit conditions	Court system (magistrate), police etc. functioning	Lack of specific legislation. Unclear responsibilities towards third parties.

Table 7.2 - Pollution from solid waste disposal

MANAGEMENT FUNCTIONS	POTENTIALS	CONSTRAINTS
Site selection based on Environmental Impact Assessment	Medical officer of Health in position in municipality	Low capacity for EIA
Implementation of disposal system	City engineer in position	Low capacity for collection and disposal

Table 7.3 - Pollution from cattle dips

MANAGEMENT FUNCTIONS	POTENTIALS	CONSTRAINTS
Extension/education on environment conscious use and discharge of chemicals, on planning of location of cattle dips and on discharge from same.	Veterinary officer (incl. extension service), Water Officer and Health Inspector in position.	Limited capacity for supervision and control. Construction of soak pits gives extra costs
Assessment of impact on ground water and soil	none	Inadequate knowledge

7.2 Geographically scattered water resources issues

Table 7.4 - Adverse impacts on hydrological regime

Management functions for: Decreased minimum flow and siltation in rivers caused by deforestation (clearing for pasture)		
MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS
Local policy formulation and regulations for use of hills as grasslands and for cultivation	Political system in place (RC councils) Forestry Officer and Agricultural Officer in position for advise	National water resources/environment/forestry policy framework not in place Lack of guidelines for local policy making No Environment Officer
Cross-sectorial coordination between water, agriculture and forestry incl. technical assessments of agriculture and forestry development related to impact on the water resources	Water Officer in position. Agricultural Officer (incl. extension service) in position. Forestry Officer in position (incl. extension service). District Development Committee in place. District Extension Coordinator for Agriculture, Forestry and Fisheries in place.	Low theoretical knowledge on water resources impacts from agriculture forestry activities Lack of formalised coordination regarding water aspects of agriculture/forestry projects
Incentives for alternative livestock keeping	District Veterinary Officer (incl. extension service) in position. Forestry Officer (incl. extension service) in position. Agricultural Officer (incl. extension service) in position. RC's and Chiefs in place (as mobilizers). Ranches with exotic cattle established.	Livestock is a major socio-economic activity - practices are tied to traditional customs Land ownership, land rights and landuse policies need adjustment Low public awareness
Enforcement of regulations	Forestry police, Chiefs and local police in place. Court system functioning (RC and Magistrates).	Lack of specific legislation. RC courts locally biased.

Table 7.5 - Sanitation impacts

Management functions for: Local contamination of surface and groundwater due to low sanitation levels		
MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS
Latrine promotion, hygiene and sanitation education.	Health Inspector (incl. extension service) in position. SWIP project in operation	Funding. Lack of awareness. Local beliefs and taboos. Soil conditions.

7.3 Issues concerning availability of water compared with demand

Table 7.6 - Demand/supply imbalance

Management functions for: Scarcity of safe water sources		
MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS
Assessment of quantity and quality incl. spatial distribution of water sources and resources	Water Officer, Community Development Officer, Health Inspector (incl. extension service) in place. RC's and water committees in place. SWIP project operating.	Limited capacity. Inadequate transport. Limited budgets.
Policy/prioritization of development of domestic/livestock water supply	Political system in place (RC councils, water committees and District Development Committee), assisted by Water Officer, Health Inspector, Veterinary Officer and Chiefs. SWIP project in operation including tight collaboration with DWD	High demand. Local customs (cattle before people). Unwillingness to pay for O&M.
Development	Water Officer, Water committees and SWIP project in place	Relatively limited funds. Limited availability of equipment.

Table 7.7 - Conservation of wetlands

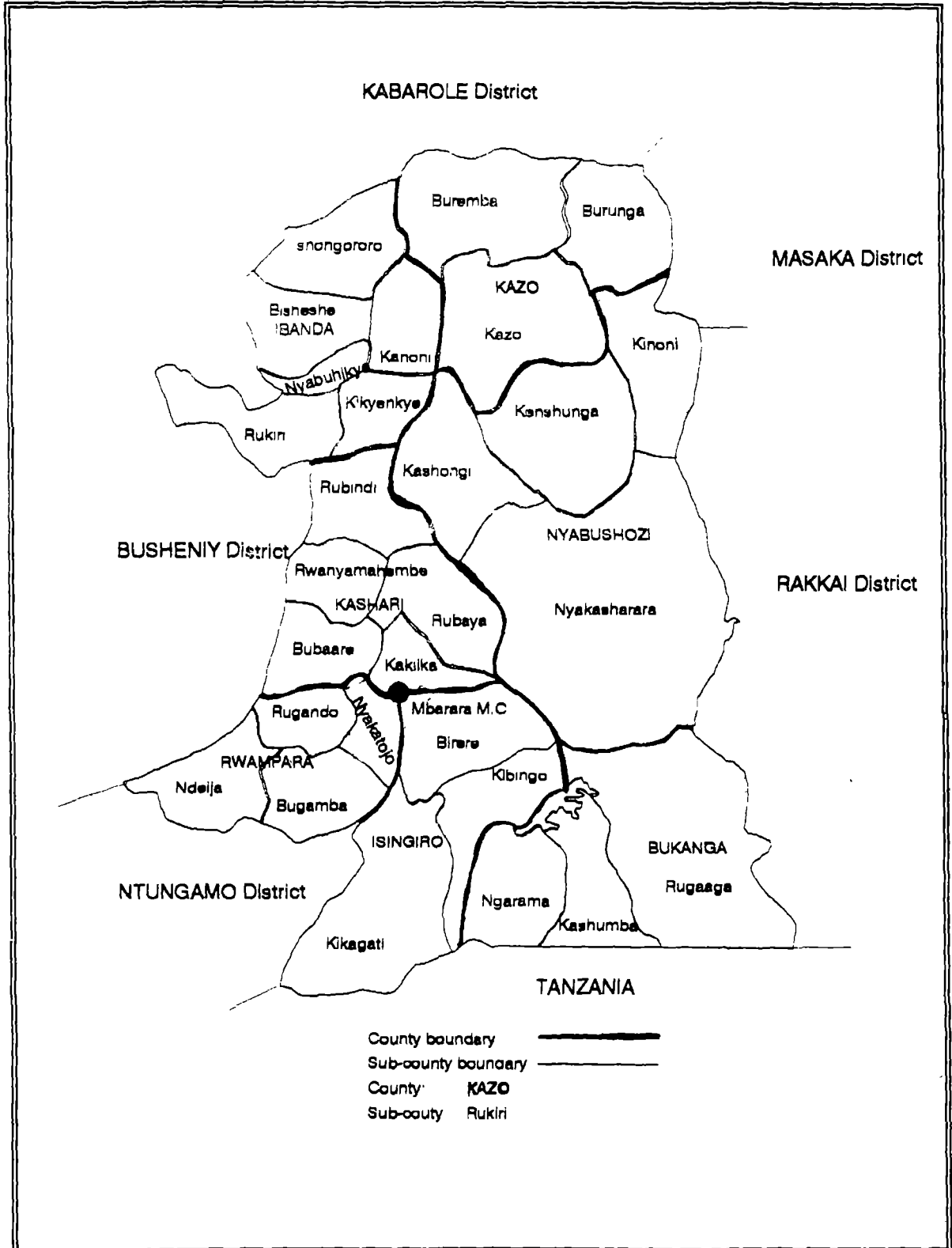
MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS
Local policy formulation and regulations for use of wetlands including cultivation, clearing for pasture, cattle watering and environmental protection	Political system in place (RC councils and water committees) assisted by Agricultural Officer (incl. extension service) and Water Officer	Lack of national policy on wetlands (to come). Lack of policy making guidelines.
Monitoring of water levels, wetland coverage and use	Water Officer and Agricultural Officer (incl. extension service)	No formulated monitoring strategy. Limited staff capacity. No monitoring equipment. Inadequate transport. Inadequate budgets.
Technical assessment of user requirements, environmental requirements and impacts	Water Officer, Agriculture Officer (incl. extension service) and District	No guidelines for impact assessment. Limited specific qualifications in wetland management. No Environment Officer.
Issuing permits	Administrative system operational in district.	Unclear interface between district, Directorate for Environment and DWD.
Control of fulfilment of permit conditions	Water Officer and Agricultural Officer (incl. extension service)	No formulated control strategy. Limited staff capacity. No monitoring equipment. Inadequate transport. Inadequate budgets.
Enforcement of permit	Court system (RC and Magistrates), police, chiefs functioning	No specific legislation. RC courts locally biased.

APPENDICES

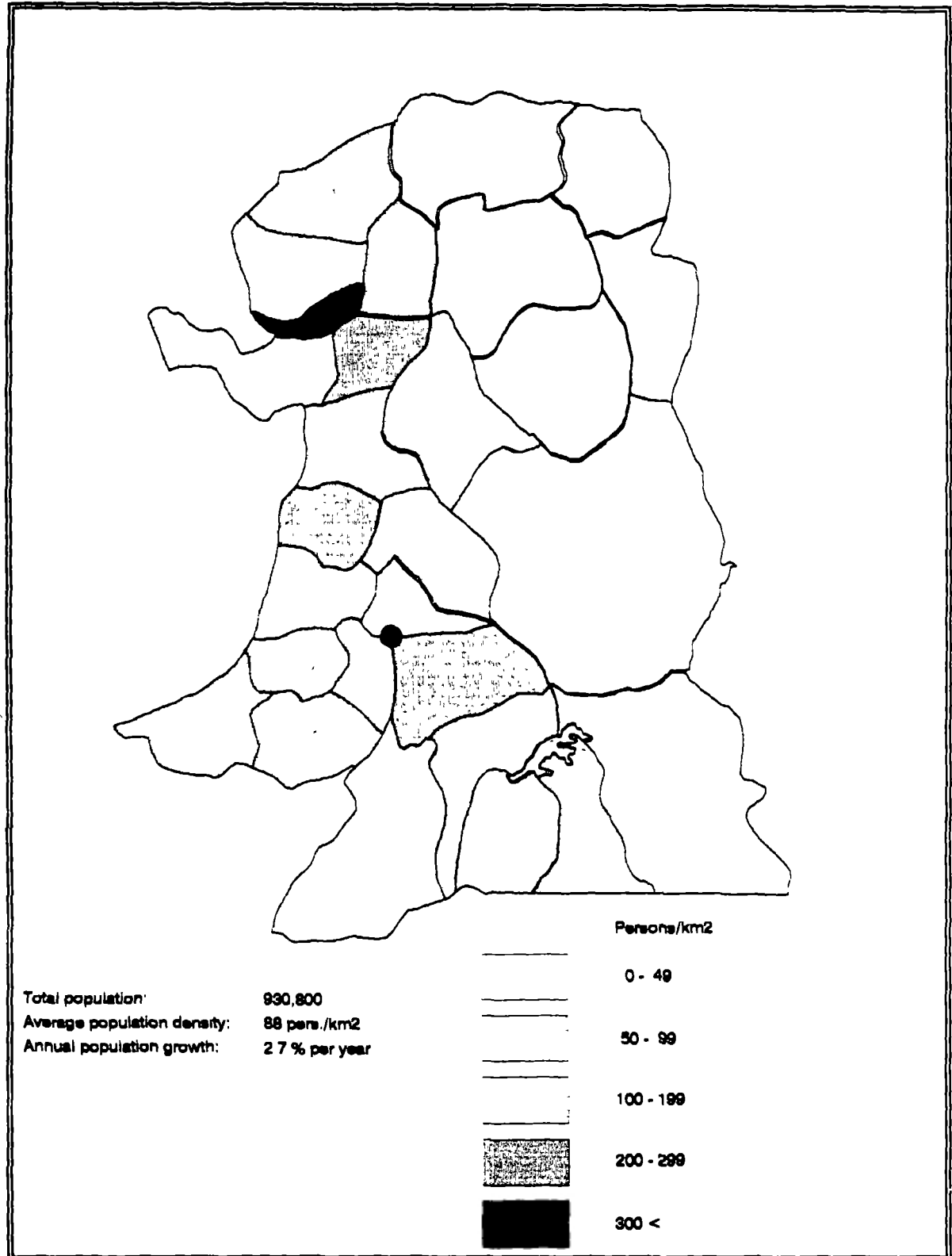
ANNEX 3

MBARARA DISTRICT

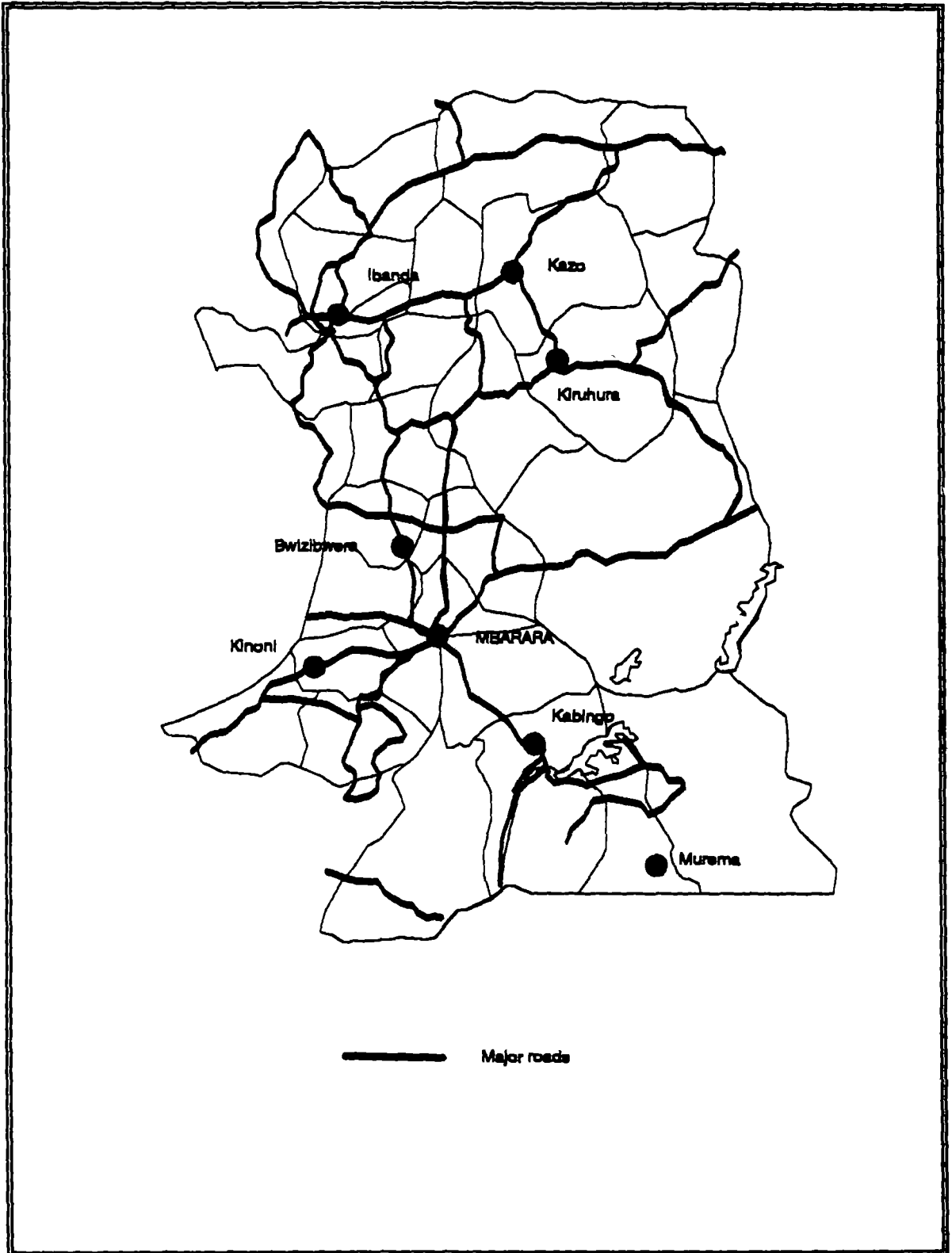
Mbarara District



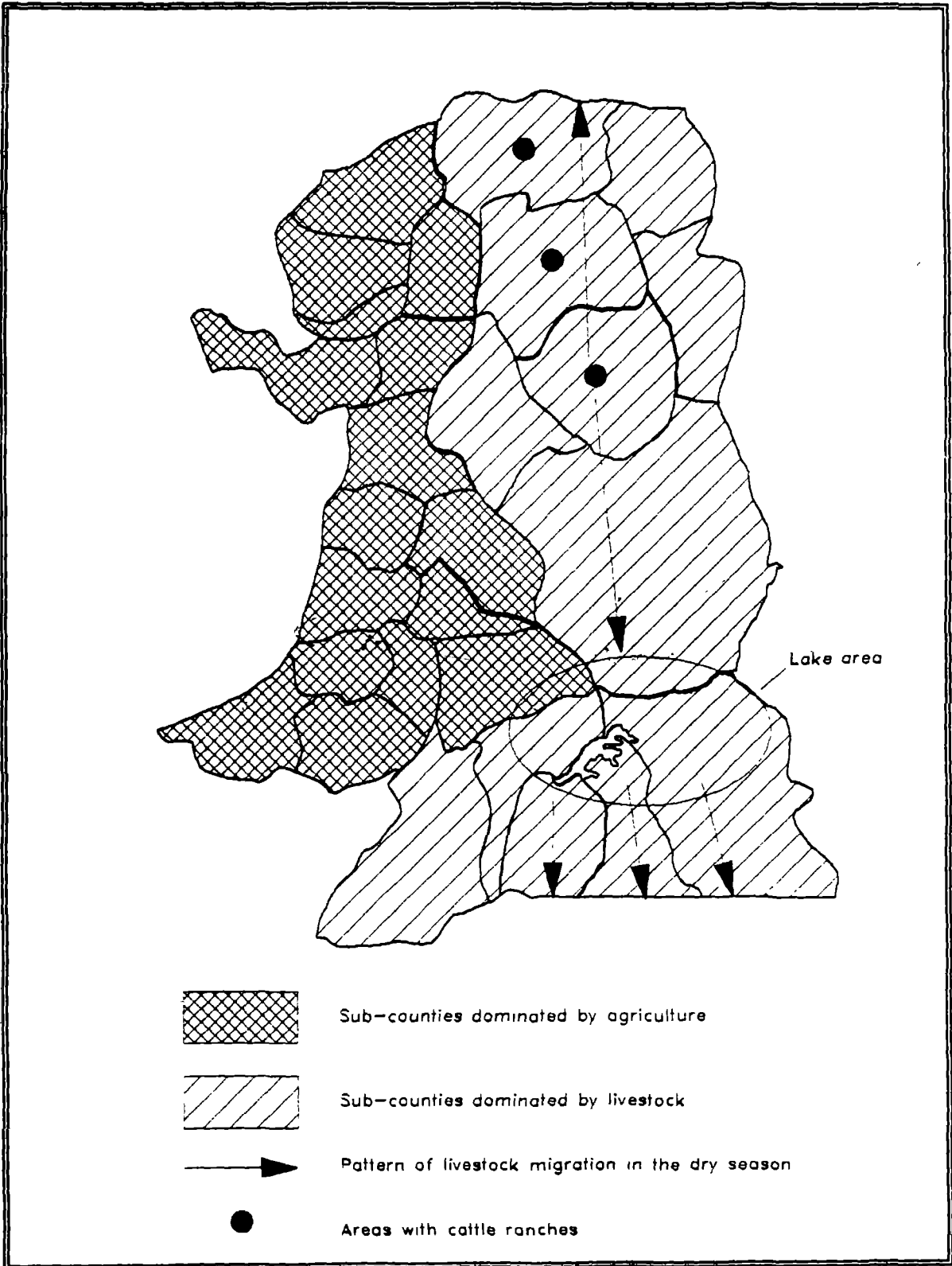
Population density



Infrastructure



Economic activities



1 GENERAL

The present land tenure situation in Uganda is a complex of various co-existing pre-colonial, colonial and post-colonial land tenure systems and land reforms. There are, also, some significant differences between what the law dictates and what goes on in practice.

2 LAND TENURE LAW

The 1975 Land Reform Decree No. 3 declared all land in Uganda to be public land - to be administrated by the Uganda Land Commission. All individual holdings were supposed to be converted into leaseholds. The lease period was meant to be 99 years for individuals and 199 years for public bodies. The 1975 Land Reform Decree No. 3 is the binding law on land tenure. However, various pre-colonial and colonial systems are still followed, both by the land administrators and by the landowners. These systems are:

- customary tenure
- mailo land
- freehold
- leasehold

3 CUSTOMARY LAND TENURE

These systems are pre-colonial, and they are the most widespread in the country. Specific regulations vary, of course, with each ethnic group and with certain localities. However, two major types of customary land tenure systems can be identified:

- specific permanent single holdings
- communal land with non-permanent holdings

The practice of having specific permanent single holdings is predominant in the southern and the eastern parts of Uganda. Each family has its own plot where it lives and cultivates the land. The head of the household decides on the use and transferability of the land. Access to land is gained through inheritance.

Communal land with non-permanent holdings is most common in the northern part of the country, but is also found in rangeland areas of the southern districts (Mbarara, Mubenda, Kiboga, Luwero, Rakai, Mukono, and Kamuli) and in the Lake Albert flats. Most of the traditional cattle are kept on communally held land. Where arable agriculture is dominant, areas of land are set aside for communal grazing and specific plots are allocated to families for homesteads and cultivation. There is no permanency in the system. Land is only retained as long as it is in use. The male elders decide who shall use a particular piece of land. Customary holders do not have any formal legal rights to the land according to the 1975 Land Reform Decree No.3.

4 MAILO LAND

The "mailo" system originates from the Buganda Agreement of 1900 between the Kabaka and the Protectorate Government. The Buganda land was divided between the Protectorate Government (Crown land and later public land) on the one hand and the Kabaka and his family and chiefs (mailo land) on the other. The mailo land was parcelled out into private and official estates. Later on, the land was surveyed and titles were given to the recipients. Customary holders became tenants of the mailo land owners. These tenants were required to pay mailo landlords for the use of the land. The system was officially abolished in 1967, and mailo land transformed into public land. In reality, the private mailo land remained as before. However, some of the mailo land has been transformed into leaseholds.

The mailo land owner enjoys full right of ownership and use of his land. Government has no access to mailo land, except in an advisory capacity. However, the mailo land owner is limited in his use of certain economic resources (minerals, for example) on his land. Government reserves the use of such to itself.

5 FREEHOLD

The term "freehold" refers to land owned by private individuals or organizations in perpetuity. By the Toro and Ankole Agreement of 1901, and the Bunyoro Agreement of 1933, the kings and their chiefs were granted land either as private or official estates. The rights to important resources remained with the Protectorate Government. Peasants on the land were transformed to tenants.

Another type of freehold land is crown land sold for development purposes. These freeholds were subject to development conditions and could be forfeited to the Colonial Governor if conditions remained unfulfilled. The 1969 Public Lands Act vested former Crown land occupied for Government purposes in the Uganda Land Commission as freehold. Crown land formerly occupied by public bodies was also vested in those bodies as freehold.

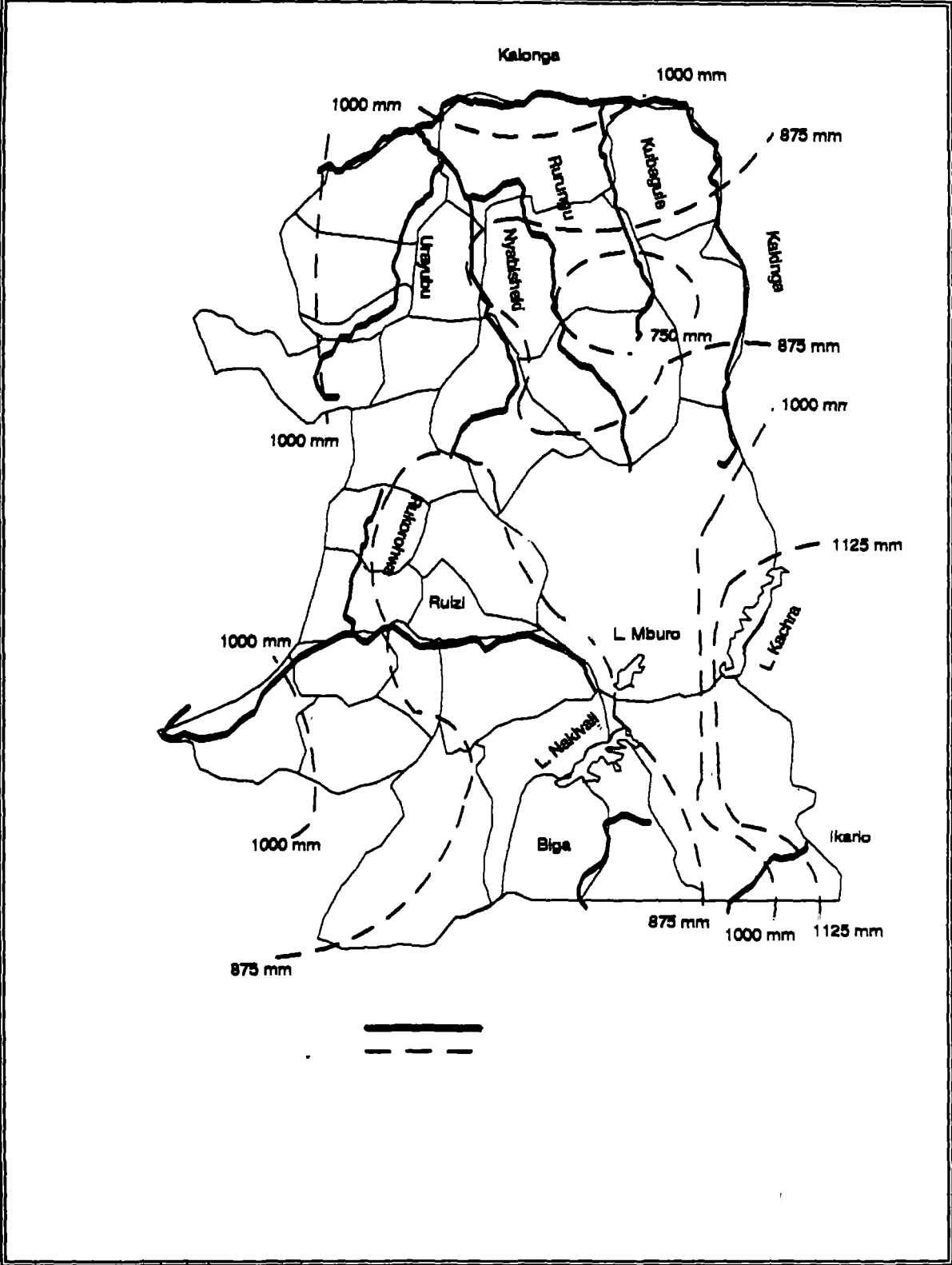
The leasehold system is based on an agreement (lease title) between the lessor (usually the Government) and the lessee (a developer). Land is leased out for development. It is more common in urban areas than in rural areas. The system originates from the 1975 Land Reform Decree.

There are three ways to obtain a lease:

- from the Uganda Land Commission
- from an urban authority on behalf of Uganda Land Commission
- from a private individual outside Government as a private lease.

Land gazetted for a specific purpose (eg. a forest reserve) cannot be leased. The Minister's approval is required for lands exceeding 200 ha or 500 acres.

Hydrology



1 GENERAL

The most distinctive and vital feature of politics in Uganda is the hierarchial system of Resistance Councils and Committees. This RC system was originally set up in the bush by the National Resistance Movement (NRM) during the civil war. The purpose then was to maintain links with the civilian population; after 1986 it has become the main mechanism through which local grievances can be expressed and officials, at all levels, can keep contact with the public.

2 THE RC STRUCTURES

2.1 Local level

All adults (those of 18 years and more) in a village or a sub-ward constitute the RC 1. The members of the Council elect the nine member RC 1 Executive Committee.

RC 1 committee members within a parish or a ward compose the RC 2, which elects the nine member RC 2 Executive Committee. The RC 3 at sub-county or town level is composed of members of the RC 2 committees. The members of the RC 3 elect the RC 3 Executive Committee. The process is continued at county or municipality level, the RC 4. (But the RC 4 is generally not active except in municipalities.) The RC 5, at district level, consists of two elected representatives from each RC 3 and one elected female representative from each RC 4. The RC 5 elects an Executive Committee from among its own members.

Each RC Executive Committee consists of a Chairman, Vice chairman, Secretary - and Secretaries for Finance, Security, Youth, Women, Information, Mobilization and Education. The total number of committee members in Uganda is over 350,000. The committees are elected every second year.

2.2 National level

The membership of the National Resistance Council is as shown in the following table.

Table 1.1 - Composition of the National Resistance Council

THE NATIONAL RESISTANCE COUNCIL	
NO. OF REPRESENTATIVES	ORIGIN OF REPRESENTATIVES
	The historical members (constituted in the bush during the resistance war)
1 from each county	Representatives elected from every county, by councillors of all RC 3 (sub-county) councils
10	The National Resistance Army (NRA)
1 from each district	Female representatives elected from every district by councillors of the RC 5 (District)
5	Youth representatives elected from the National Youth Organisation.
3	Workers' representatives, representing all the workers elected by the National Workers' Organisation
20	Presidential nominees
1 from each Division of Kampala	Representatives from each Division of the city of Kampala, elected by councillors of all wards in the division
1 from each municipality (2 from Jinja)	Representatives from each municipality

Policy is formally made by the National Executive Committee of the National Resistance Movement. The NEC comprises:

- the historical members of the NRC
- one representative from each district elected by the NRC, from among the RC 5 representatives.
- ten presidential nominees, from among the members of NRC.

3 POWERS AND RESPONSIBILITIES

The NRM has always tended to increase the authority of the RCs. They have been given powers to hear domestic and land disputes, try minor misdemeanours, maintain law and order, develop and maintain infrastructure. And they are encouraged to set up local defence units. All levels of the RC system can pass by-laws. The RC 3 and RC 5 have been given corporate legal status, so they can engage in economic as well as political activities (which means that they are entitled to sell services in competition with the private sector). They are also used as implementing agencies by donors and NGOs. In performing their judicial, service delivery and development roles, the RCs coexist with the administrative system.

3.1 RC Courts

Resistance Committee Courts are courts established by the Resistance Committee (Judicial Powers) Statute of 1988. The RC Courts comprise the nine members of the RC Executive Committee. RC Courts exist at RC 1, RC 2 and RC 3 levels.

The jurisdiction of the RC Courts is within civil cases and customary law. They are supposed to deal with cases concerning, for example, debts, contracts, trespass, land disputes relating to customary tenure, marital disputes. The RC Courts have no powers to try criminal cases, though they may arrest an offender and hand the offender to the police. Every suit should be instituted in a court within the local limits. Where a defendant objects to the jurisdiction of the court, the case should, if the objection is upheld, be referred to a higher court.

Court proceedings are held in an open place, where members of the public can enter and listen to the proceedings. Every question arising before court should be determined by consensus; in default of a consensus, it is determined by a majority vote of the members sitting - provided that, where decisions are made by voting, the chairman does not have an original vote, but, in cases of equal votes, he has a casting vote.

In cases of infringement of by-laws, the RC Court can impose a fine or any other penalty authorised by the particular by-law. All cases brought before the RC 1 Court have rights of appeal to RC 2 and RC 3 levels. If a case is not settled satisfactory at the RC 3 level, it can, in certain circumstances, be brought to the Magistrates Court, Grade I.

3.2 Water committees

Initially, the RC system did not contain any special institutional arrangements for the management of water resources. Now, however, there are many groups and committees set up for the management of water sources and facilities.

3.2.1 RC 1 Village Water Committees

Two responsible residents in the village, a man and a woman, living near the water source (borehole, spring, well, etc.) are charged with the responsibility for the day-to-day care of the utility. These two belong to a larger "Users' Committee", but they have specific assignments, such as keeping order at the point source and collecting users' fees. The Users' Committee acts as a sub-committee of the Village Water Committee within the RC 1, and it is responsible to the RC 1 Committee. The caretakers should normally report to the RC 1 Committee. In areas where the RUWASA project is operating, the Users Committees are permitted to report directly to the RC 3 Water and Health Committees.

3.2.2 RC 3 Sub-county Water and Sanitation Committees

These are sub-committees of the RC 3, in charge of water and sanitation. Their main functions are to coordinate and supervise the work of the Users Committees - to receive progress reports from these committees and to take appropriate action. They can organize meetings for disseminating information to the community or for training committee members and water facility attendants.

3.2.3 RC 5 District Water and Sanitation Committees

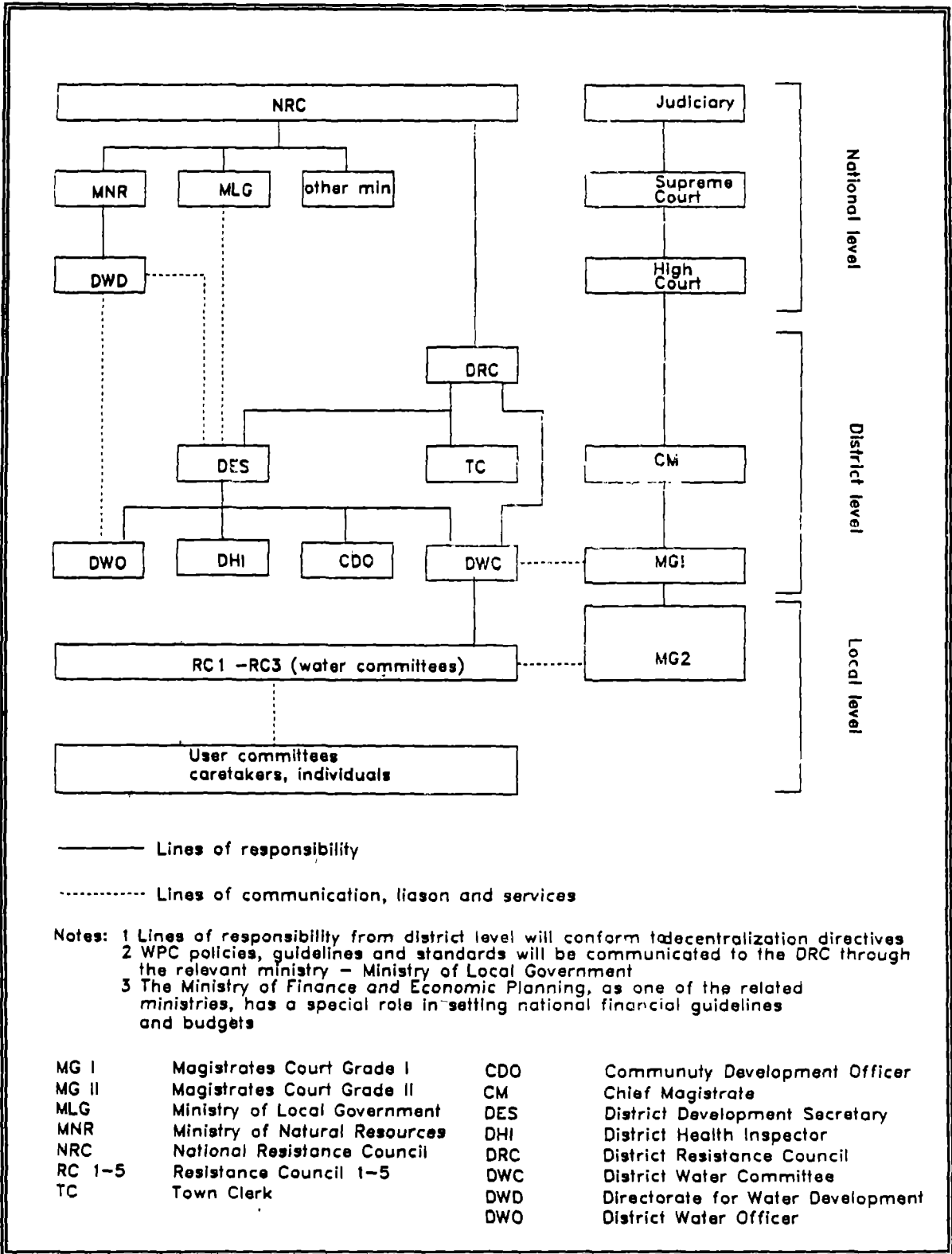
These committees are sub-committees of the District Resistance Councils charged with the overall policy formulation and guidance in matters relating to water supply and sanitation within the district. They register, monitor and coordinate NGOs who are active in the water and health sector. They report to the RC 5, which, as the district parliament, debates policies, designs strategies, passes budgets and approves programmes.

4 LINKS TO THE ADMINISTRATIVE SYSTEM

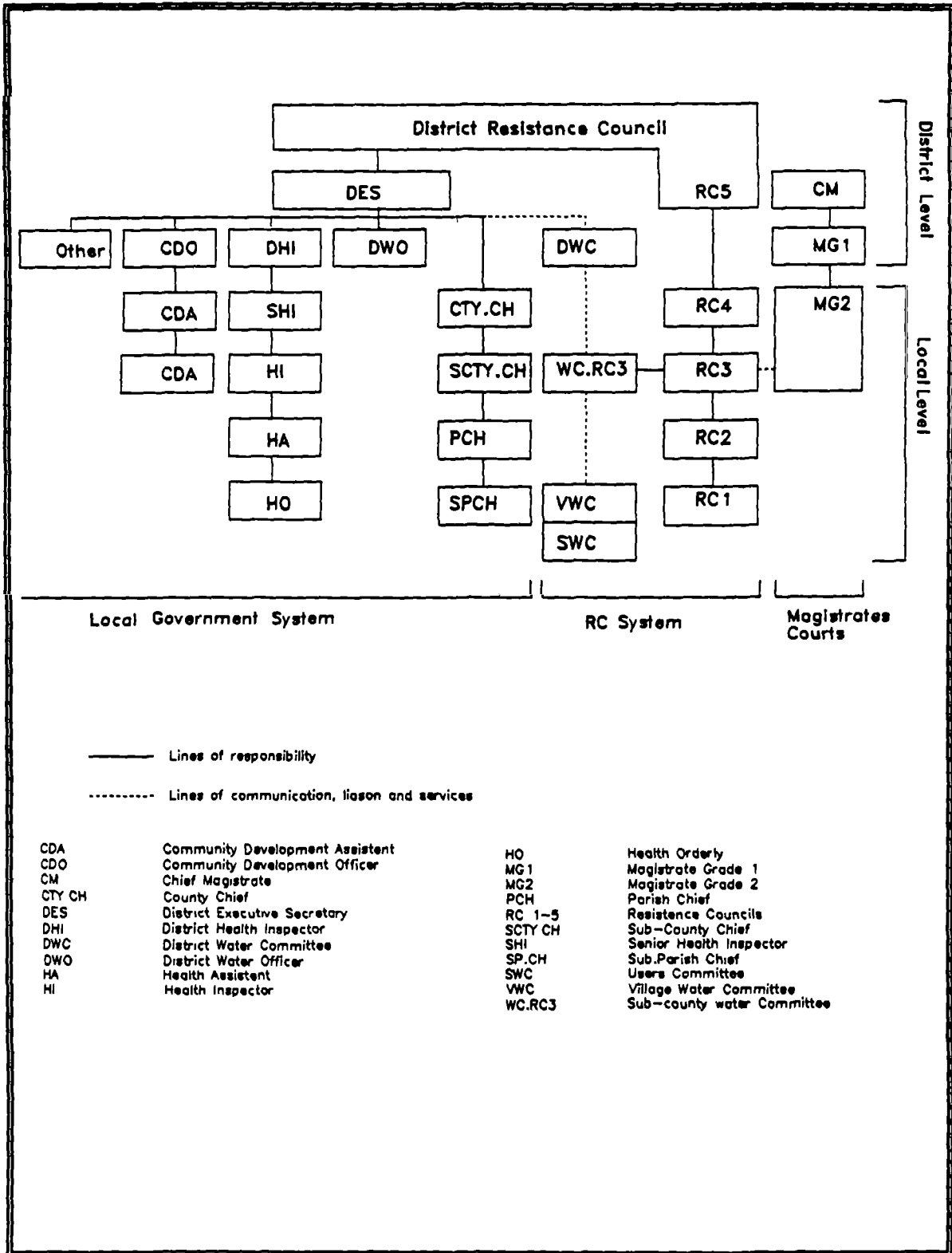
The RC system has always co-existed with the administrative system, but, sometimes, there have been uncertainties concerning the demarcation of tasks. The ongoing decentralization programme is expected to eliminate any such "boundary" issues.

The Resistance Councils have acted as legislative bodies, while the Local Government Administrations have assumed the executive role. Now, the Chairman of the RC 5 will replace the appointed DA as the political head of the district. All locally-based Ministry staff will become accountable to the DES, who is the administrative head of the district - responsible to the Council rather than to the Ministry of Local Government. The DA remains, but becomes a "Representative of the Central Government" - with a responsibility for overall security and defence.

Administrative levels



District level and local level institutions



ANNEX 3
DISTRICT STUDY - MBARARA

MOROTO DISTRICT REPORT**LIST OF CONTENTS****Abbreviations**

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LIST OF ABBREVIATIONS

ACAV	Associazione Centro Aiuti Voluntari
AMREF	African Medical Research and Education Foundation
ATM	African Textile Mill, Mbale
BOD	Biochemical Oxygen Demand
CDO	Community Development Officer
CIDA	Canadian International Development Agency
DA	District Administrator
Danida	Danish International Development Assistance
DAO	District Agricultural Officer
DDC	District Development Committee
DES	District Executive Secretary
DHC	District Health Committee
DHEO	District Health Education Officer
DHI	District Health Inspector
DMC	District Water and Health Management Committee
DMO	District Medical Officer
DRC	District Water Engineer
DRC	District Resistance Council
DWD	Directorate of Water Development
DWO	District Water Officer
EIA	Environmental Impact Assessment
FHh	Female-headed household
HYDROMET	Hydrometeorological Survey of the Catchments of Lakes Victoria, Kyoga and Albert
IDA	International Development Agency
KDA	Karamoja Development Agency
LMNP	Lake Mbuoro National Park
LWF	Lutheran World Federation
MLG	Ministry of Local Government
MOH	Municipal Medical Officer
NEAP	National Environmental Action Plan
NEC	National Executive Committee of the
NGO	Non-Governmental Organization
NRM	National Resistance Movement
NWSC	National water and Sewerage Corporation
NYTIL	Nyanza Textile Industry Limited
RC	Resistance Council
RUWASA	Rural Water and Sanitation (East Uganda Project)
SCOUL	Sugar Corporation of Uganda Limited
SIDA	Swedish International Development Authority
SWIP	South-West Integrated Health and Water Programme

UNICEF	United Nations Childrens Fund
UWE	Urban Water Engineer
WAP	Water Action Plan
WATSAN	National Water and Sanitation Programme (a UNICEF programme)
WDD	Water Development Department (former name of DWD)
WFP	World Food Programme
WID	Ministry of Women in Development
WPC	Water Policy Committee

1 INTRODUCTION

1.1 Background

A first phase of the "Water Action Plan for Water Resources Development and Management" (WATER ACTION PLAN PHASE I) was prepared from February to May 1993. The major components were:

- draft water resources policy
- draft rapid water resources assessment
- draft institutional & management study
- international study

In the period from June to November 1993, follow-up work was carried out during the "Consolidation Phase I", which also comprised preparatory activities for Phase II. These activities were preliminary data collection and information gathering in five districts selected as pilot areas for studies to be undertaken under Phase II. The Consolidation Phase I activities were undertaken by the project counterpart staff.

The Project Document entitled "Water Action Plan for Water Resources Development and Management" (WATER ACTION PLAN PHASE II) describes the second phase of the project to develop a Water Action Plan for Uganda. The work on Phase II started in November 1993. The second phase will produce among other items:

- an outline proposal for appropriate local water resources management levels based on district studies
- an outline proposal for management procedures providing the administrative machinery at national and district levels with guidelines for sustainable water resources management

District studies to support such proposals were carried out in each of five selected pilot districts: Arua, Mbarara, Mukono, Mbale and Moroto. These studies comprise reconnaissance level evaluations of sociological and economic conditions which combine to give the background for assessments of water uses and demands. These uses and demands are compared to available water resources in terms of quantity and quality.

An unequal distribution of demands and resources leads to the identification of a number of water resource issues and cases which require management strategies and capabilities at different levels (national, district, and community). Based on the existing institutional and judicial framework, management potentials and constraints are identified and evaluated.

1.2 District studies

The objective of the district studies is to gain knowledge adequate to recommend which aspects of local water resources management can be generalized throughout the country and which aspects are area specific and require some adaptation of the general principles. Further, the objective is to support the preparation of guiding principles for the distribution of management responsibilities between national and local levels.

The tasks undertaken in fulfilling these objectives were:

- data reviews and brief reconnaissance
- identification of water resources issues
- review of the role of formal and informal institutions in water resources management
- identification of necessary management functions
- preliminary assessment of water resources management capacity in relation to the management functions and responsibilities
- assessment of the role of women

The 5 pilot district studies were supplemented by short visits to other districts where particular issues are dominant features (wetland cultivation, aquaculture, soil erosion, etc.)

Thus, the district studies do not describe the characteristics of a district in detail, giving a comprehensive geographical profile. The focus is on management of water resources and on the issues that are related to water resources. Further, it will become apparent that it is not the intention of the studies to propose solutions, but rather to identify the present and possible problems in order to recommend a framework within which such problems can be approached.

1.3 Moroto District visit

The Moroto District was visited by the study team during the period from 13 to 17 February 1994. Two days were used for the interviews and discussions, as well as for the collection of statistics from the District Administration Headquarters in Moroto Town.

After the meetings in the district centre, the team visited a number of local administration offices and sites, including:

- meetings with representatives from the town council in Moroto
- meetings with representatives from some selected sub-county councils and water committees
- meeting with LWF
- visits to various sites (water sources, valley tanks, gravity schemes)

During the visit, the team was accompanied by officers from the district administration, who acted as resource persons as well as guides.

The summaries and results from this district study are presented in the following chapters.

Chapter 2 summarizes in a tabular form the main characteristics of Moroto District - in terms of physical features, population, economic activities, health and sanitation. The water resources, their use and availability, are described briefly in Chapter 3; while Chapter 4 gives an overview of the consumer categories, the use of water in the district, and the demands. Chapters 1 to 4 all lead up to the description of the present institutions involved in water management in Chapter 5, and to the identification of issues and management functions and levels in Chapter 6. Chapter 7 gives an assessment of the present management capacities, related to the identified management functions.

General material on, for instance, the RC system and on land tenure systems is given in appendices.

2 DISTRICT SUMMARY

Table 2.1 - Physical features of Moroto District

PHYSICAL FEATURES.	
Location	Moroto is located in the Karamoja Region in the northeastern part of Uganda. The District borders Kapchorwa and Kumi Districts in the south, Soroti District in the west, Kotido District and the Republic of Kenya in the east.
Area	14,113 km ²
Relief	Moroto lies on the Karamoja plateau. The eastern part of the plateau is undulating, while the western part is flat. The average altitude of the plateau is 1100-1200 m, with three mountains: Moroto (3084 m), Kadam (3068 m) and Napak (2537 m).
Climate	<p>The district is located in the semi-arid zone.</p> <p>Rainfall: 600-800 mm/year Recorded max. (1989-92): 1247.8 mm Recorded min. (1989-92): 333.1 mm</p> <p>The mountain area receives more rain than the plains. E.g. Moroto town (1347 m) receives 900 mm on an average. Rainfall is unreliable, irregular and often with high intensities.</p> <p>Dry season: September-March Rainy season: April-August</p> <p>The rainy season is often interrupted by periods without rain. Situations described as drought have occurred three times within the last 15 years: in 1980, 1984 and in 1993.</p> <p>The mean annual potential open water evaporation range from 2000-2200 mm.</p> <p>Temperature: Mean annual max: 27.5-30.0 C Mean annual min: 12.5-15.0 C</p> <p>During the hot season, dry northerly winds are predominant.</p>
Soil	<p>Several types of soil are found in the district:</p> <p>Dark grey to dark brown clay loams to clays. Shallow sandy loams. Black to grey clay termed "black cotton soil".</p> <p>The two latter soil types are erodible and both gullies and sheet erosion are common in the plains around mountainous areas. The banks of the seasonal rivers are prone to erosion too.</p>
Landcover	<p>The total forest area is 108 km² Estimated area under cultivation (1992): 180 km² According to the District Agricultural Officer, app. 50% of the total area is cultivable.</p>

Table 2.2 - Key population characteristics of Moroto District

POPULATION																						
Total	According to the 1991 census, the total population was 174,400. This figure is probably significantly lower than the real number of persons living in the district, as the census was carried out in the dry season when a large number had migrated to other districts. A survey carried out by LWF and St. Kizito Hospital in the counties of Bokora and Matheniko found the number of people 1.8 and 1.5 times higher than those from the 1991 census.																					
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Ethnic groups and language	The major ethnic group in the district is the Karimojong and the common language is Akarimojong.																					
Patterns of migration	<p>The Karimojongs are semi-nomadic pastoralists. Migration with cattle within the district and to the neighbouring districts is very common during the dry season. Mainly men and young boys migrate with the cattle.</p> <p>The settlement pattern in the district is changing. The formation of manyattas (group of huts) was traditionally based on the clan. There is now a tendency to form larger manyattas inhabited by a number of clans in order to better protect a territory.</p> <p>In addition, people tend to settle near urban centres as they find social services and some employment opportunities there.</p> <p>The net out migration (1980-91) was about 80,000 persons, after allowing for annual population growth.</p>																					

Table 2.3 - Main economic activities in Moroto District

ECONOMIC ACTIVITIES	
Agriculture	<p>Cultivation of food crops is traditionally undertaken by the women. However, men not owning any cattle (app. 15-20%) are taking up cultivation. There is no cash crop production in the district. The agricultural production does not meet the subsistence needs.</p> <p>Sorghum is the most important crop, grown on more than half of the cultivated area. Other important crops are maize and millet.</p> <p>The crops are rainfed and the cultivation is extensive. Land preparation is done with hoes, and in some cases ox-ploughing. Cattle are grazing the fields after harvest.</p> <p>The district receives food relief whenever there is food shortage, which occurs almost every year. The Food for Work under UN/WFP engage people in activities such as road repairs and de-silting of atapas.</p>
Livestock	<p>There are no census figures on livestock in the district. The estimated number of cattle is 300/350,000. A smaller number of sheep and goats are kept in addition to the cattle.</p> <p>Livestock plays a significant role in the Karimojong society and culture. Cattle represent a high symbolic and real value. Prestige is the main reason for keeping animals. Milk mixed with blood, butter and ghee is a part of Karimojong diet. Livestock can be traded in exchange for food during times of shortage. Livestock are only slaughtered on special occasions. E.g. if a man offends the rules of the clan, he might be asked to slaughter one of his animals as a penalty.</p> <p>The Karimojongs are maintaining their livestock herds partly by cattle rustling, within the district and in the neighbouring districts. Ownership of livestock seems to have been rather evenly distributed in the past. However, now ownership tends to be concentrated in a smaller number of persons.</p> <p>The livestock is watered at dams, atapas (ponds), boreholes with troughs and, in some cases, at shallow dug holes in the riverbeds.</p> <p>Migration for pasture and water takes place during the dry season. 50-80% of the cattle population is migrating within the district and in the neighbouring districts.</p>
Trade	<p>A growing number of younger men in Bokora county have gone into petty commodity trade.</p>
Energy	<p>Fuelwood is the most common source of energy. It is common that women produce and sell charcoal. There are only very few woodlots to support the production of fuelwood and charcoal.</p>
Other activities	<p>Gold mining, handicraft and hunting are minor additional sources of income. Beer brewing is a common sources of income for women in the urban centres.</p>

Table 2.4 - Key health and sanitation characteristics for Moroto District

HEALTH AND SANITATION															
Common diseases	<p>The most common diseases according to the District Health Inspector are:</p> <p>guinea worm, diarrhoea, scabies, eye infections, skin infections.</p> <p>These diseases can be related to the very low standard of sanitation.</p> <p>Malaria is very common during the rainy season. Elephantiasis and bilharzia are common in the southern part of the district.</p> <p>Bokora county is one of the areas most affected by guinea worm. One of the criteria for obtaining a borehole from LWF is guinea worm infestation of the existing water source.</p>														
Health Services	<table border="0"> <tr> <td>Hospitals</td> <td>2</td> <td>(total no. of beds, 372)</td> </tr> <tr> <td>Health centres</td> <td>3</td> <td></td> </tr> <tr> <td>Sub-dispensaries</td> <td>13</td> <td></td> </tr> <tr> <td>Mobile clinics</td> <td>3</td> <td></td> </tr> </table>			Hospitals	2	(total no. of beds, 372)	Health centres	3		Sub-dispensaries	13		Mobile clinics	3	
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Health centres	3														
Sub-dispensaries	13														
Mobile clinics	3														
Sanitation	Type of facility	Persons served	Persons (% of total)												
	Water borne not shared	1274	0.7												
	Water borne shared	585	0.3												
	Pit latrine not shared	1114	0.6												
	Pit latrine shared	6403	3.7												
	None	146,164	85.6												
	Other	12,145	7.1												
	Not stated	3081	2.0												
	Total	170,766	100.0												

3 WATER RESOURCES

3.1 Water Resources Availability

Moroto District in Karamoja region lies in the driest part of Uganda. It has a semi-arid climate, with sharp variations in rainfall.

Usually, rain falls in one season, between April and September (with a dry spell of 1-3 months in between). The rest of the months from October to March are dry. However, the onset of rains is highly variable, by +/- 1-3 months. The annual total rainfall varies from 300-1200 mm from year to year, and from place to place - depending on the local topography. Most of the rain falls in a few torrential storms, with an average of 50 rainy days per year. In general, the southern part, Namalu, and the mountain areas of Moroto, Kadam and Napak, receive more rainfall than the rest.

Evaporation is very high: ranging between 1500-2500 mm. During the dry season, strong northerly winds are experienced.

The table below shows the total annual rainfall and the number of rainy days for a few selected stations in the district - for the period 1989 to 1992.

Table 3.1 - Raintall pattern in Moroto

Station	1989			1990			1991			1992		
	R'fall	No of R/days	Mean	R'fall	No of R/days	Mean	R'fall	No of R/days	Mean	R'fall	No of R/days	Mean
Kangole	636	66	10.28	613	50	12.26	513	56	10.57	705	51	13.8
Moroto	1024	67	15.13	651	51	12.76	788	76	13.37	832	71	11.72
Nakapiripirit	700	60	13.27	1248	81	15.40	949	70	13.54	738	68	10.85
Nadunget	785	49	16.04	333	34	9.8	716	50	14.33	675	50	13.05

Source: Department of Agriculture, Moroto.

Due to the sharp variations in rainfall, drought is a recurrent problem. The worst recent drought occurred in 1982. This has had a severe impact on the availability of surface water for livestock, and on the acreage/yields of rainfed agriculture - leading to famine and the death of stock.

Surface runoff in the whole district is seasonal, except for the upper courses of a few streams fed by springs in the mountainous areas of Lilia, Nakapiripirit and Namalu. Even so, these perennial courses often disappear in the plains - where it is possible that they recharge groundwater. There is, therefore, a severe shortage of surface water in the whole region to meet the predominant demand for livestock, and the semi-nomadic pastoralists seasonally migrate to the neighbouring districts in search of water and pasture.

There is no data on the flow of the ephemeral streams in the whole region, to determine the runoff which could be stored in small dams and valley tanks to meet the high demand for livestock water supply, mobilise the resources for irrigation, or to estimate groundwater recharge.

During the district visit, it was reported that the seasonal streams carry high sediment loads - possibly due to the combination of torrential rain storms after the prolonged dry season, the poor vegetation cover, and the loose sandy clay loams which are found in the major parts of the district. Deep meandering gulleys and dry river beds filled with sediments were also observed. This is possibly partially responsible for the high rate of siltation of the dams, valley tanks and ponds constructed for livestock water supply - most of which have silted. However, there is no documentation on the sediment loads in the streams.

Deep groundwater potential in the district is comparatively high - with yields of up to 9 m³/hr. However, the abstraction is limited by the capacity of the hand pumps installed for domestic use. Therefore, groundwater is not widely used to supply the livestock demand, for which increased extraction would be required. This has led to boreholes being abandoned when the nomadic pastoralists migrate in search of livestock water sources.

With the exception of the mountain areas and southern parts of the district, there is limited potential in the plains for shallow wells and springs.

3.2 Water Quality

The water quality pattern in Moroto District is very much dependent on the water source, the season of the year, and the nature of the prevailing weather at a particular time.

The sources of all-year-round good quality water are the boreholes. They number about 600 throughout the District. LWF has just compiled information on these boreholes in terms of well location, depth and yields. Yields, it appears, are quite high. Besides this descriptive information, there is no data in terms of water quality. Wells are rejected on grounds of the water being either too salty or having some unfamiliar smell or taste. However, the water is generally hard.

Moroto town has 39 boreholes, serving a community of 12,000 people. The bacteriological quality of these sources is highly dubious. There are either very shallow pit latrines or no latrines at all in the whole of Moroto town. The bucket system is used and the night-soil is dumped on open ground. There is a possibility of groundwater contamination. As a result the incidence of diarrhoeal diseases (rated the third major cause of mortality) and intestinal worms are high.

Rainfall would provide the best water in terms of quality. Unfortunately, rain harvesting is not developed.

Runoff after rains is normally stored in dams, valley tanks and ponds, for both livestock and domestic use. However, the quality of water in these structures is very poor. The cause is the high siltation, and poor management. Cows, goats, camels, donkeys and people all walk directly into the water and stir up mud and silt while drinking. The highest source of contamination is probably bacteriological, but there is no data on the quality of these sources.

The appearance of the water in the facilities ranges from yellow to orange to black - depending on the colour of the silt or mud which make up the bottom of the water source.

Sanitation in the whole district is extremely poor, due to traditional beliefs. The situation in Moroto town is worst, because of the population concentration.

Guinea Worm infestation, especially in Bokora county is high. Cyclops, which are responsible for Guinea Worm infestation, are water based. On stepping into the open water as the Karimojong do, the chances of being infested are quite high. However, it was reported from Matany hospital that the incidence of Guinea Worm is related to the presence of stagnant water. Now that there is a severe drought in the district, the rate of infestation has dropped. Filters are being provided under the Global 2000 project. (It was reported that since there is no water to filter at present, due to the severe drought, those who are given the filters use them to filter local brew!)

It was reported from the Central Government Representative that 20 years ago the whole of Karamoja district had a good land cover and good vegetation. This land cover is no more - as result of overgrazing. The consequence is serious erosion in the whole region. Both sheet and gully erosion are rampant. The gullies turn into swift running rivers during rainy seasons. Bush burning also deprives the soil of any remaining land cover. This is practised in preparation for green pasture, and also to enhance firewood collection.

The lack of an alternative source of energy has meant that there has been a serious depletion of the scanty forest reserve in the district. Almost all the 12,000 people in Moroto town depend on fire wood and charcoal as their source of energy.

4 CONSUMER CATEGORIES, WATER USES AND DEMANDS

4.1 General

The main consumptive demands in Moroto District are related to livestock as well as people. There are significant seasonal variations in water availability, and, as a result, a large number of herdsman and livestock migrate during the dry season. within the district as well as into other districts. Normally, the dry season lasts from September/October through March. A small number of institutions (e.g. hospitals and missionary educational centres) rely on their own supplies - mostly boreholes and a few gravity schemes.

4.2 Rural domestic water use

The 1991 Population Census was conducted during the dry season, and therefore it reflects conditions specific for this period.

The census figure of 160,000 people living in the rural areas of the district does not include the large part of the male population which had migrated to other districts. The population is considerably higher during the rainy season, when the men return to the district. Thus, the demand for domestic water increases during that period.

Again, according to the census figures, approx. 47% of the population (urban and rural) are primarily using boreholes for domestic water supply (Table 4.1). However, traditionally, women are collecting water from surface water bodies such as atapas, valley dams/tanks and water holes dug in the river beds. During the rainy season, water is likely to be fetched at the nearest source regardless of the quality of the water. Another factor that might influence the choice of water source is the claimed preference of surface water compared to water from boreholes. Even though dependency on water from boreholes increases during the dry season, the share of the population depending on boreholes is probably overestimated (Table 4.2). Only 50% of the 627 boreholes in the district are functional. It is estimated that only 50% of the non-functional boreholes can be rehabilitated.

The settlement pattern has an impact on the community's access to water sources, as people increasingly prefer to move together in clusters of manyattas for security reasons. The new settlement sites might not be near boreholes or other safe water sources. Boreholes are abandoned in areas considered insecure.

Table 4.1 - Water source use

TYPE OF SUPPLY	POP.	POP%
Piped water, inside	257	0.1
Piped water, outside	443	0.3
Borehole	79,955	46.8
Protected well/spring	12,186	7.1
Open well/spring	38,088	22.3
Stream/river	29,172	17.1
Lake/pond/dam	6085	3.6
Other	189	0.1
Not stated	4391	2.6
Total	170,766	100.0

Source: Population and Housing Census, 1991

Table 4.2 - Distribution and status of boreholes.

COUNTY	BOREHOLES WORKING	BOREHOLES FOR REHABILITATION	BOREHOLES ABANDONED	TOTAL
Matheniko	73	29	30	132
Bokora	92	38	49	179
Chekvi	49	23	22	94
Pian	41	38	19	98
Upe	12	23	24	59
Moroto M.C.	36	14	15	65
Total	303	165	159	627

Water collected from surface water sources is of a very poor quality and it is not treated before use. Guinea worms, diarrhoea and infections are very common water related diseases. It has been anticipated that the Global 2000 Programme's efforts to introduce water filters will reduce the incidence of guinea worm.

4.3 Urban domestic water use

Approximately 13,000 people live in urban or semi-urban settlements. The majority (approx. 10,000 people) live in Moroto town.

Boreholes are the most common water source in Moroto town. Only about 50% of the 65 boreholes in and around the town are working. The average walking distance is less than 1 km. It was claimed that the drought in 1994 had caused a higher number of dry boreholes than usual.

The piped water scheme in Moroto town has not been working since June 1993.

4.4 Livestock consumption

Cattle keeping is the most important activity for most of the men in the district. There are approximately 300,000 head of cattle and a smaller number of small ruminants in the district. All cattle are of an indigenous breed, each one requiring 20-25 litres of water per day. During the rainy season, the water requirement for livestock consumption is met by surface water resources. Ataparas (water ponds), seasonal rivers and valley dams/tanks. When water sources dry out, the livestock herds have to be moved over longer distances in order to find other water sources. Watering frequency might change from once a day to once every second day. As the dry season proceeds and water and pasture becomes scarce, the male population start migrating with their livestock. 50-75 percent of the livestock are thus moved within the district or to neighbouring districts (Table 4.3).

Table 4.3 - Livestock migration pattern

COUNTY	MIGRATING LIVESTOCK %	DESTINATION
Bokora	75%	Westwards, Soroti and Northwest
Pian	50%	Soroti and Kumi. In very dry years Mbale.
Chekwi	50%	Soroti and Kumi. In very dry years Mbale
Matheniko	n.a.	Normally to the neighbouring districts, but the last three years within the district, due to insecurity.
Upe	50%	Kenya

The water required for the livestock remaining in the area throughout the dry season is supplied from boreholes. Livestock are given first priority for water at the boreholes by the rural population. Some of the boreholes have been installed with windmills for the purpose of livestock supply, though the system proved not reliable due to an irregular wind regime.

4.5 Water for agriculture

The rudimentary agriculture is rainfed and carried out in the more inhabited and more fertile zones of the district: in parts of Chekwi and Bokora counties. Yields are highly susceptible to the unreliable and uneven distribution of rain. The importance of agriculture might increase, as a growing number of men are losing their livestock and turn to farming for a livelihood. Irrigation is only practised on a very small scale at a few institutions.

4.6 Water for small scale processing

Beer brewing is a common and important income-generating activity for many women. In urban areas, hired female labourers are paid in kind to supply the required water. In rural areas family labour is used to haul the water.

5 AGENCIES INVOLVED IN WATER RESOURCES MANAGEMENT

5.1 Introduction

This chapter identifies the institutions involved in water resources related management in Moroto District, and it describes their present functions. In this context, the term "institution" should be taken to have a broad meaning: it includes any formal or informal agency which does, or might, make decisions related to the water resources.

In the following sections, an attempt has been made to distinguish between institutions involved in policy making, administration, enforcement, and conflict resolution - even though these functions are not always clearly separated in the present system. In subsequent sections, other types of institutions, which play a significant role in water management are identified: NGOs, aid programmes and development projects.

It is important to note that a number of specific but interrelated cultural, political and environmental factors, such as the deeply embedded traditional social structures, the seasonal variations in water availability, patterns of migration, and security matters - all these have a significant impact on the present water management situation in Moroto District.

In order to cope with the challenging conditions in Moroto, and other parts of the Karamoja Region, a Resident Minister for Karamoja Affairs has been appointed. The role of the Minister has not yet been made absolutely clear. However, he is the head of the district; and he is assisted by the DA and the DES, who are responsible for the political and civil service sector, respectively. Supervising and co-ordinating functions are vested in the Karamoja Development Agency (KDA).

5.2 The RC system and the committee structure

The RC framework of committees exists in the district. However, it is not functioning as it is designed to function - because the traditional customary systems still play a dominant role in social relationships. It may be said that the system is operating fairly well at the central level, but the authority of the RCs is not really recognized at lower levels.

A number of committees composed of representatives from the RC system, NGOs and the district administration function at District level. Below District level, the committees are less well developed; if they are formed at all at this local level, the members tend to be either powerful members of the community, such as elders, kraal and clan leaders - or they are people who are subordinate to such leaders.

5.2.1 District Development Committee (DDC)

The DDC is composed of representatives from each sub-county, from NGOs and Government Departments. The DDC is responsible for the formulation and implementation of the district development plan and for encouraging and monitoring development initiatives within the district.

5.2.1 Borehole Allocation Committee

The Borehole Allocation Committee is composed of 25 members, including the DA as the chairman, the DWO as the secretary, RC 3 councillors and representatives of the RC 5. The committee meets once a year, and its key responsibility is to make an overall allocation of boreholes by sub-counties.

A technical sub-committee consisting of the DWO, representatives of KDA and the Lutheran World Federation (LWF), the RC 5 Chairman and a geologist meets once a month.

Applications for boreholes are received from the RC 1 through the RC 3. Criteria for allocation include: population size; the migratory pattern of the area; the location of other boreholes in the area; incidence of Guinea Worm; existence of institutions (e.g. schools and hospitals) and technical data. The selected community is then requested to submit, through the RC 1, proposals for three possible locations of the borehole. The DWO makes a technical assessment of the most suitable location - but leaves as many decisions as possible to the community, in order to establish a sense of ownership of the facility.

5.2.2 District Health Committee (DHC)

The DHC is composed of nine members of the District Council and representatives from relevant district governmental departments. The responsibilities of the committee include the development and implementation of a District Health Policy and Plan - and the overseeing of health-related activities in the District.

5.2.3 Caretakers at water source levels

In the LWF borehole programmes, the LWF community mobilizers identify two caretakers, preferably an old man and a young woman, to be responsible for a borehole. The advantage of having an old man is that he is likely to be respected within the community - and he does not go on the migrations. The young woman is likely to be in touch with the needs of the users, which are, of course, mainly women.

Caretakers are easily recruited. They are given specific tasks, such as notifying when a pump breaks down, encouraging the users to make contributions to meet the cost of repair, sending for trained pump mechanics when needed, and informing the RC 1 Chairman or an Elder about matters relating to the contributions.

Payments for the repair of the borehole are the responsibility of women. In times of food shortages, the maintenance and repair of a water source might well receive a lower priority ranking than in more normal circumstances. And it is fairly common to have delays in repairing broken pumps.

Caretakers of livestock water sources are not as easily recruited as those for the boreholes. There is less sense of responsibility for these facilities - and less willingness to contribute towards maintenance and repair.

5.3 District administration

5.3.1 District Water Officer

There are no water activities implemented directly by DWD in the district. The DWD staff and equipment are seconded to LWF. Since the EEC stopped funding the KDA, the implementation of water development activities, mainly boreholes, is carried out by the LWF in close collaboration with technicians seconded from DWD. It was reported that allocation of funds for operational work by the DWD office had not been received for the current year.

5.3.2 District Medical Officer

The DMO, posted to the district by the Ministry of Health, chairs the District Health Management Team and is a key ex-officio member of the District Health Committee. He is responsible for the supervision of all health activities within the district.

5.3.3 District Health Inspector

The DHI and his staff of Health Assistants and Health Orderlies are responsible for carrying out public health activities, focusing on water and sanitation at the community level. This includes spring protection. They also implement disease control programmes. In addition to the District Health Inspector and the District Health Educator (DHE), both based at the DMO's office, there is a Health Inspector for Moroto Municipality, 8 Health Assistants, 3 Assistant Health Educators, and 3 Health Orderlies. In Bokora County, Matany Hospital has a network of 24 Field Health Workers whose job description includes implementing the National Disease Control programmes, carrying out community data collection, and giving some training to Village Health Workers. However, posting of

adequate staff in the district is a problem, as no compensatory allowances are paid for the remoteness and the difficult working conditions.

Owing to a lack of operational funds within the Government system, the implementation of health programmes and activities are mainly carried out by NGOs and under development programmes: e.g. by UNICEF, Global 2000, the informal adult education network.

5.3.4 District Agriculture Officer

The current shortfall in staff within the agricultural department in the district (104 established posts and 6 filled) seriously hampers the agricultural extension work needed to tackle a number of problems: to improve land and water management, increase food security - as well as monitor development activities.

5.3.5 District Veterinary Officer

Among the responsibilities of this office are vaccinating and issuing of health certificates for animals to be moved to other districts, overseeing the use of cattle dips, (presently only one out of 13 is functioning). The land's carrying capacity for livestock has not been recorded since the 1960s.

5.3.6 District Forestry Officer

Presently, two out of three posts at district level are filled, and 11 field posts for the counties are vacant. Only a limited number of priority activities can therefore be carried out. Among the responsibilities of this office are the supervision of the 108,433 ha of gazetted mountain range which is continuously being encroached upon - and the reforestation activities.

5.3.7 Chiefs

The chiefs are civil servants appointed by the DES; they might be elders, a clan head or a kraal leader. They operate from county level down to sub-parish level. Their formal responsibilities include the collection of taxes, the mediation of civil disputes and the supervision of civil servants in their areas. In their capacity as local agents of the civil service system, chiefs are thus responsible for coordinating the work of agricultural field assistants and extension officers, health assistants and health orderlies, community development assistants and other field based government workers.

5.4 Judicial institutions

Traditional customs play a crucial role in conflict resolution in Moroto District, leaving the formal judicial institutions with a relatively minor role.

RC committees on the local level are often dominated by powerful male members of the community. Decisions made by the RC Courts are either subordinate to or in aligned with decisions made by the forum of elders. Decisions by the elders are always considered final. The independent Magistrates Court system, however, is established in Moroto District, as elsewhere in the country, with identical judiciary obligations and responsibilities. The Chiefs, also, have formal responsibilities for the mediation of civil disputes.

5.5 Water Development Projects

A number of NGOs, development projects and aid programmes are active in Moroto District. The two most important, in relation to water development, are the Karamoja Development Agency (KDA) and Lutheran World Foundation (LWF).

5.5.1 Karamoja Development Agency (KDA)

KDA is a semi autonomous government parastatal established by Statute No 4/1987. It is headed by a council composed of the Permanent Secretaries of 11 ministries, 5 special members, a chairman, the Director of KDA and the district RC 4 chairmen. The council is responsible to the President's Office/the Resident Minister.

The KDA is charged with monitoring, co-ordinating and supervising the EEC-funded development in the Karamoja region on behalf of the Government. KDA is composed of 6 departments: agriculture, livestock, technical assistance, finance, planning and education and community development. The principal goals are to develop skills to facilitate participation of the Karimojong population in development activities. KDA supports activities which include water resource development, diversified agricultural production and community services. KDA is presently awaiting Government agreement for a third phase of the development work.

The KDA has since 1988 constructed 3 valley tanks, two in Bokora County (each with a capacity of 3 million gallons) and one in Matheniko County, with a capacity of 15 million gallons. A fourth dam of similar capacity is planned, also in Matheniko county. All valley dams and tanks are constructed to serve the livestock population in the areas. There is a proposal, by Korean Consultants, for 27 new sites for dams and tanks - and, by DWD, for an additional 25 throughout Moroto district.

During the same period, 67 atapas have been constructed. Any further development of water sources by KDA was halted when the EEC funding came to an end.

5.5.2 Lutheran World Foundation (LWF)

In terms of water development, LWF is the most important institution in the district. It is active in the fields of water and sanitation - and agricultural promotion - primarily in Matheniko and Bokora counties. Because of insecurity, LWF has of late been prevented from working in some of the sub-counties in the southern parts of the district. Matheniko and Bokora, therefore, have the highest numbers of boreholes. The LWF funding capacity has allowed up to 30 new boreholes to be developed per year up to 1992/93. As 1992 was a year when security was particularly bad in the district, only 21 boreholes were installed. Since the beginning of 1994, LWF policy has been to rehabilitate old boreholes rather than provide new ones.

LWF is trying to establish a system of community-based borehole maintenance with the technical assistance of DWD. Teams of field workers, capable of maintenance, have been trained and equipped with suitable tools, and spare parts are made available. LWF proposes the establishment of a borehole committee, but they do not make it a conditional for their intervention for assistance.

5.5.3 Food for Work

The Food for Work under UN/WFP engage people in activities like road repair, de-silting of atapas, etc.

5.6 Informal Structures and management on local level

The dominance of traditional social structures, the seasonal variations in water availability, patterns of settlement and migration, perceptions of water rights and security matters have a significant impact on the management situation on local level.

5.6.1 Different Roles in Management

Elders are ex-warriors of particular distinction. They have certain decision making responsibilities within the clan; whereas the role of elderly women is mostly restricted to the family. Decisions made by the elders are regarded as final. Women are under-represented in decision making consultations and they have very little influence in the water management considerations. One of the most significant factors in this situation is the limited time available for them to participate in general meetings.

5.6.2 Customary rules

During the rainy season, human and animal populations return to their original settlement locations - where traditional and informal customs related to ownership of and access to water sources and grazing areas hold sway.

Clans living within the same manyatta or within the same cluster of manyattas have equal access to the water sources. Those living in the immediate vicinity of a source are the first priority users. Second priority users are those who live further away but who are of the same clan. And the third priority users are those who come from other counties. Watering is done accordingly. During the dry season, someone who does not belong to the area must request permission to water his animals. Sick animals are not allowed to be watered. Access routes have to be respected.

If somebody from another county or district, who does not belong to the same clan, does not follow these rules, a fight is likely to break out - or at least a fine levied by the elders. Should someone from the same clan, or a local living in the same manyatta, break the rules, the dispute is brought before the group of elders who decide whether the offender should be whipped - or should slaughter a cow.

During the dry season, when men and cattle migrate, the women are left to cope with a long period most essential commodities are scarce. A number of special rules apply during the dry season - all having the purpose of preventing wasteful use of water.

5.6.3 Management of Water Sources

A lack of a sense of ownership for livestock water source facilities appears to limit the willingness to contribute in caretaking, maintenance and repair. Ideally, these management activities would be carried out during the dry season - but this is also the migration season, when most Karimojong men are away.

Ataparos are normally the responsibility of the men, who should clean and repair as required and meet any costs involved. But as most able bodied men migrate with the livestock during the dry season, maintenance work is often left to the women. A number of Food for Work programmes have been introduced in the district, including some concerned with de-silting the ataparos. Participation in such programmes is primarily in direct response to the need for supplementary food stuff. Such programmes may undermine the users' initiatives and weaken the sense of responsibility for the facilities.

The demand for water for livestock and domestic consumption during dry season causes conflicts at the water sources. These areas are often crowded and scuffles occur. As adult men take the cattle for watering to the boreholes, women and children collecting water are forcibly made to wait till the cattle have been watered.

6 ISSUES, MANAGEMENT FUNCTIONS AND RESPONSIBILITIES

6.1 Introduction

Based on the findings from the visits to the districts a number of water related key issues have been identified. The issues fall into two categories:

- impact issues
- user requirement issues

The impact issues are derived from human activities affecting the water resources negatively with regard to quantity or quality. The negative effects can either concern other direct uses or relate to environmental degradation.

The user requirement issues are derived from inadequate matching of user requirements and the available water resources (quantity and/or quality).

Such situations require interventions, based on rational decisions and operational management functions, in order to obtain a stable and sustainable beneficial use of the water resource. The process is shown in Fig 6.1 below.

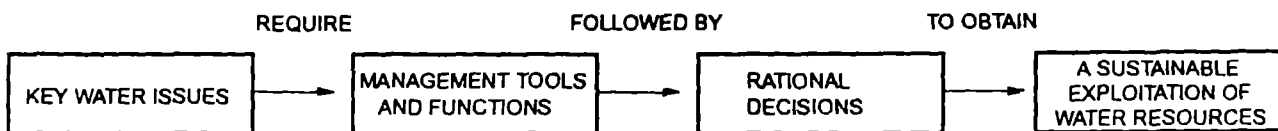


Figure 6.1 - Water resources issues management process

The present chapter describes the issues that have been identified as well as the rationale behind the selection. Management functions necessary to approach and tackle the issues, and tools for intervention in the district is also briefly described here.

The identified issues have been grouped under the following headings:

- surface water quantity
- surface water quality
- groundwater quantity
- groundwater quality

The issues identified may not all be perceived by the district population as being critical issues for which interventions are required. Some of the problems, for instance those related to water quality and environment, are in many cases not possible to observe directly but require specialized investigations for exact identification and description. They can, however, be just as potentially damaging as those which are obvious to the observer.

An overview of the issues identified in the general district context is given in Fig 6.2, while details of issues are given in the tables below. For each issue identified the rationale behind its inclusion as an issue is given. Further, a tentative listing of management functions necessary to approach the issue is given and finally the functions are distributed as responsibilities at different management levels (national, district or community level).

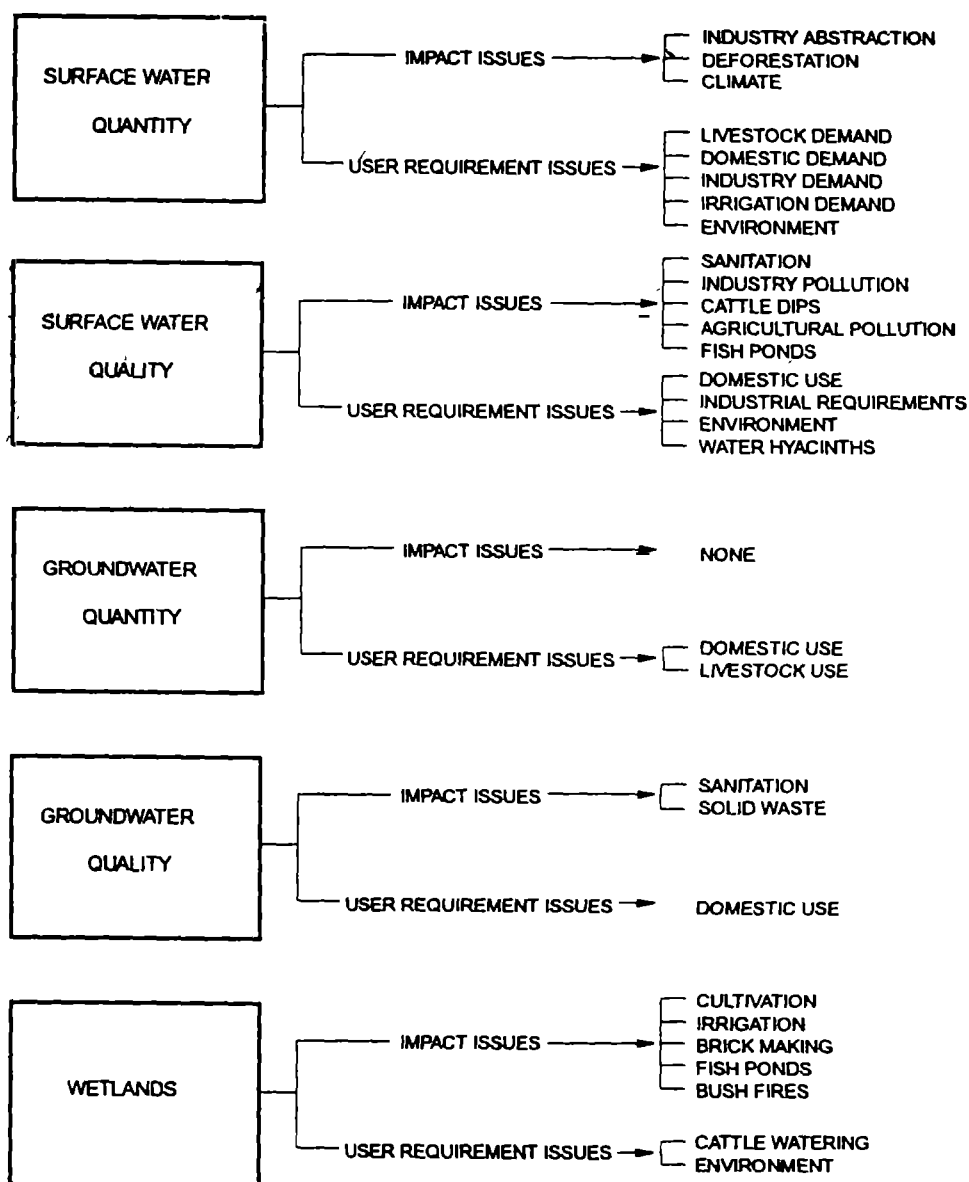


Figure 6.2 - Overview of general district issues identified

Table 6.1 - Surface water quantity

SURFACE WATER QUANTITY (Moroto)			
IMPACT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
None			
USER REQUIREMENT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Livestock demand	The availability of surface water in the District does not match the livestock demand for watering due to drying up of rivers, valley dams and atapas (ponds) during the dry season. The issue is causing seasonal migration within the district, and out of the district, as well as potential conflicts regarding access to sources.	Clear rules about access to water sources, as well as responsibility for maintenance of valley tanks and ponds. Conflict resolution capacity and capability required locally. Policy and operational strategies for provision of water for livestock.	NATIONAL: Policy/strategy for provision of water for livestock. Regulations for access to water sources. DISTRICT: By-laws for access and maintenance. COMMUNITY: Conflict resolution capacity and capability.

Table 6.2 - Surface water quality

SURFACE WATER QUALITY (Moroto)			
IMPACT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Livestock	Livestock is often watered at sources also being used for domestic consumption. This causes pollution and poses health risks.	Protection of water sources avoiding direct contact between open source and cattle.	NATIONAL: None. DISTRICT: Promotion of health awareness. COMMUNITY: Separation of sources used for domestic and livestock consumption. Fencing of water sources and raising of health awareness.
Sanitation	Low sanitation levels near water sources increases the risk of spreading water borne diseases during the rainy season, through surface water drainage into valley tanks or ponds used as domestic sources.	Increased awareness on sanitation, education within health and hygiene, promotion of pit latrine construction and use.	NATIONAL: Policy and strategy for sanitation. DISTRICT: Promotion of appropriate sanitation facilities. Hygiene and sanitation education. COMMUNITY: Construction of appropriate sanitation facilities. Increased awareness about benefits of improved sanitation.
Domestic use	When available surface water is used untreated for domestic consumption, a (non-perceived) requirement to the quality is not met.	Management requires increased awareness on relationship between surface water quality and health.	NATIONAL: None. DISTRICT: Promotion of health education. COMMUNITY: Creation of awareness of health.

Table 6.3 - Groundwater quantity

GROUND WATER QUANTITY (Moroto)			
IMPACT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
None			
USER REQUIREMENT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Domestic use	The domestic requirement for ground water in the district is not matched due to: - poor maintenance of boreholes. - migration, people leaving areas with bore holes also making maintenance responsibility diffuse. - yields are claimed to decline during the dry season.	Demand driven planning of source development consistent with overall national policies. Management of maintenance action at consumer group level, intermediate level and district level.	NATIONAL: Source development policy and strategies for pastoral areas. DISTRICT: Promotion of demand driven source development and maintenance. Education of caretakers and pump mechanics. COMMUNITY: Participation and promotion of awareness and responsibility for maintenance.
Livestock demand	Surface water for watering livestock is scarce during the dry season and water troughs supplied from ground water are insufficient.	Construction of separate cattle troughs at borehole sites. A demand driven distribution of water for domestic use and livestock should be pursued at local level.	NATIONAL: None. DISTRICT: Assistance in construction of cattle troughs. COMMUNITY: Participation and responsibility for maintenance.

Table 6.4 - Groundwater quality

GROUND WATER QUALITY (Moroto)			
IMPACT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
None			
USER REQUIREMENT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Domestic use	There is a lack of data on ground water quality. However it was reported that some boreholes were yielding saline water and water with high hardness.	Monitoring of groundwater quality and enforcement of standards by closure of boreholes with substandard water quality.	NATIONAL: Drinking water standards with appropriate flexibility. DISTRICT: Groundwater quality monitoring. COMMUNITY: Awareness of sound hygienic behaviour near water points.

7 ASSESSMENT OF PRESENT MANAGEMENT

The existing institutions for district and community management were described briefly in Chapter 5, and the water resources issues and their related management functions were identified as they appeared in Moroto District in Chapter 6. In the following tables, water resources management in the district will be assessed with respect to significant potentials, as well as constraints, within the existing management system at district level.

The management functions are divided into three categories according to the character of the issues to be dealt with. These are:

- management issues concerning geographically localized water resources problems with relatively simple responsibility relations and management functions (no such issues were identified in Moroto District)
 - management issues concerning geographically scattered water resources problems (or causes) with unclear definitions of responsibility and complex cause/effect relationships
- management issues concerning the availability of water compared with the demand. The related management functions mainly include prioritization of funds to be used in water development projects.

It should be noted, however, that the major constraint affecting all the water management functions is financial. There are at present severe constraints on both national and district finances, with very few funds available for development purposes.

7.1 Geographically scattered water resources issues

Table 7.1 - Sanitation impacts

Management functions for:		Local contamination of surface and groundwater due to low sanitation levels
MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS
Latrine promotion, hygiene and sanitation education.	Health Inspector (incl. extension service in position. LWF programme in operation	Funding. Lack of awareness. Local beliefs and taboos. Soil conditions. Migration.

7.2 Issues concerning availability of water compared with demand

Table 7.2 - Demand/supply imbalance

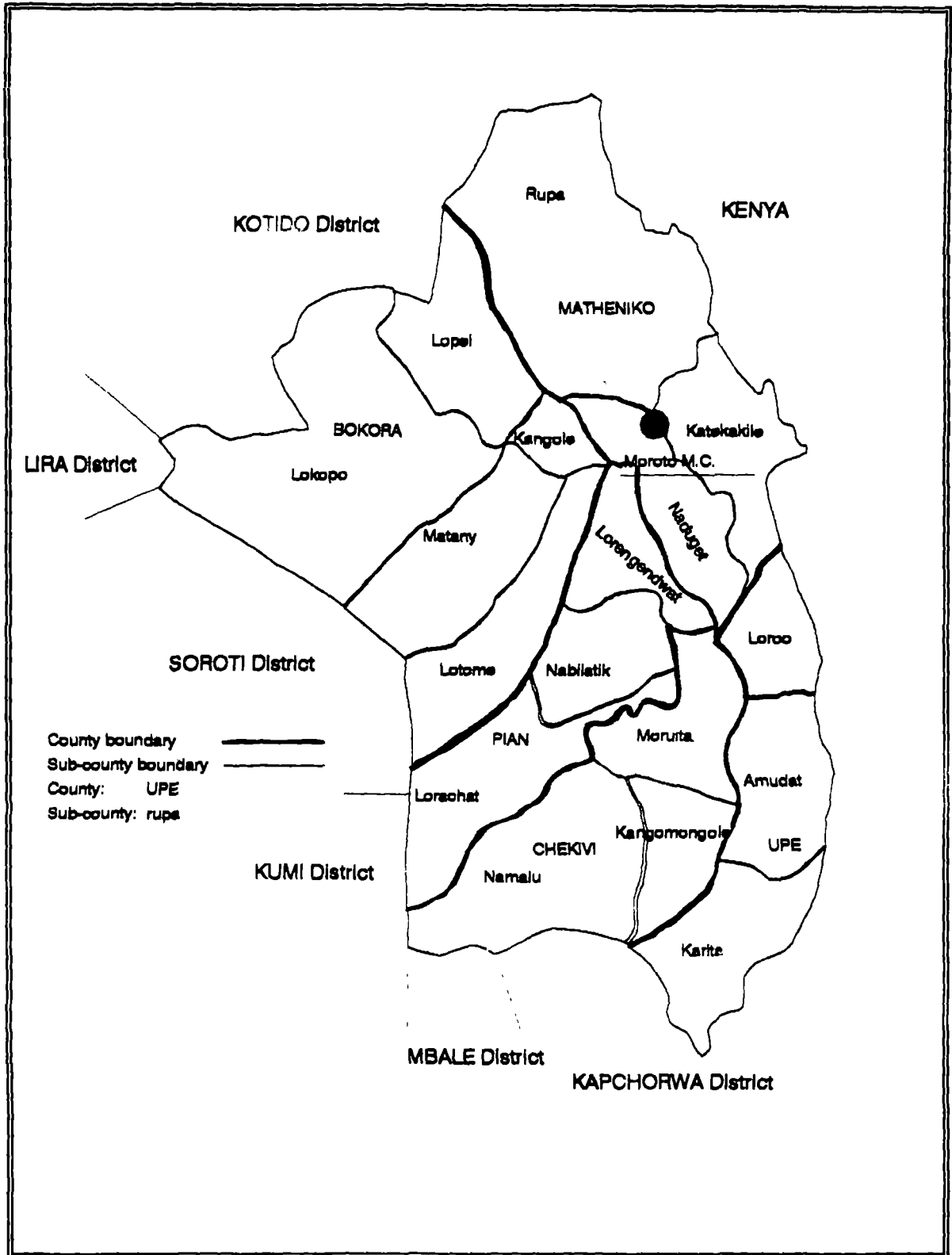
Management functions for:		Scarcity of safe water sources
MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS
Assessment of quantity and quality incl. spatial distribution of water sources and resources	Water Officer, Community Development Officer, Health Inspector (incl. extension service) in place. RC's and water committees in place. LWF programme operating.	RC's not fully functional Limited capacity Inadequate transport Limited budgets
Policy/prioritization of development of domestic/livestock water supply	Political system in place (RC councils, water committees and KDA), assisted by Water Officer, Health Inspector, Veterinary Officer and elders. LWF programme in operation	High demand. Local customs (cattle before people, migration). Unwillingness to pay for O&M.
Development	Water Officer, Water committees, and LWF project in place	Relatively limited funds. Limited availability of equipment.

APPENDICES

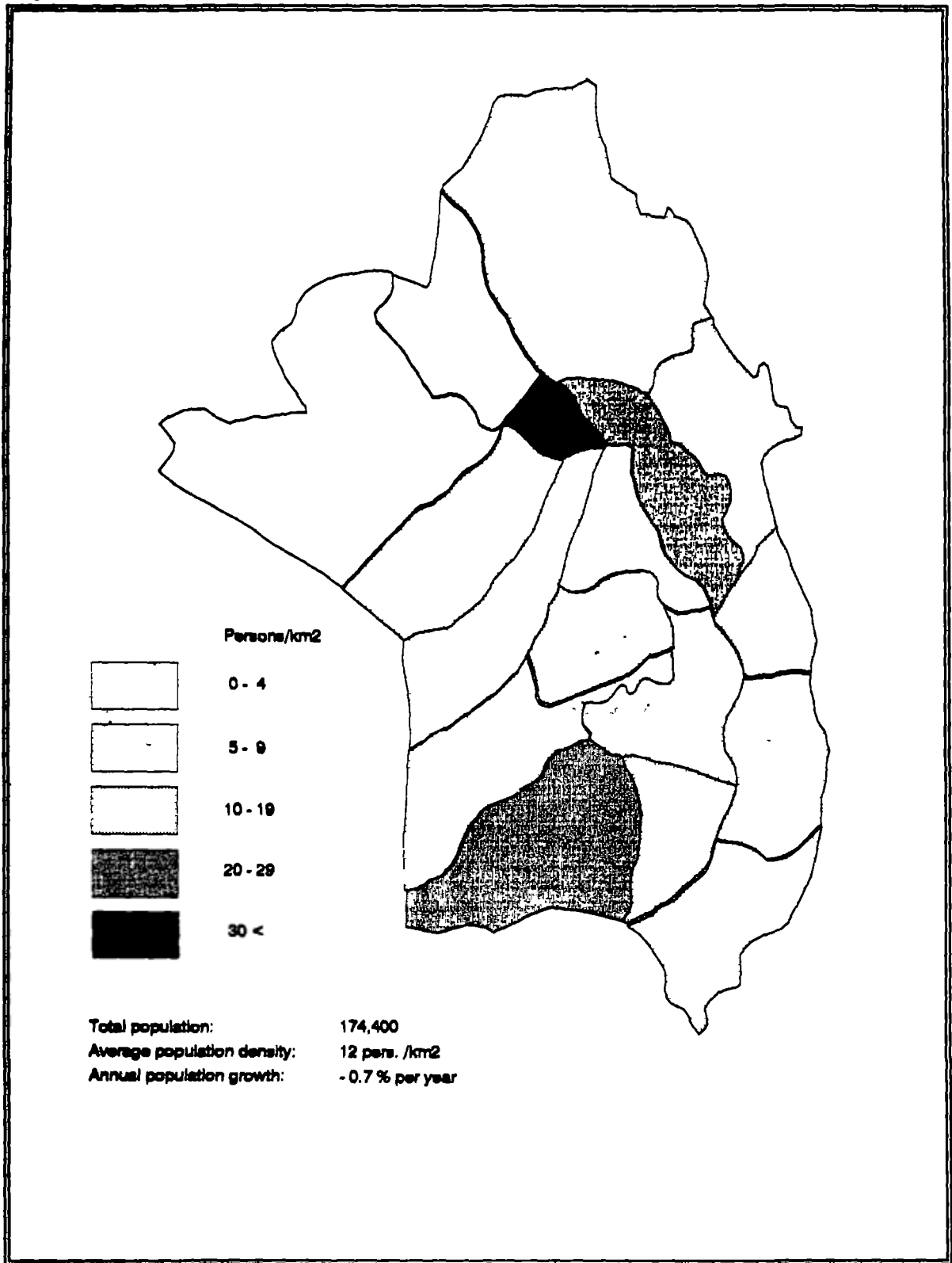
ANNEX 4

MOROTO DISTRICT

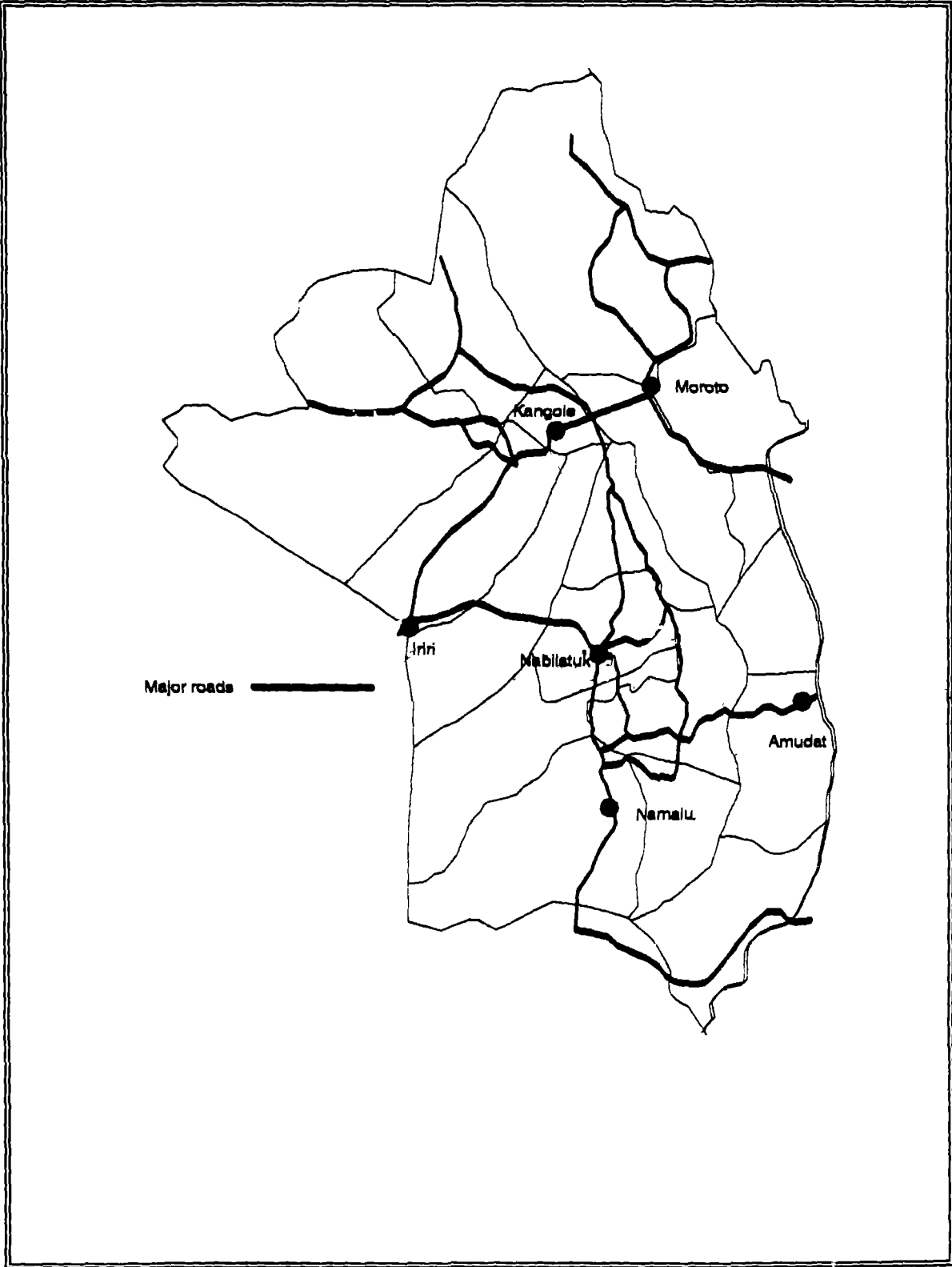
Moroto District



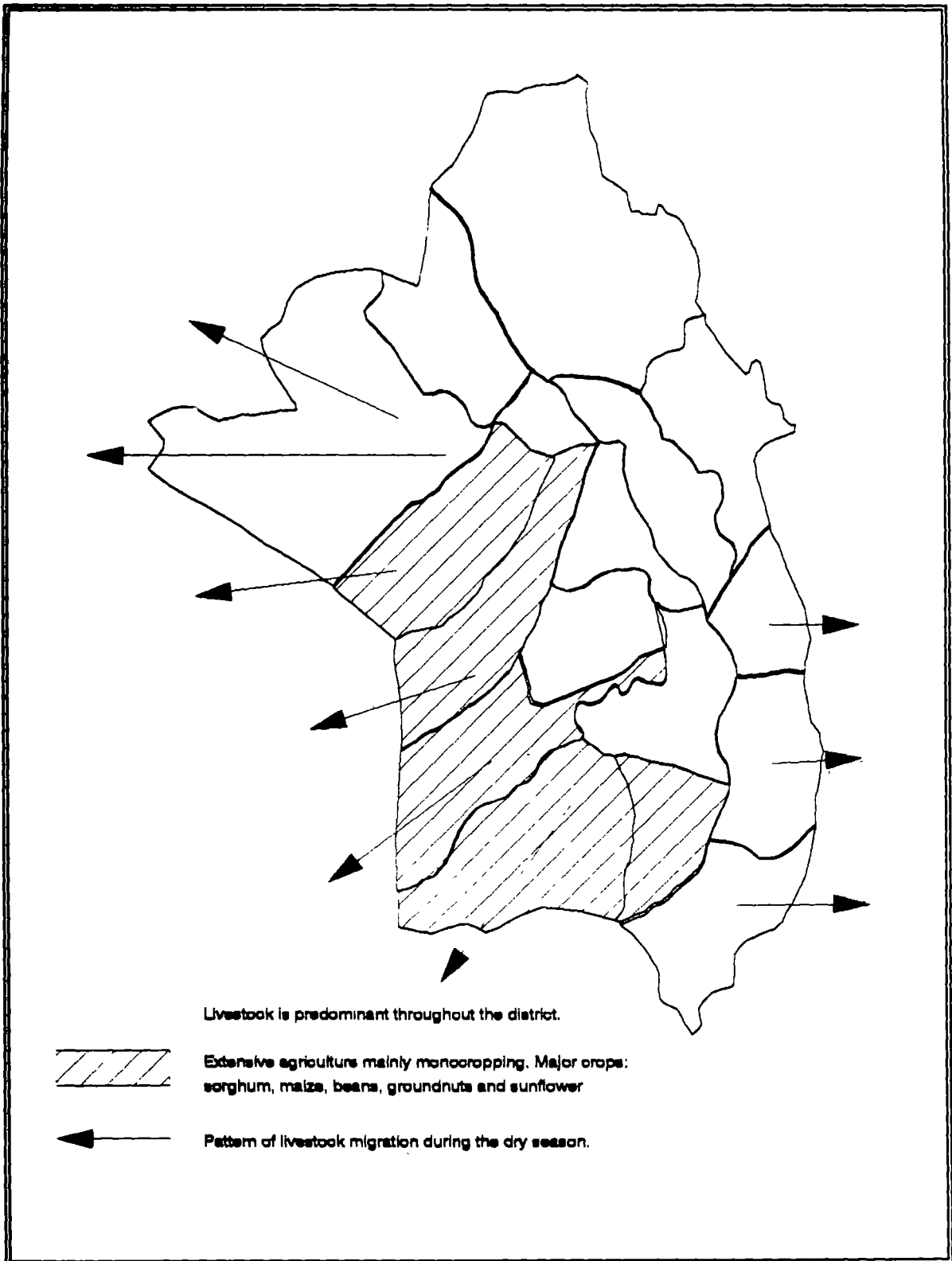
Population density



Infrastructure



Economic activities



1 GENERAL

The present land tenure situation in Uganda is a complex of various co-existing pre-colonial, colonial and post-colonial land tenure systems and land reforms. There are, also, some significant differences between what the law dictates and what goes on in practice.

2 LAND TENURE LAW

The 1975 Land Reform Decree No. 3 declared all land in Uganda to be public land - to be administrated by the Uganda Land Commission. All individual holdings were supposed to be converted into leaseholds. The lease period was meant to be 99 years for individuals and 199 years for public bodies. The 1975 Land Reform Decree No. 3 is the binding law on land tenure. However, various pre-colonial and colonial systems are still followed, both by the land administrators and by the landowners. These systems are:

- customary tenure
- mailo land
- freehold
- leasehold

3 CUSTOMARY LAND TENURE

These systems are pre-colonial, and they are the most widespread in the country. Specific regulations vary, of course, with each ethnic group and with certain localities. However, two major types of customary land tenure systems can be identified:

- specific permanent single holdings
- communal land with non-permanent holdings

The practice of having specific permanent single holdings is predominant in the southern and the eastern parts of Uganda. Each family has its own plot where it lives and cultivates the land. The head of the household decides on the use and transferability of the land. Access to land is gained through inheritance.

Communal land with non-permanent holdings is most common in the northern part of the country, but is also found in rangeland areas of the southern districts (Mbarara, Mubenda, Kiboga, Luwero, Rakai, Mukono, and Kamuli) and in the Lake Albert flats. Most of the traditional cattle are kept on communally held land. Where arable agriculture is dominant, areas of land are set aside for communal grazing and specific plots are allocated to families for homesteads and cultivation. There is no permanency in the system. Land is only retained as long as it is in use. The male elders decide who shall use a particular piece of land. Customary holders do not have any formal legal rights to the land according to the 1975 Land Reform Decree No.3.

4 MAILO LAND

The "mailo" system originates from the Buganda Agreement of 1900 between the Kabaka and the Protectorate Government. The Buganda land was divided between the Protectorate Government (Crown land and later public land) on the one hand and the Kabaka and his family and chiefs (mailo land) on the other. The mailo land was parcelled out into private and official estates. Later on, the land was surveyed and titles were given to the recipients. Customary holders became tenants of the mailo land owners. These tenants were required to pay mailo landlords for the use of the land. The system was officially abolished in 1967, and mailo land transformed into public land. In reality, the private mailo land remained as before. However, some of the mailo land has been transformed into leaseholds.

The mailo land owner enjoys full right of ownership and use of his land. Government has no access to mailo land, except in an advisory capacity. However, the mailo land owner is limited in his use of certain economic resources (minerals, for example) on his land. Government reserves the use of such to itself.

5 FREEHOLD

The term "freehold" refers to land owned by private individuals or organizations in perpetuity. By the Toro and Ankole Agreement of 1901, and the Bunyoro Agreement of 1933, the kings and their chiefs were granted land either as private or official estates. The rights to important resources remained with the Protectorate Government. Peasants on the land were transformed to tenants.

Another type of freehold land is crown land sold for development purposes. These freeholds were subject to development conditions and could be forfeited to the Colonial Governor if conditions remained unfulfilled. The 1969 Public Lands Act vested former Crown land occupied for Government purposes in the Uganda Land Commission as freehold. Crown land formerly occupied by public bodies was also vested in those bodies as freehold.

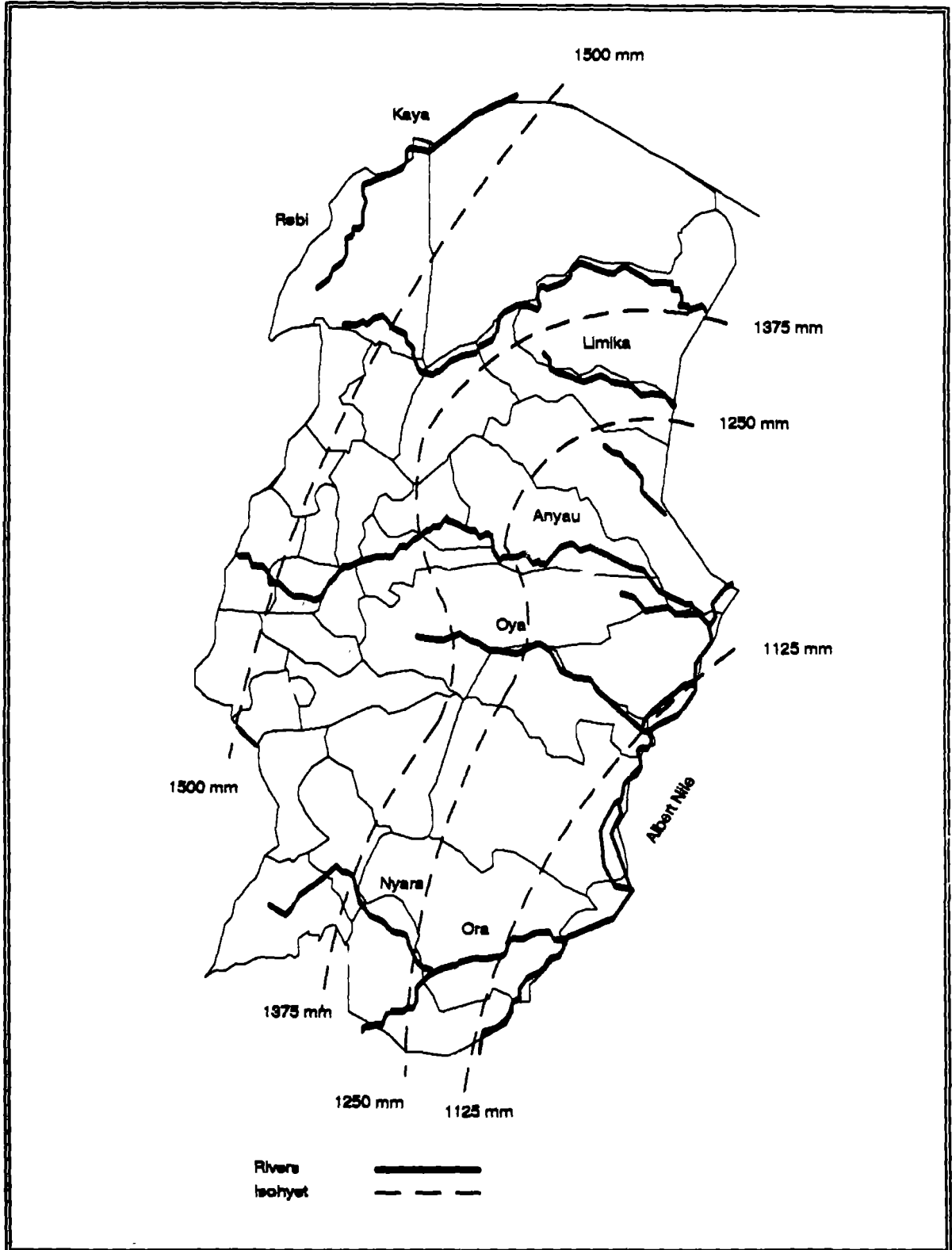
The leasehold system is based on an agreement (lease title) between the lessor (usually the Government) and the lessee (a developer). Land is leased out for development. It is more common in urban areas than in rural areas. The system originates from the 1975 Land Reform Decree.

There are three ways to obtain a lease:

- from the Uganda Land Commission
- from an urban authority on behalf of Uganda Land Commission
- from a private individual outside Government as a private lease.

Land gazetted for a specific purpose (eg. a forest reserve) cannot be leased. The Minister's approval is required for lands exceeding 200 ha or 500 acres.

Hydrology



1 GENERAL

The most distinctive and vital feature of politics in Uganda is the hierarchial system of Resistance Councils and Committees. This RC system was originally set up in the bush by the National Resistance Movement (NRM) during the civil war. The purpose then was to maintain links with the civilian population; after 1986 it has become the main mechanism through which local grievances can be expressed and officials, at all levels, can keep contact with the public.

2 THE RC STRUCTURES

2.1 Local level

All adults (those of 18 years and more) in a village or a sub-ward constitute the RC 1. The members of the Council elect the nine member RC 1 Executive Committee.

RC 1 committee members within a parish or a ward compose the RC 2, which elects the nine member RC 2 Executive Committee. The RC 3 at sub-county or town level is composed of members of the RC 2 committees. The members of the RC 3 elect the RC 3 Executive Committee. The process is continued at county or municipality level, the RC 4. (But the RC 4 is generally not active except in municipalities.) The RC 5, at district level, consists of two elected representatives from each RC 3 and one elected female representative from each RC 4. The RC 5 elects an Executive Committee from among its own members.

Each RC Executive Committee consists of a Chairman, Vice chairman, Secretary - and Secretaries for Finance, Security, Youth, Women, Information, Mobilization and Education. The total number of committee members in Uganda is over 350,000. The committees are elected every second year.

2.2 National level

The membership of the National Resistance Council is as shown in the following table.

Table 1.1 - Composition of the National Resistance Council

THE NATIONAL RESISTANCE COUNCIL	
NO. OF REPRESENTATIVES	ORIGIN OF REPRESENTATIVES
	The historical members (constituted in the bush during the resistance war)
1 from each county	Representatives elected from every county, by councillors of all RC 3 (sub-county) councils
10	The National Resistance Army (NRA)
1 from each district	Female representatives elected from every district by councillors of the RC 5 (District)
5	Youth representatives elected from the National Youth Organisation.
3	Workers' representatives, representing all the workers elected by the National Workers' Organisation
20	Presidential nominees
1 from each Division of Kampala	Representatives from each Division of the city of Kampala, elected by councillors of all wards in the division
1 from each municipality (2 from Jinja)	Representatives from each municipality

Policy is formally made by the National Executive Committee of the National Resistance Movement. The NEC comprises:

- the historical members of the NRC
- one representative from each district elected by the NRC, from among the RC 5 representatives.
- ten presidential nominees, from among the members of NRC.

3 POWERS AND RESPONSIBILITIES

The NRM has always tended to increase the authority of the RCs. They have been given powers to hear domestic and land disputes, try minor misdemeanours, maintain law and order, develop and maintain infrastructure. And they are encouraged to set up local defence units. All levels of the RC system can pass by-laws. The RC 3 and RC 5 have been given corporate legal status, so they can engage in economic as well as political activities (which means that they are entitled to sell services in competition with the private sector). They are also used as implementing agencies by donors and NGOs. In performing their judicial, service delivery and development roles, the RCs coexist with the administrative system.

3.1 RC Courts

Resistance Committee Courts are courts established by the Resistance Committee (Judicial Powers) Statute of 1988. The RC Courts comprise the nine members of the RC Executive Committee. RC Courts exist at RC 1, RC 2 and RC 3 levels.

The jurisdiction of the RC Courts is within civil cases and customary law. They are supposed to deal with cases concerning, for example, debts, contracts, trespass, land disputes relating to customary tenure, marital disputes. The RC Courts have no powers to try criminal cases, though they may arrest an offender and hand the offender to the police. Every suit should be instituted in a court within the local limits. Where a defendant objects to the jurisdiction of the court, the case should, if the objection is upheld, be referred to a higher court.

Court proceedings are held in an open place, where members of the public can enter and listen to the proceedings. Every question arising before court should be determined by consensus; in default of a consensus, it is determined by a majority vote of the members sitting - provided that, where decisions are made by voting, the chairman does not have an original vote, but, in cases of equal votes, he has a casting vote.

In cases of infringement of by-laws, the RC Court can impose a fine or any other penalty authorised by the particular by-law. All cases brought before the RC 1 Court have rights of appeal to RC 2 and RC 3 levels. If a case is not settled satisfactory at the RC 3 level, it can, in certain circumstances, be brought to the Magistrates Court, Grade I.

3.2 Water committees

Initially, the RC system did not contain any special institutional arrangements for the management of water resources. Now, however, there are many groups and committees set up for the management of water sources and facilities.

3.2.1 RC 1 Village Water Committees

Two responsible residents in the village, a man and a woman, living near the water source (borehole, spring, well, etc.) are charged with the responsibility for the day-to-day care of the utility. These two belong to a larger "Users' Committee", but they have specific assignments, such as keeping order at the point source and collecting users' fees. The Users' Committee acts as a sub-committee of the Village Water Committee within the RC 1, and it is responsible to the RC 1 Committee. The caretakers should normally report to the RC 1 Committee. In areas where the RUWASA project is operating, the Users Committees are permitted to report directly to the RC 3 Water and Health Committees.

3.2.2 RC 3 Sub-county Water and Sanitation Committees

These are sub-committees of the RC 3, in charge of water and sanitation. Their main functions are to coordinate and supervise the work of the Users Committees - to receive progress reports from these committees and to take appropriate action. They can organize meetings for disseminating information to the community or for training committee members and water facility attendants.

3.2.3 RC 5 District Water and Sanitation Committees

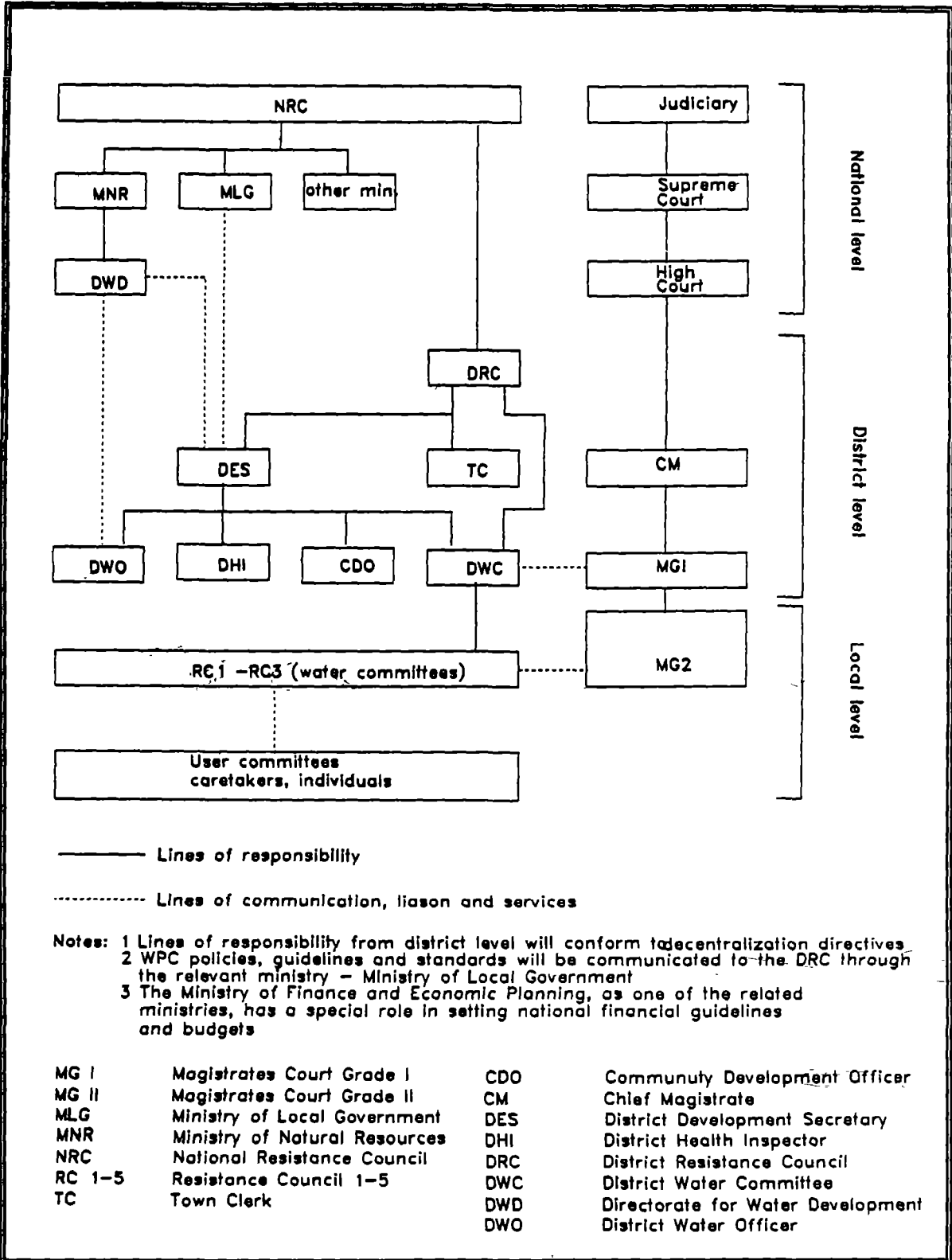
These committees are sub-committees of the District Resistance Councils charged with the overall policy formulation and guidance in matters relating to water supply and sanitation within the district. They register, monitor and coordinate NGOs who are active in the water and health sector. They report to the RC 5, which, as the district parliament, debates policies, designs strategies, passes budgets and approves programmes.

4 LINKS TO THE ADMINISTRATIVE SYSTEM

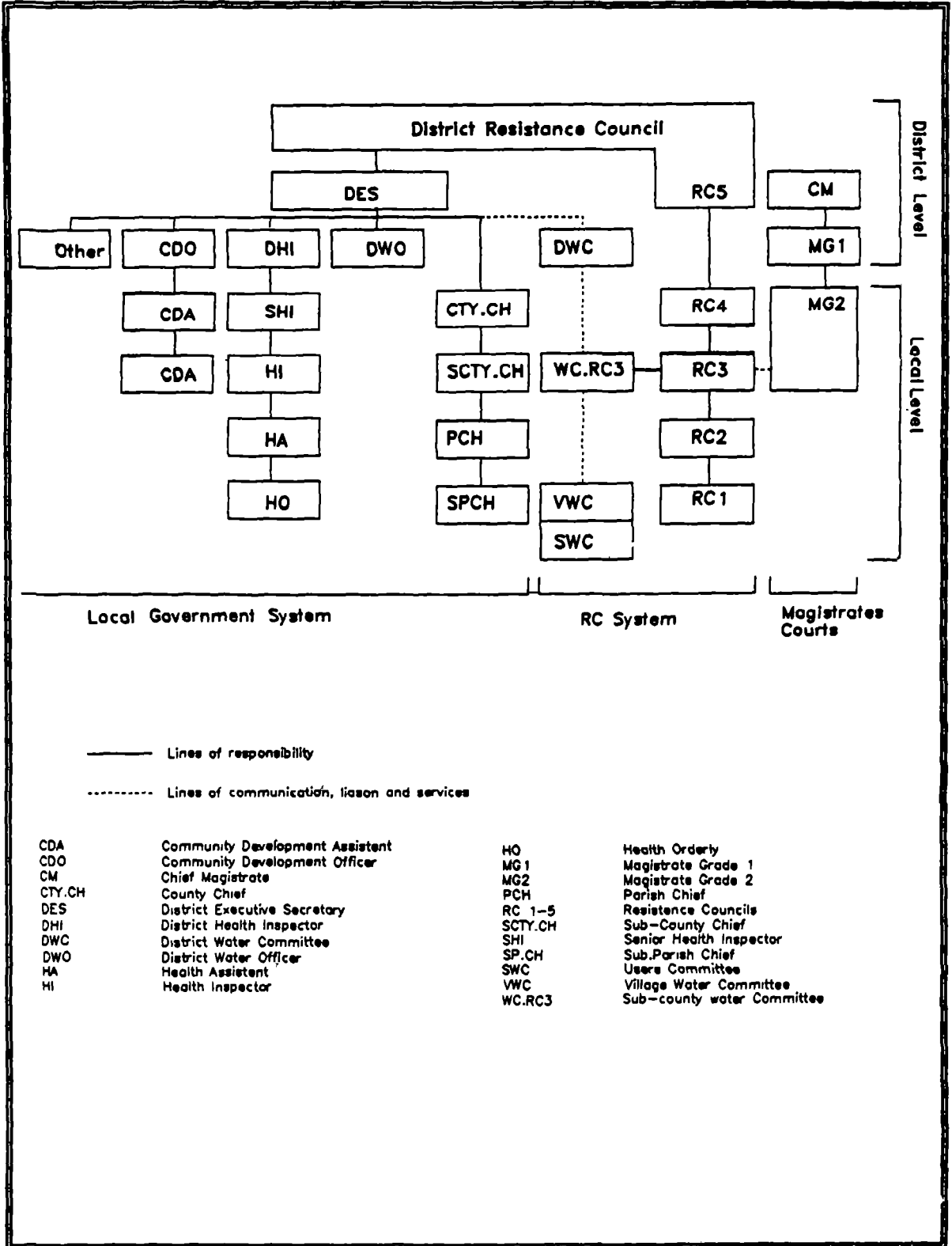
The RC system has always co-existed with the administrative system, but, sometimes, there have been uncertainties concerning the demarcation of tasks. The ongoing decentralization programme is expected to eliminate any such "boundary" issues.

The Resistance Councils have acted as legislative bodies, while the Local Government Administrations have assumed the executive role. Now, the Chairman of the RC 5 will replace the appointed DA as the political head of the district. All locally-based Ministry staff will become accountable to the DES, who is the administrative head of the district - responsible to the Council rather than to the Ministry of Local Government. The DA remains, but becomes a "Representative of the Central Government" - with a responsibility for overall security and defence.

Administrative levels



District level and local level institutions



ANNEX 5

DISTRICT STUDY - MUKONO

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LIST OF ABBREVIATIONS

ACAV	Associazione Centro Aiuti Volontari
AMREF	African Medical Research and Education Foundation
ATM	African Textile Mill, Mbale
BOD	Biochemical Oxygen Demand
CDO	Community Development Officer
CIDA	Canadian International Development Agency
DA	District Administrator
Danida	Danish International Development Assistance
DAO	District Agricultural Officer
DDC	District Development Committee
DES	District Executive Secretary
DHC	District Health Committee
DHEO	District Health Education Officer
DHI	District Health Inspector
DMC	District Water and Health Management Committee
DMO	District Medical Officer
DRC	District Water Engineer
DRC	District Resistance Council
DWD	Directorate of Water Development
DWO	District Water Officer
EIA	Environmental Impact Assessment
FHh	Female-headed household
HYDROMET	Hydrometeorological Survey of the Catchments of Lakes Victoria, Kyoga and Albert
IDA	International Development Agency
KDA	Karamoja Development Agency
LMNP	Lake Mburo National Park
LWF	Lutheran World Federation
MLG	Ministry of Local Government
MOH	Municipal Medical Officer
NEAP	National Environmental Action Plan
NEC	National Executive Committee of the
NGO	Non-Governmental Organization
NRM	National Resistance Movement
NWSC	National water and Sewerage Corporation
NYTIL	Nyanza Textile Industry Limited
RC	Resistance Council
RUWASA	Rural Water and Sanitation (East Uganda Project)
SCOUL	Sugar Corporation of Uganda Limited
SIDA	Swedish International Development Authority
SWIP	South-West Integrated Health and Water Programme

UNICEF	United Nations Childrens Fund
UWE	Urban Water Engineer
WAP	Water Action Plan
WATSAN	National Water and Sanitation Programme (a UNICEF programme)
WDD	Water Development Department (former name of DWD)
WFP	World Food Programme
WID	Ministry of Women in Development
WPC	Water Policy Committee

1 INTRODUCTION

1.1 Background

A first phase of the "Water Action Plan for Water Resources Development and Management" (WATER ACTION PLAN PHASE I) was prepared from February to May 1993. The major components were:

- draft water resources policy
- draft rapid water resources assessment
- draft institutional and management study
- international study

In the period from June to November 1993, follow-up work was carried out during the "Consolidation Phase I", which also comprised preparatory activities for Phase II. These activities were preliminary data collection and information gathering in five districts selected as pilot areas for studies to be undertaken under Phase II. The Consolidation Phase I activities were undertaken by the project counterpart staff.

The Project Document entitled "Water Action Plan for Water Resources Development and Management" (WATER ACTION PLAN PHASE II) describes the second phase of the project to develop a Water Action Plan for Uganda. The work on the Phase II started in November 1993. The second phase will produce among other items:

- an outline proposal for appropriate local water resources management levels based on district studies
- an outline proposal for management procedures providing the administrative machinery at national and district levels with guidelines for sustainable water resources management

District studies to support the above proposals were carried out in each of five selected pilot districts: Arua, Mbarara, Mukono, Mbale and Moroto. The studies comprise reconnaissance level evaluations of sociological and economic conditions which combine to give the background for assessments of water uses and demands. These uses and demands are compared to available water resources in terms of quantity and quality.

An unequal distribution of demands and resources leads to the identification of a number of water resource issues and cases which require management strategies and capabilities at different levels (national, district, and community). Based on the existing institutional and judicial frameworks, management potentials and constraints are identified and evaluated.

1.2 District studies

The objective of the district studies is to gain knowledge adequate to recommend which aspects of local water resources management can be generalized throughout the country and which aspects are area specific and require some adaptation of the general principles. Further, the objective is to support the preparation of guiding principles for the distribution of management responsibilities between national and local levels.

The tasks undertaken in fulfilling these objectives were:

- data reviews and brief reconnaissance
- identification of water resources issues
- review of the role of formal and informal institutions in water resources management
- identification of necessary management functions
- preliminary assessment of water resources management capacity in relation to the management functions and responsibilities
- assessment of the role of women

The 5 pilot district studies were supplemented by short visits to other districts where particular issues are dominant features (wetland cultivation, aquaculture, soil erosion, etc.)

Thus, the studies do not describe the characteristics of a district in detail, giving a comprehensive geographical profile. The focus is on management of water resources and on the issues that are related to water resources. Further, it will become apparent that it is not the intention of the studies to propose solutions, but rather to identify the present and possible problems in order to recommend a framework within which such problems can be approached.

1.3 Mukono District visit

Mukono District was visited by the study team during the period from 8 to 14 December, 1993. Two days were used for interviews and discussions, as well as for the collection of statistics from the District Administration Headquarters in Mukono Town.

After the meetings in the district centre, the team visited a number of local administration offices and sites, including:

- meetings with representatives from town councils (RC3) in Mukono, Lugazi, Njeru and Kayunga towns
- meetings with representatives from selected sub-county councils (RC3): Kangulumira, Galiraya, Baale, Kasawo, Ngongwe
- meetings with representatives from the three major industries in the district: SCOUL sugar works in Lugazi, NYTIL textile industry and Nile Breweries in Njeru (including inspection of the plants)
- visits to various sites (water sources, fishing villages, etc.)

During the visit, the team was accompanied by officers from the district administration, who acted as resource persons as well as guides.

The summaries and results from this district study are presented in the following chapters.

Chapter 2 summarizes in a tabular form the main characteristics of Mukono District - in terms of physical features, population, economic activities, health and sanitation.

The water resources, their use and availability, are described briefly in Chapter 3; while Chapter 4 gives an overview of the consumer categories, the use of water in the district, and the demands. Chapters 1 to 4 all lead up to the description of the present institutions involved in water management in Chapter 5, and to the identification of issues and management functions and levels in Chapter 6. Chapter 7 gives an assessment of the present management capacities, related to the identified management functions.

General material on, for instance, the RC system and on land tenure systems is given in appendices.

2 DISTRICT SUMMARY

Table 2.1 - Physical features of Mukono District

PHYSICAL FEATURES	
Location	Mukono District is situated in the central part of Uganda, and it borders Jinja District to the east, Kampala, Mpigi and Luwero District to the west, Lake Kyoga to the north and Lake Victoria to the south. (Ref. Appendix 2.1 and 2.3)
Area	14,242 km ²
Relief	The district is situated on a high plain at 1060 to 1220 m above sea level with some areas along Sezibwa River and Victoria Nile below 760 m above sea level. These areas form a basin of swamplands along the shores of Lake Kyoga. A small area in Buikwe County reaches 2440 m, and is drained by rivers Sezibwa and Musamya.
Climate	Rainfall: South 1400 mm/year North 1000 mm/year The rain is well distributed with small seasonal variations. Peaks appear in March-May and October-November. The drier seasons are December-March and June-July. Mean annual max. temperatures: 27.5-30 C Mean annual min. temperatures: 15-17.5 C
Soil	South: ferrasols, including fertile friable clays (eg. red sandy clay). North: ferrasols, including sandy clay loams.
Landcover	Total forest cover: 590 km ² Tropical natural forest: 580 km ² Natural high forest: 80 km ² Savanna woodland: 0.78 km ² Open water and swamps: 9647 km ² (incl. parts of L. Victoria and L. Kyoga) Land area: 4594 km ² Estimated area of agricultural land: Arable land: 4150 km ² Area under cultivation: 1720 km ² Area under annual crops: 310 km ² Area under perennial crops: 1630 km ² Area with interplanted crops: 90 km ² Area with second crops: 130 km ²

Table 2.2 - Key population characteristics of Mukono District

POPULATION	
Total	1991: 816,200 persons
Population growth	1969-1980: 1.5% per year 1980-1991: 2.4% per year Uganda 1980-1991: 2.5% per year
Population density	1980: 138 pers./km ² 1991: 178 pers./km ² Uganda 1991: 85 pers./km ² (Ref. Appendix 2.2)
Ratios	Urban pop: 98,735 pers. 12.0% Rural pop: 725,869 pers. 88.0% Uganda urban pop: 11.3% Uganda rural pop: 88.7% Male: 413,580 pers. Female: 411,024 pers. Sex ratio (M/F): 100.1% Uganda sex ratio (M/F): 96.5% Age structure: 0 -15 years: 48% of total 15-64 years: 49% of total > 64 years: 3% of total The number of female-headed households (FHh) de jure was 20% in 1990, while the number of FHhs de facto is increasing and estimated to be between 25% and 40% depending on locality.
Ethnic groups & language	Mukono District is part of the Buganda kingdom. The population composition is a result of both national and international migration and holds people from several tribes of Uganda and from nearby countries. The main ethnic groups in the district include Bantu (Ganda, Soga), Hamitic (Nkole, Rwandese/Rundi) and Nilotic groups (Lugbara and Luo). The common language is Luganda.
Patterns of migration	Census 1991: 251,000 pers. residing, but not born in Mukono. 143,000 pers. born in Mukono, but residing in other districts Migration has affected the age structure of the Mukono population. In-migration of young job seekers drawn to the factories and estates mostly from neighbouring districts accounts for the majority of immigrants. Migrant labourers and fishermen who come for shorter periods and therefore often without their families, live as squatters with very low living standards in terms of access to safe water and practices of hygiene and sanitation.

Table 2.3 - Main economic activities in Mukono District (table continues)

ECONOMIC ACTIVITIES			
Occupation	Economic activity	Total	%
	Agricultural workers	197,000	66.5
	Trade & handicraft	39,900	13.4
	Adm. and professionals	11,600	3.9
	Other occupation	48,100	16.2
	Total registered	296,600	100.0
Sources of income	Most rural households derive their earnings from, e.g. fishing, agriculture and charcoal production, industrial employment, brickmaking and trading in the south. (Ref. Appendix 2.4)		
Industry	Industry plays a significant role in Mukono compared to other districts. The three major industries are Sugar Corporation of Uganda Ltd. (SCOUL) located in Lugazi, Nyanza Textile Industry (NYTIL) and Nile Breweries in Njeru. The total no. of employees in these three industries is approx. 9,400. The majority of employees are male migrant workers. (Ref. Appendix 4.1 for industry profiles)		
Estate farming	Estate farming is a distinct feature in Mukono. Lugazi is dominated by large tea and sugar estates, eg. SCOUL sugar estate covering an area of 10,200 ha, and Kasaku Tea Estate.		
Agriculture	<p>Both annual and perennial crops are grown in Mukono. Farming practices include mixed cultivation of food and cash crops. 45% of the plots are less than 1 ha in size and only 7% are larger than 5 ha. Some 82% (1991) of the holdings are "kibanja" operated on freehold or "mailo" land without ownership titles and without paying rent while legal right of use is still retained.</p> <p>The agriculture in the southern part of the district is dominated by the intensive banana-coffee lake shore system. Coffee is the main cash crop, while bananas are the most common food crop. Other crops are maize, cassava, sweet potatoes, groundnuts, beans and vegetables. The intercropping with perennial crops (coffee, bananas and tea) has a beneficial effect on soil conservation because of the existence of vegetation cover throughout most of the year.</p> <p>The predominant agricultural system in the northern part of the district is the forest-savanna mosaic banana-coffee system. The main crops are coffee and bananas, supplemented with cassava, maize, sweet potatoes, ground nuts, and beans. Intercropping is a common feature. Due to the relative abundance of land, fallowing is still a common practice.</p>		

ECONOMIC ACTIVITIES			
Livestock	Livestock type	Nos.	Households with livestock (% of total)
	Cattle	81,294	16
	Goats	148,797	37
	Sheep	50,449	14
	Pigs	77,148	25
	Chickens	672,171	68
	<p>Livestock plays a significant role in the economy and for the status of a majority of households in the northern part of the district. During wet seasons the animals are moved 2 to 4 km daily in search of pasture and water. Most of the grazing is done on "mailoland" (privately owned but with user's rights) and to some extent on public land, leased by migrant cattle herders. Livestock is watered at dams, swamps, rivers and lakes.</p> <p>The dry seasons force the livestock holding households to migrate to distant areas. The reduced water accessibility and availability decreases the milk productivity and health in the cattle - which may result in losses. Pressure on grazing land and water holes is increased by migrant herds of livestock, e.g. in Baale sub-county. It was not reported as a cause of conflicts but it is seen as a customary right.</p> <p>Zero-grazing/stall-feeding is a common income earning activity in the south; also in households owning only few animals. The activity is predominantly the responsibility of women, who also control the earned income.</p>		
Fisheries & aquaculture	<p>The district has good fishing potential and about 10% of the district's households depend mainly on fishing for their livelihood. Aquaculture used to be a common activity in the past although its role vanished during the 1980s.</p> <p>Fishing is the most important economic activity in the northern sub-county of Galiraya (from R. Sezibwe, R. Nile and L. Albert), along the shores of L. Victoria in the south and on the 40 islands which constitute Buwuma county. The total catch is estimated to be 45,000 tonnes/year; 80% of which is sold. Fish catches are seasonal, with the maximum catch during the rainy season.</p>		
Energy	<p>The two dominant sources of energy for domestic use are firewood and charcoal, in rural and urban households respectively.</p> <p>Charcoal production takes place year round, but most intensively during the dry seasons. It represents a vital income opportunity to migrant labourers and young under-employed males and an additional income earning activity for many rural households. An estimated 40 per cent of district households produce charcoal, of which most is sold in Kampala and in other urban markets. The firewood is used both for domestic consumption and brickmaking.</p> <p>Charcoal burning and firewood extraction has led to a considerable deforestation, notably on the Buwuma islands, and in the central parts of the district, stretching into the northern part. This may lead to accelerated soil erosion and changes in the hydrological regime.</p> <p>The industries depend mainly on hydropower and oil.</p>		
Brickmaking	<p>In the southern and central parts of the district brickmaking is a very common economic activity taking place along all major roads where the suitable clay and required fuelwood are available. Brickmaking is a preferred economic activity of many male self-employed and migrant labourers</p>		

Table 2.4 - Key health and sanitation characteristics for Mukono District

HEALTH AND SANITATION			
Common diseases	According to the Mukono district survey, the most common diseases reported are:		
	Malaria		22.6%
	Diarrhoea		8.5%
	Respiratory tract infections		19.3%
	Intestinal worms		11.2%
	Skin diseases		4.0%
	Eye infections		4.3%
	Trauma injuries, wounds		6.7%
	Others		23.4%
Health Services	Hospitals		6
	Health centres		4
	Dispensaries		12
	Sub-dispensaries		19
	Clinics		70
52 % of the population live within 5 km of a health unit.			
Sanitation	Type of facility	Persons served	Persons (% of total)
	Water borne not shared	4,951	0.6
	Water borne shared	1,703	0.2
	Pit latrine not shared	525,889	64.1
	Pit latrine shared	164,258	20.0
	None	117,440	14.3
	Other	600	0.1
	Not stated	6,218	0.8
	Total	821,059	100.0

3 WATER RESOURCES

3.1 Water resources availability

The availability of water resources in Mukono District decreases from south to north due to variations in rainfall and other climatic parameters. During the Rapid Water Resources Assessment (WAP Phase I), climatic variations have been classified as ranging from humid in the extreme south over moist sub-humid to dry sub-humid in the north.

The most important water resources in the southern part of the district are: the high and reliable rainfall (up to 1600 mm per year), the high surface water potential of Lake Victoria, perennial streams and swamps, and the shallow groundwater. The rainfall variations are shown in Appendix 3.1.

Groundwater is the most frequently used resource for domestic consumption due to the existence of a great number of wells and springs. For example, Buikwe sub-county has more than 256 protected springs with fairly reliable yields (estimated at 20 l/min on the average). The availability of groundwater is thus not a limiting factor for domestic water supply in the southern part of the district where the only issue is the protection of springs.

The Rapid Water Resources Assessment (WAP Phase I) estimated the deep well potential to be an average of 2.0 - 3.0 m³/hr for the district as a whole. However, large variations occur. Similarly, the shallow well potential has been estimated to be medium as an average for the district. Again, large variations occur from south to north.

The streams and swamps constitute reliable sources which are, for example, used for livestock watering. (The major streams include Lwajali, Sezibwa and River Musambya.)

The whole of the southern part of Mukono District is bounded by Lake Victoria and Victoria Nile which, moreover, represent a huge source for urban and industrial water supply in the Njeru area. (They act at the same time as relatively robust receiving waters for wastes.)

In the northern part of the district, rainfall is lower (approx. 1000 mm/year) and less reliable. A ground water potential exists, but the resource is deep lying (static water level at 30 m) and, to some extent, the aquifers are widely distributed (50 % failure rate for deep drillings was experienced in the RUWASA Project) and as a consequence the development of rural domestic water supply in this area may not reach the target of 1.5 km as the maximum acceptable walking distance for fetching water (RUWASA). Near the shores of Lake Kyoga, groundwater potential is nil due to impermeable lake bottom sediments deposited at a time in the geologic history of Uganda when Lake Kyoga was covering part of what is now a low-lying area near the southern shore.

Surface water resources are very limited in the north and the availability is highly seasonal in the central strip between the River Nile, Lake Kyoga and River Sezibwa. Here, ponds, swamps, dams and valley tanks are the most frequently used sources for both domestic and livestock water supply during the rainy season. In the dry season, however, all the small swamps and ponds dry out and, consequently, the only resources available in the northern sub-counties are the groundwater (through deep boreholes), Lake Kyoga and River Sezibwa and Victoria Nile.

Hydrological stations exist at four sites in Mukono District: two discharge gauging stations on the Victoria Nile, one at the Sezibwa River - and one lake level station at Jinja Pier. Averages from these stations are given in Table 3.1.

Table 3.1 - Average figures from hydrological stations in Mukono District. All figures are mean monthly values and none of the records are continuous.

PARAMETER	LAKE VICTORIA AT JINJA PIER	VICTORIA NILE AT NAMASANGALI	VICTORIA NILE AT MBULAMUTI	RIVER SEZIBWA AT FALLS
Storage (mill. m ³)				
Maximum	14,690			
Mean	12,665			
Minimum	11,210			
Observation period	1948-1991			
Discharge (m ³ /sec)				
Maximum		1,927	1,560	10.39
Mean		1,055	1,171	2.14
Minimum		423	766	0.34
Observation period		1953-1978	1971-1992	1960-75

Source: Directorate of Water Development, 1994

During the Rapid Water Resources Assessment (WAP Phase I), the district was broadly estimated to have average annual run-off values of more than 300 mm/year in the southern part and values between 100 mm/year and 300 mm/year in the middle and northern part. Minimum dependable yield (one in 5 year minimum monthly flow) was similarly estimated to be more than 0.5 l/sec/km².

As the two rivers and the lake are the only sources for watering cattle (except for a few private ponds and dams), the herds have to be moved up to 8 km for watering during the dry season. These two rivers and the lake are in principle unlimited resources, but the exploitation is at present influenced by a limited accessibility due to steep river banks and land ownership at access sites.

The Lakes Kyoga and Victoria, as well as the rivers, represent rich fishery resources, and fisheries are an important economic activity in the district. A recent infestation with water hyacinth, however, is affecting many landing sites by blocking the waterways at lake shores and in bays.

On Lake Kyoga, for example, the weed entangles with the natural papyrus; thereby causing extreme difficulties for sailing. The presence of the weed has forced the fishing households to abandon many landing sites on both the Victoria and the Kyoga lake shores.

3.2 Water quality

The general water quality of the ground water resources in Mukono district can be considered suitable for domestic use. However, there is a tendency to elevated hardness in the mid-north part of the district and to low pH in the south east part. Strong carbon dioxide corrosion is furthermore found in the central-south part of the district. There are scattered sources with high iron concentrations, and a few boreholes have been abandoned due to high salinity. (Ref. Appendix 3.2).

In southern counties where the domestic consumption mainly relies on springs and wells, bacteriological contamination is frequently reported. Many springs are not yet protected, and the location of pit latrines near these water sources imposes a risk of faecal contamination - in particular, in Mukono and Lugazi towns.

In the towns of Mukono District, the collection systems for solid waste are not well developed. However, some collection of solid waste is done and indiscriminate dumping of these waste materials takes place. Thus, there is a risk of contamination of the groundwater sources locally near the dump sites.

The quality of surface water resources is not documented by actual measurements, but the following observations have been made:

- use of surface water bodies (lake shores, valley tanks, ponds, etc) for diverse purposes increases the risk of spreading pollution and pathogenic bacteria
- the stream waters in the southern part of the district are generally suitable for fish production, because of the low rate of fish diseases and no anoxia-related fish-kills
- discharges of industrial waste-water take place in the southern part of the district (see industry profiles in Appendix 4.1) and in one case - Sugar Corporation of Uganda Ltd - the pollution undoubtedly affects River Musambya severely
- substantial use of fertilizers and pesticides in large estate productions of tea and sugar may cause contamination problems in the southern part of the district
- tick control by use of cattle dips may cause pesticide contamination of surface water locally during emptying

Finally, the general water quality of the lakes and the Nile is of importance for Mukono, and the findings from the Rapid Water Resources Assessment (WAP Phase I) apply for this district. These include that ecological changes in Lake Victoria have been observed during the last 20 years. The lake water has thus become less transparent, the composition of species has changed - indicating eutrophication. The quality degradation of Lake Victoria will eventually influence the quality of the downstream lakes of Kyoga and Albert.

As mentioned above, the Lake Victoria and Lake Kyoga systems have been infested by the non-native water hyacinth, *Eichornia*. The direct water quality impacts from this infestation may, for example, be oxygen depletion (and release of hydrogen sulphide) below the vegetation mats.

4 CONSUMER CATEGORIES, WATER USES AND DEMANDS

4.1 General

The major consumptive demands in Mukono district are for domestic water supply (rural and urban), industrial and livestock water supply - and water for aquaculture; while non-consumptive demands are mainly for fisheries and hydropower. Others demands include the consumptive demand for cultivation in the wetlands and small scale irrigation. The distribution of water uses and demands is unequal through the district, and the settlement pattern reflects the water resource availability - decreasing from south to north. (Ref. Appendix 2.2).

4.2 Rural domestic water use

The general coverage of safe and accessible rural water supply (max. acceptable walking distance 1.5 km) in the district has increased from 4% (1989) to an average of 43% at present, through the RUWASA programme. However, the coverage varies from sub-county to sub-county, depending on resource availability and areas already covered by RUWASA. In the southern part of the district with high spring potential, and in the areas where the RUWASA project is operating, the coverage is above 75%, with an average maximum walking distance of less than 1 km. In the north, the resources are scarce and supply is mainly from expensive boreholes. The maximum walking distance is up to 2 km - even after the completion of the RUWASA programme. With scarce resources in the north, a pattern of scattered settlement follows.

Water is consumed by some 150,000 households. The average use per person varies with the location and season. An amount of 20 litres per day is considered a level of water use which meets the requirements to maintain adequate personal hygiene and sanitation. At 10 litres and below, the situation becomes vulnerable - and hygiene and sanitation are at risk.

In a large part of the district, particularly the north, the population is not provided with adequate and reliable supplies of water. Water use levels follow seasonal changes of the source yields, and they were stated in some sub-counties to average 10 litres per person during dry seasons. In the central and southern parts of the district, people generally benefit from more easily available water resources - allowing a water use level of up to 20 litres per person in most households.

4.3 Urban domestic water use

The supply of safe water to small towns in the district is still low. For the four towns of Mukono, Lugazi, Kayunga and Njeru, the estimated coverage is 26%. Safe supply comes mainly from point sources (springs, boreholes and shallow wells) with a maximum walking distances of 400 m. The source areas are often crowded - leading to scuffles, and a long time spent in collecting water. A notable initiative in these towns is private water supplies to the public at fees ranging from UShs 20-100 per jerrycan. The quality of water from some of these private sources is, however, dubious.

The larger industries, hospitals, etc. have private wells for domestic water use, and the SCOUT sugar factory supplies approximately 7,000 workers, living in the factory area - partly from wells and partly from their intake of process water at River Musambya. For the latter, the factory has installed a treatment plant which, however, is not presently working.

Table 4.1 below shows the urban water supply situation in the five towns; while Table 4.2 shows the overall domestic and urban water supply situation.

The bulk of the population which is not covered by safe sources exploit sources such as swamps, rivers, unprotected springs and the lakes. The people often walk long distances, especially in the dry season. It is estimated that for 100% coverage from accessible and potable sources, the present urban demand is 1.8 million m³/year; while the corresponding demand for rural supply would be 6.6 million m³/year.

Table 4.1 - Urban water supply situation

TOWN	POPULATION	AREA(km ²)	SAFE SOURCES	COVERAGE	
				POPULATION	%
Mukono	33,000	36	33 + piped supply	9,900	30
Nkokonje	7,000	24	1	2,000	29
Lugazi	15,000	7(20)	8	2,400	16
Kayunga	20,000	22	12	3,600	18
Njeru	40,000	44	10 + NWSC	14,800	37
Total	115,000			32,700	28

Table 4.2 - Urban and rural domestic water supply situation

DESCRIPTION	RURAL DOMESTIC	URBAN DOMESTIC
Population (1992)	725,869	98,735
Service target	25 l/c/d	50 l/c/d
No. of sources	1065	
Population served	319,500	24,683
Coverage (1992) in %	43	25

4.4 Industrial consumers

There are three major water consuming industries in the district (SCOUL sugar factory, NYTIL textile industry, and Nile Breweries) each with its own private water system - with a present total demand of 4.2 million m³/year and a projected estimate of 14.6 million m³/year. The water needed by SCOUL is drawn from a small stream depleting approximately 50% of the flow. A planned expansion of the production will imply a water demand exceeding the existing flow in the river. The planned expansion will thus require exploitation of water sources other than the river - groundwater - and the factory has started test drilling for this reason.

The other two industries draw water from the Nile and they will, therefore, experience no limitations regarding intake quantities. The textile factory and the brewery have installed facilities for the treatment of their production water (though the operational status has not been ascertained). The requirement to process water is, however, said to be generally fulfilled for the three major water-consuming industries in the district. The most sensitive of these factories, with respect to water quality, is the Nile Brewery - for which the lake water is an ingredient in the product. At present, the brewery adjusts the chemical composition of the lake water to fulfil the requirements for brewing. The factory will, however, be highly affected by, for example, oxygen depletions, toxic algae blooms - or other drastic changes of the lake water around its intake.

Industry profiles are shown in Appendix 4.1.

4.5 Livestock water consumption

Consumption of water by livestock in Mukono district depends mainly on surface water resources (approx. 115,000 head of cattle and 85,000 small ruminants). Water requirements vary. The local breed of cattle, for example, need about 40 litres per day - as compared to the exotic breed, which need up to 80 litres daily. Small ruminants require 5 to 10 litres a day.

Most of the livestock is distributed in the three counties of Baale, Buikwe and Mukono. In the latter two, the surface water resource potential is very high and supply is not limited; while in the dry sub-humid northern county of Baale water availability has seasonal variations, causing periodical scarcity of water for the livestock. Communal dams and valley tanks that were constructed in the past have silted up and, during the dry season, the livestock daily move up to 8 km to the three perennial sources of River Sezibwe, River Nile and Lake Kyoga - or migrate to other areas or districts. There were reports of conflicts over access to these and to private sources.

Provision of an adequate livestock water supply in the north is locally considered a high priority - perhaps even preferred over domestic supply.

4.6 Water for agriculture

Agricultural activities require dependable and adequate water supplies at the right seasons. The southern part of the district and part of the central region have a climate very suitable for rain-fed agricultural production.

In the north, the agricultural potential is less, because of the lower rainfall here; food shortages have been experienced during years of drought, as, for instance, in 1992.

Swamps are used for the cultivation of crops such as maize, yams and vegetables. This takes place in the seasonal parts of the swamps, and the diversion of water to the cropping areas is claimed to decrease the size of the permanently flooded areas of the swamps.

Rice production on swampland has also been introduced recently, but on a limited scale, in Seeta and Nakifuma sub-counties. A possible development of these activities can be foreseen as representing a significant agricultural consumption of water from the swamps.

The only proper irrigated scheme observed in the district is the SCOUT scheme for cultivation of roses in Lugazi. It is utilizing 200 m³/d, which at present are drawn from River Musambya. However, a valley dam is under construction for collection of rainwater and excess irrigation water for use in the scheme.

4.7 Aquaculture and fisheries

Fish farming (mostly Tilapia) is practised in the south, where perennial streams are abundant. The fish ponds are constructed at the edge of the streams or swamps, from where the water is abstracted and eventually returned. The fish farming requires reliable sources of good quality water (e.g. low BOD, high oxygen concentrations and relatively low suspended solids) which are generally found in the area.

Major constraints to the further development of aquaculture include lack of fish fry, expensive construction of fish ponds, lack of transport, and predators. However, with the restoration of extension services, the number and capacity of aquaculture enterprises are now expected to increase.

4.8 Water pollution

All activities which produce wastes have a need to dispose of them, and liquid wastes are most often drained into the surface water bodies. A certain use of surface waters for this purpose is unavoidable, but a trade-off has to be made between wastewater quantities, wastewater impact potential, requirements from other users of the receiving waters, available economic resources for pollution reduction, and the ecological sensitivity of the receiving water.

In Mukono District, the huge surface water bodies such as Lake Victoria and the River Nile in principle represent potential receiving waters for all kinds of wastewaters, due to the very large dilution factors. The discharges from the two industries in Njeru (Nile Brewery and NYTIL) must, if seen in isolation, be considered relatively harmless because of the access to the Nile as receiving water. However, the general deterioration processes, which have been seen for Lake Victoria, as well as the increasing water hyacinth problem, imply that the discharges from Mukono industries should be seen in a wider context - as contributors to a regional pollution problem.

The SCOUT sugar factory, on the other hand, is a clear example of an industry having a waste production itself, which is far from balanced with the capacity of the receiving stream.

The run-off of nutrients and pesticides from the large estates in south Mukono may cause pollution problems in local streams (though this has not been quantified). The possibility of regional pollution contribution also applies for these, since a part of the agrochemicals eventually reaches the Nile or Lake Victoria.

The fish farming is presently practised on a relatively moderate scale, and at low intensity (the inputs in terms of fertilizers and fodder are small) and, thus, pollution from this source - organic matter - is not likely to be of real significance at the moment. However, the prospects for developing this activity are good, and a substantial increase in the number of ponds, as well as methodological improvements with respect to efficiency (higher production due to external inputs) can be expected in the near future. In cases where the fish farms exploit small streams with low minimum flows, such a development may lead to exceeding the self-purification capacity of the stream, and thereby introduce ecological changes as well as water quality problems for other users.

In urban or semi-urban areas, surface waters such as streams, swamps or lake bays are often used for various purposes such as washing and bathing. Furthermore, they often receive pollutants from nearby latrines, septic tank overflows, and from solid and liquid wastes through surface run-off during rainfall. This means that these waters locally can be heavily polluted, creating high health risks, especially when they are used for domestic consumption - as they are in Mukono town.

4.9 Environmental requirements

Basically, the environmental requirement is the need to maintain the natural resources, including land and water ecosystems - and, thereby, also the original diversity of plant and animal species.

Mukono District has experienced a rapidly increasing deterioration of the natural resources due to, for example, uncontrolled deforestation, encroachment of swamps - as well as changes to the ecosystems of Lake Victoria and Lake Kyoga.

The types of natural ecosystem of the district are, however, shared with a number of other districts, and the requirements for conservation of the ecosystems - and thus the environmental protection - should therefore be seen in a national policy context (The National Wetland Programme, The National Environment Action Plan) rather than in a local focus.

5 AGENCIES INVOLVED IN WATER RESOURCES MANAGEMENT

5.1 Introduction

This chapter identifies the institutions involved in the management of water resources in Mukono District, and it describes their present functions. In this context, the term "institution" should be taken to have a broad meaning: it includes any formal or informal agency which does, or might, make decisions related to water resources.

In the following sections, an attempt has been made to distinguish between institutions involved in policy making, administration, enforcement, and conflict resolution - even though these functions are not always clearly separated in the present system. In subsequent sections, other types of institutions which play a role in water management are identified: parastatals, development projects, private enterprises, etc. Finally, there is a commentary on the role of the Ministry of Women in Development, Culture and Youth.

5.2 Water Committees

In Mukono, the RC system is well established; the committees related to water management at the different levels, as described in Appendix 5.1, appear to be fully functioning.

5.2.1 Users Committee (RC 1)

Two people who live near to a water source are given the responsibility of the day-to-day running of the utility - whether a borehole, spring or well. These two persons are members of a larger "Users Committee", but they have these specific assignments of, for example, keeping order at collection points or collecting fees. The Users Committee acts as a sub committee of the RC 1 (village council), and it is responsible to the RC 1 Executive Committee. However, it should be noted that the present RUWASA system permits the Users Committees to report directly to the RC 3 (sub-county) Water and Health Committees.

5.2.2 Sub-county Water and Sanitation Committee (RC 3)

This is a sub committee of the RC 3, and it has coordinating functions related to both water and health matters. The main task is to follow the work of the Users Committees, through progress reports, and to supervise their activities. They can also organise of seminars and training.

5.2.3 District Water & Sanitation Committee (RC 5)

This is a sub-committee of the District Resistance Council (RC 5), and it is charged with overall policy formulation and guidance in matters related to water in the district. It registers, monitors and coordinates NGOs and their programmes within the water and health sector. Since the RC 5 is the district parliament, it debates policies and strategies and passes budgets and programmes. In Mukono, the District Executive Secretary acts as chairman of the Water and Sanitation Committee, on behalf of the RC Secretary for Mass Mobilization. An Assistant DES is permanently charged with the routine coordination of water activities as a "water desk officer".

5.3 District Administration

Mukono is one of 13 pilot districts where the decentralization policy - the devolution of powers and functions from central government - is currently being implemented. The departments of central government operating at local level have thus become constituent units of the District Resistance Council. They operate under the control and supervision of the District Executive Secretary (DES), who as head of administration, is now responsible for their performance.

5.3.1 The District Water Officer

The key functions of water resources management in the district are performed by the District Water Officer (DWO). The formal duties of the DWO include:

- identifying water projects
- making demand forecasts
- collecting hydrological data
- siting and drilling boreholes
- protecting springs
- promoting an extension service related to operation and maintenance
- collecting and analysing data on water quality
- preparing a district water budget
- supervising the implementation of water schemes

- supervising NGO water programmes
- monitoring and evaluating water programmes

The DWO now reports directly to the DES and not to DWD. However, the District Water Office continues to receive some technical support from the DWD Headquarters. The various water committees do not report to the DWO, but are independent.

5.3.2 District Medical Officer of Health

Mukono has 45 health centres. The DMO is the officer in overall charge of all health aspects in the district. The District Health Inspector, whose responsibilities include duties relating to water and sanitation, reports to the DMO.

5.3.3 District Health Inspector

The District Health Inspector carries out certain functions related to spring protection, water quality control, hygiene education, and sanitation. The district has 11 Health Inspectors at county level, 27 Health Assistants at sub-county or town council level, 45 Health Officers at parish level, and 12 spring artisans.

5.3.4 Municipal Medical Officers of Health

The Municipal Medical Officers for Health in the towns have similar responsibilities to the DMO - they handle public health within the municipalities. The MOH in Njeru, for example, inspects all industries according to the Public Health Act and issues yearly licences. The MOH uses the Government Chemist in Kampala (Ministry for Internal Affairs) to monitor food standards and water supply.

5.3.5 District Agriculture Officer

The unification of the extension service under the Ministry of Agriculture, Animal Industry and Fisheries (Unified Extension Project) is funded by IDA. The Departments for Veterinary Services, Agriculture and Fisheries have been coordinated to enhance administrative efficiency. The service at district level is headed by a District Extension Coordinator assisted by Subject Matter Specialists.

5.3.6 District Fisheries Officer

An area of 960,000 ha of Mukono is open water and swamps, where extensive fisheries or aquaculture is practised - particularly on the rivers Nile and Sezibwa and the lakes Victoria and Kyoga. The main functions of the District Fisheries Officer are to advise on fishery techniques and fish farm construction and operation. Moreover, he inspects the landing sites, controls the landings (species, catches, minimum sizes etc.) and collects revenue from the fishermen.

5.3.7 District Forest Officer

The District Forest Officer is charged with forest management (60,000 ha of gazetted government forest reserves in Mukono) and other forests on private/public land totalling 60 reserves. Because of the high deforestation rate in the district (estimated at between 10-20% p.a.) preserving the forests is a major task. There are 3 Forest Officers, 6 Assistant Forest Officers, 10 Forest Rangers and 23 Forest Guards. According to a number of by-laws and the Forest Act, the Forest Officer can prosecute offenders in a court of law. There are approximately 10 cases per month.

5.3.8 Chiefs

A key feature of the Local Government Administration is a hierarchy of salaried officers, the Chiefs, who administer well established units, such as: the Saza Chief at county level, the Gombolola Chief at sub-county level, the Muluka Chief at the parish level and the Mutongole Chief at the sub-parish level. These levels correspond to the RC 4, RC 3, RC 2 and RC 1 levels. The office holders need not be residents of the particular area. In addition to collecting government revenue, the chiefs are instrumental in keeping law and order - by controlling the local police. In this respect, they are essentially an arm of central government. They also have an important role in mobilising community participation. Furthermore, the chiefs are involved in conflict resolution - as discussed in Sub-section 5.4.3.

5.4 Judicial institutions

There are a number of complementary institutions engaged in conflict resolution at various levels. These are: the RC Courts, the Magistrates Courts, the Chiefs and the Elders.

5.4.1 The RC Courts

The extent of judicial power for the Resistance Council Courts has been clearly defined by the Resistance Committees (Judicial Powers) Statute, 1987. This statute establishes the

RCs as Courts and outlines their proceedings. Civil disputes governed by customary law that can be handled by the RC Courts include water and land disputes relating to customary tenure.

RC Courts help to settle disputes on any violation of local by-laws or offence to traditional ethics - with regard to water and land management. Such disputes could relate to trespassing, for example, access to domestic and livestock water points, and livestock watering at water sources on privately owned lands. (Ref. Appendix 5.1)

5.4.2 Magistrates Courts

Magistrates Courts exist at sub-county level (Grade II), at the district level (Grade I).

Some cases go direct to the Magistrates Courts; others are referred from RC 3 Courts - for example, cases of trespassing, land ownership, assaults at watering points. Most of the water-related conflicts are solved at RC 3 or lower levels - very few reach the Magistrates Courts. Most cases referred to these courts are land related. In civil cases, people can choose to have their case tried at the Magistrates Court directly, without passing through the RC court system.

The magistrates in Mukono District organize and conduct seminars for RC members to enlighten them further on the law, to assist them in keeping records and to develop routines for referral cases. The two institutions are complementary and function effectively in the district.

5.4.3 Chiefs

The Local Administration's Chiefs play an important part in conflict resolution over matters related to the management of water and land. Such matters include:

- being in arrears or refusing to pay debts (water contributions, by-laws)
- refusing to construct pit latrines (for improved common environmental sanitation)
- causing land problems (squatting, trespassing, blocking access to water sources, etc.)
- breaking by-laws regulating water use

Decisions of the Chiefs do not need the backing of a committee consensus, but they often consult with or refer to the RC Committees - particularly when more facts or evidence are required. This joint consultation is regarded as a kind of appeal court, whose legitimacy is upheld and whose decisions are more respected than those arrived at by either of the institutions alone.

5.4.4 The role of the Elders

The role of elders and traditional cultural heads is important in Mukono District. Their power is deeply embedded in local beliefs and traditional practices that quite clearly legitimize their involvement in the arbitration of disputes.

The elders also function as useful mobilisers and opinion leaders through whom programmes can be channelled. Clan elders also play a significant role in the arbitration of disputes - particularly related to land ownership - before they are forwarded to RC or Magistrates Courts, where the elders again appear as witnesses.

5.5 Water development projects

Much of the water supply planning and management and, thus, water resource management, in Mukono is strongly influenced by a number of development projects.

5.5.1 RUWASA

The Danida-funded RUWASA project, implemented by DWD, is playing the lead role in the planning, implementation and maintenance of water supplies in the district. RUWASA's objectives are to improve rural domestic water supply and sanitation. The goal is a 70% coverage. The project has increased the coverage rate for rural domestic water supply from 15% to 40% in Mukono in three years.

The activities include: borehole drilling, spring protection, shallow well development, water quality monitoring, community-mobilization, training and institutional support. The allocation of water supply schemes is based on the population size and density at district and sub-county level. The design population is equal to 70% of the population in a target area. The standard set is that 300 people should share one water supply unit (one borehole or two springs). The number of water supply units allocated to an area is calculated by dividing the design population by 300. The villagers decide where in the village the water supply units should be located. Their decision is followed if technically feasible.

Villagers receiving a water supply unit form a Users Committee, responsible for operation and maintenance.

5.5.2 Other development projects

The two NGOs, AMREF and World Vision, have done work on spring protection and shallow well development in the district - though not at all on the same scale as RUWASA.

5.6 The private sector

The private sector is an emerging stakeholder in water resources management. The enterprises involved can be divided into two major groups: private water suppliers and private water consumers - each having an increasing impact on the water resources situation.

5.6.1 Private water suppliers.

The development and management of water resources - especially the provision of potable domestic water in the District - has been considered an exclusive function of the central government. However, a number of private initiatives have emerged primarily because of gaps in public services:

- privately developed water supplies, delivering water to the public for a fee; e.g. in Mukono, Njeru and Kayunga (where some of the developers have been licensed by the town councils)
- water vendors, especially in Lugazi and Njeru towns, where most vendors are licensed to trade in water collected from the point sources
- the only and few operational valley tanks and dams in the predominantly livestock area (in Baale) are privately owned, and developed essentially for livestock. They are presently used for both livestock and domestic supply, especially in the dry season, by the public through a mutual arrangement with the owners at a cost, which can be in kind or cash

The above initiatives are in line with the new government policy of encouraging private sector involvement. The quality of water supplied for domestic use to the public is however doubtful. Though the developers are licensed, it is apparent that technical expertise is lacking, "treatment works" are deficient, and the developers' activities are being neither monitored nor regulated.

5.6.2 Private water consumers.

Industry

The three major industrial consumers are Nyanza Textile Industry (NYTIL), Nile Breweries and the Sugar Corporation of Uganda (SCOUL). SCOUL also supplies water for domestic use to part of the estate.) They all have provisions for full treatment. There is no external monitoring of, and control over, the quantity of water consumed or the quality of water discharged.

Aquaculture and irrigation

The rapidly growing aquaculture and the emerging irrigation schemes are all private; the role of Government is confined to extension services and the provision of inputs.

5.7 Traditional structures

The new systems of managing domestic water sources through committees do, in fact, draw on some long established practices. In traditional societies, it was common, for example, to appoint a caretaker who lived near the source - though sometimes the responsibility was handed down within certain families, through the generations.

Heads of households used to take great pride in protecting ancestral wells - some of which had been a clan responsibility for centuries. Sometimes they imposed a ban on cutting trees near these wells, for example. Occasionally, these traditional taboos run counter to the modern processes of protecting the wells or springs.

There are some customary concepts regarding ownership, access to and control of communal water sources and swamps, that impinge on current objectives of water resource management. One is that water is a "God given gift", to which everybody has a right - irrespective of where it is located or who developed it. This perception cuts across the notion that water is an economic good - which should be utilized in a most careful and economic manner.

5.8 Ministry of Women In Development, Culture and Youth

The Ministry has seconded staff to districts and sub-counties with the purposes of stimulating women's participation in the management of development activities.

The involvement of women in point water source management is well established in Mukono. Each point water source under the RUWASA project has one woman and one man as caretaker. All other established committees have three women out of the six members as mandatory - and women are encouraged to compete for the remaining three posts on merit.

In the RC system, each executive committee has one guaranteed post of Secretary for Women. The remaining eight posts are equally open to men and women. So far, however, most executive posts are held by men.

In spite of the opportunities recently made available to the women of Mukono, many of them, even if duly elected, choose not to take up the challenge. Some of the reasons put forward to explain this reluctance are:

- lack of support from other women
- lack of adequate formal education
- family responsibilities
- shyness
- lack of management experience
- lack of support from men

6 ISSUES, MANAGEMENT FUNCTIONS AND RESPONSIBILITIES

6.1 Introduction

Based on the findings from the visits to the districts a number of water related key issues have been identified. The issues fall into two categories:

- impact issues
- user requirement issues

The impact issues are derived from human activities affecting the water resources negatively with regard to quantity or quality. The negative effects can either concern other direct uses or relate to environmental degradation.

The user requirement issues are derived from inadequate matching of user requirements and the available water resources (quantity and/or quality).

Such situations require interventions, based on rational decisions and operational management functions, in order to obtain a stable and sustainable beneficial use of the water resource. The process is shown in Fig 6.1 below.

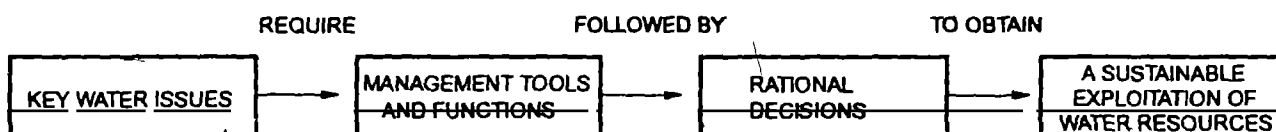


Figure 6.1 - Water resources issues management process

The present chapter describes the issues that have been identified as well as the rationale behind the selection. Management functions necessary to approach and tackle the issues, and tools for intervention in the district is also briefly described here.

The identified issues have been grouped under the following headings:

- surface water quantity
- surface water quality
- groundwater quantity
- groundwater quality

wetlands

Wetlands should strictly speaking be regarded as a part of the surface water resources. However, issues related to this resource have been grouped under their own heading. The complex and unique nature of wetland processes has traditionally made it convenient to regard those areas as a confined water resources entity.

The issues identified may not all be perceived by the district population as being critical issues for which interventions are required. Some of the problems, for instance those related to water quality and environment, are in many cases not possible to observe directly but require specialized investigations for exact identification and description. They can, however, be just as potentially damaging as those which are obvious to the observer.

An overview of the issues identified in the general district context is given in Fig 6.2, while details of issues are given in the tables below. For each issue identified the rationale behind its inclusion as an issue is given. Further, a tentative listing of management functions necessary to approach the issue is given and finally the functions are distributed as responsibilities at different management levels (national, district or community level).

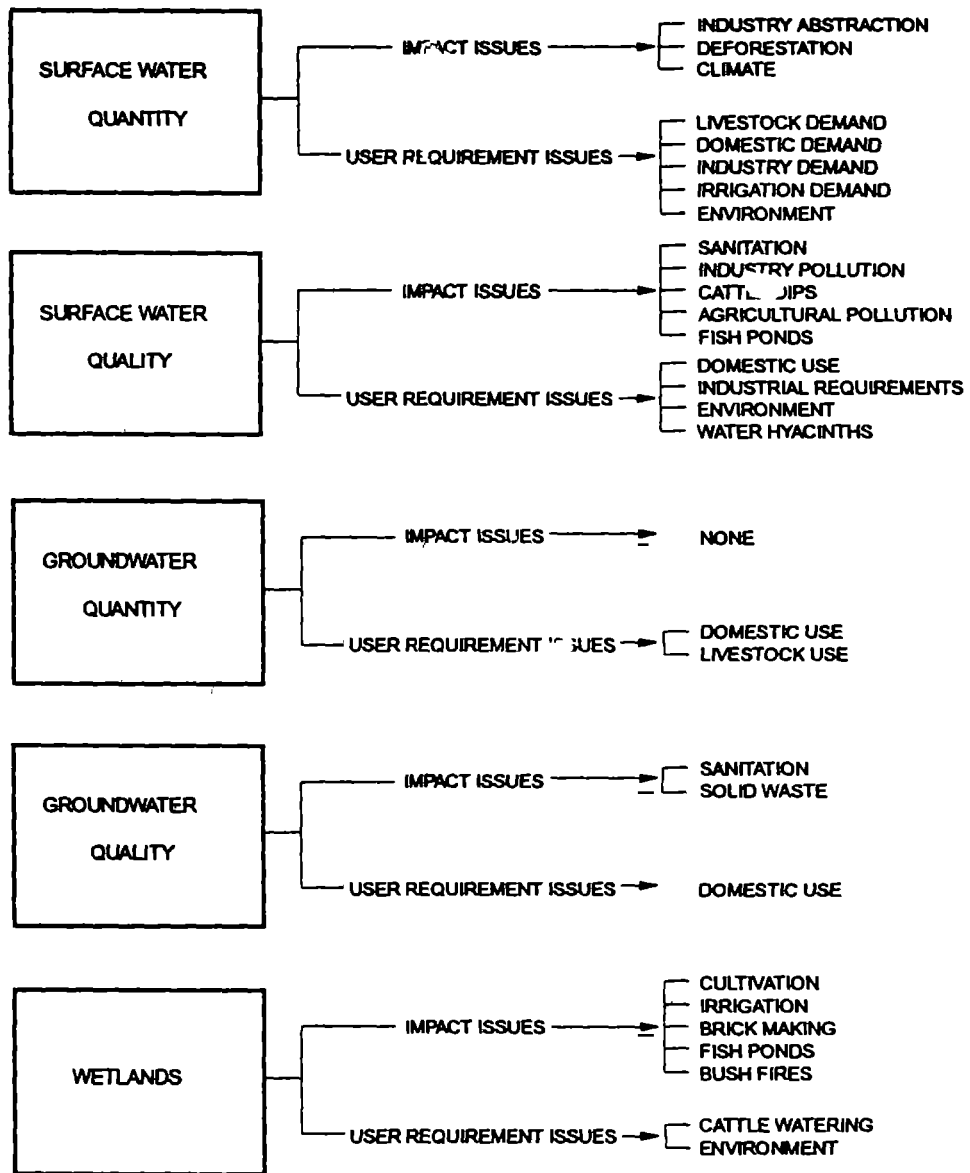


Figure 6.2 - Overview of general district issues identified

Table 6.1 - Surface water quantity

SURFACE WATER QUANTITY (Mukono)			
IMPACT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Industry abstraction	One industry in the district (Sugar Corporation of Uganda Ltd., Lugazi) abstracts water for production and irrigation, impacting the source significantly (6 mill. m ³ /d out of a total flow of River Musambya at 12 mill. m ³ /d.	Abstraction permit based on impact assessments, relation to other planned abstractions, monitoring & control of river flows and abstractions, legal means of intervention, regulations and by-laws making it possible to limit/withdraw permits in case of violations	NATIONAL: Framework for issuing of permits, for impact assessments and for legal interventions. DISTRICT: Issuing of permits, preparation of impact statement, monitoring and control of river flow and levels, by-laws. COMMUNITY: None
Deforestation	Deforestation due to timber felling, fuelwood collection, charcoal burning (for domestic use within and out of the district - brickmaking) may cause unacceptable siltation of streams	Regulatory control of gathering of fuelwood, timber felling and charcoal production. Incentives for use of alternative fuels (biomass briquettes, kerosene, rural electricity), declaration of forest reserves, legal means of intervention.	NATIONAL: Framework for regulatory control of biomass use. Declaration of forest reserves, legal means of intervention. DISTRICT: By-laws and incentives for use of alternative fuels. COMMUNITY: Incentives and awareness raising, by-laws and community self-control.
Climate	Declining rainfall is claimed to reduce the surface water availability especially in the northern subcounties (documentation needed)	Landuse regulation and control in particular relating to forests, wetlands management, general environmental protection and protection of water catchment areas.	NATIONAL: Framework for landuse planning, regulation, control and legal intervention. DISTRICT: By-laws relating to wetland use, forestry, water catchments and environment. COMMUNITY: Tree planting, community forestry, wetland conservation, environmental awareness.
USER REQUIREMENT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Livestock demand	The availability of surface water in Baale County does not match the livestock demand for watering due to drying up of streams and swamps during dry season. The issue is causing migration into, and out of, the district as well as potential conflicts regarding use of private/communal sources	Regulation of ownership of water sources and access in pastoral areas and areas with settled agriculture. Conflict resolution capacity and capability required locally. Policy and operational strategies for provision of water for livestock.	NATIONAL: Policy/strategy for provision of water for livestock. Regulations for ownership and access to water sources. DISTRICT: By-laws for ownership and access. COMMUNITY: Conflict resolution capacity and capability.
Industry demand	One industry in the district (Sugar Corporation of Uganda Ltd., Lugazi) has a significant water demand seen in relation to the source availability (River Musambya - 50%). Planned expansions of the production will exhaust this resource, and will require identification of alternative sources	Water resources development planning tools, combined with industrial planning, criteria for prioritizing, licensing and abstraction permits and surface water data availability	NATIONAL: Policy/strategy and criteria for planning of industry locations. Legal intervention framework. DISTRICT: Licensing of industries, abstraction permits and discharge permits. Environmental Impact Statement (EIA). COMMUNITY: None

SURFACE WATER QUANTITY (Mukono)			
USER REQUIREMENT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Environment	Reduction of minimum flows in rivers and streams affects the gradient from perennial - intermittent - ephemeral streams (from south to north of the district) and thereby the ecological base conditions for plant and animal life	Environmental policy and operational strategies, environmental impact assessments, ecological monitoring and regulatory means of intervention.	NATIONAL: Environmental policy and strategies. Legal intervention framework. Major EIAs. DISTRICT: Ecological monitoring, impact assessments, by-laws. COMMUNITY: Environmental awareness

Note: District means District Administration or Town Administration

Table 6.2 - Surface water quality

SURFACE WATER QUALITY (Mukono)			
IMPACT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Sanitation	Low sanitation levels in areas near the lake and rivers increase the risk of spreading water borne diseases due to the multi-use of these surface water resources	Increased awareness on sanitation, education within health and hygiene, promotion of pit latrine construction and use.	NATIONAL: Policy and strategy for sanitation. DISTRICT: Latrine promotion, hygiene and sanitation education. COMMUNITY: Construction and increased awareness about benefits of latrines.
Industry pollution	<p>Three major industries in the district discharge significant amounts of pollutants to surface waters: Nile Breweries discharges app. 370 m3 of waste water per day to the Nile (rich in organic substances, detergents and caustic soda). NYTEL textile industry discharges app. 4000 m3 of waste water per day to the Nile (rich in starch and various chemicals such as dyes). The enormous flow of the Nile implies a high dilution rate of these effluents, but the lack of precise quantifications of the pollution at this site (including outlets at the Jinja side), prohibits an assessment of the impacts of this pollution.</p> <p>The Sugar Corporation of Uganda Ltd. in Lugazi discharges waste water highly loaded by organic substances to the River Nusambya. The amount of waste water is very high compared to the flow of the river, and the river must be considered severely impacted for a long distance down stream the outlet.</p>	Industrial effluent standards and regulations based on trade-offs between treatment costs and environmental benefits. Monitoring and control of effluents, industrial environmental awareness building, legal means of interventions in case of violations. Economic incentives.	NATIONAL: Policies, strategies, effluent standards, guidelines for EIAs, regulations and intervention means, economic incentives. DISTRICT: EIAs, monitoring and control of effluents, environmental awareness building. COMMUNITY: None.

SURFACE WATER QUALITY (Mukono)

IMPACT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Cattle dips	The district has a great amount of livestock (especially in the northern part) which is treated against ticks partly by the use of cattle dips. Where the dips are drained to surface water resources, the acaricides used eventually contaminates these waters.	Education on efficient use of chemicals and discharge to low priority streams or to seepage pits. Planning of location of dips in relation to sensitive recipients or downstream users is required.	NATIONAL: None DISTRICT: Extension/education on environment conscious use and discharge of chemicals, on planning of location of cattle dips and on discharge from same. COMMUNITY: Environment consciousness/awareness in use of cattle dips
Agricultural pollution	No precise estimate of the use of agrochemicals has been obtained for the district. However, the large estates in the south part are run with a substantial use of fertilizers (>2000 t/y) and pesticides which to some extent reach the drainage system.	Regulations on acceptable pesticide types, education on application methods, timing and amounts in order to minimize waste and thus impacts on surface water. Efficient fertilizer use (amounts, timing, methods).	NATIONAL: Regulation and control of import of pesticides. DISTRICT: Extension/education on efficient and proper handling of pesticides and fertilizers. COMMUNITY: Awareness of efficient and proper handling of fertilizers/pesticides
Fish ponds	Mukono has several hundred fish ponds mainly located in the south part, and this activity is increasing as supply of fry increases. The ponds take in water from streams and rivers, and from time to time they are flushed releasing settled organic material to the receiving waters.	Regulations for flushing procedures and assessment of trade-offs between stream water quality and fish production	NATIONAL: Policy and strategy for development of fish ponds. DISTRICT: Permits for water abstraction for ponds and impact assessments in case of intensive aquaculture. COMMUNITY: Awareness of possible environmental impacts of fish pond operation.
USER REQUIREMENT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Domestic use	Due to scarcity of developed ground water sources in Mukono district, a substantial number of households (at least periodically) depend on surface water for consumption (lakes, rivers, ponds, swamps etc.). No direct monitoring of the surface water quality takes actually place, but it is well known (also among people in the district) that the quality of these sources often is questionable for drinking purposes. Often the source used for drinking water is also used for wastes, washing, cattle watering etc.	coordination between upstream/downstream riparian use and enforcement of regulations and standards for effluents. Monitoring and control, effluent permits based on environmental impact assessments and legal means of intervention.	NATIONAL: Effluent standards and wastewater regulations. Legal means of enforcement. DISTRICT: Planning of water intake and wastewater discharge locations. Monitoring and control. COMMUNITY: Awareness of water quality of sources

SURFACE WATER QUALITY (Mukono)

USER REQUIREMENT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Industrial requirements	<p>The requirement to process water is generally fulfilled (after sand-filtering) for the three major water consuming industries in the district. The most sensitive of these factories is however the Nile Brewery to which the lake water is an ingredient in the product. At present the brewery adjusts the chemical composition of the lake water to fulfil the requirements for brewing. The factory will however, be highly affected by eg. oxygen depletions, toxic algae blooms or other drastic changes of the lake water around its intake.</p>	<p>Coordination between upstream/downstream riparian use and enforcement of regulations and standards for effluents. Monitoring and control, effluent permits based on environmental impact assessments and legal means of intervention.</p>	<p>NATIONAL: Effluent standards and wastewater regulations. Legal means of enforcement. DISTRICT: Industrial location planning. Planning of water intake and wastewater discharge locations. Monitoring and control. COMMUNITY: None</p>
Environment	<p>Pollution and nutrient enrichment from eg. use of fertilizers cases (besides direct unsuitability for users) also ecological changes of the aquatic environment. Ecological changes in Lake Victoria have eg. been observed during the last 20 years. The lake water has thus become less transparent, the composition of species has changed etc. (eutrophication indicators). Discharges (or runoffs) of hazardous chemicals eg. from textile industry or pesticides from agriculture or tic control, may cause accumulation of harmful, less degradable chemicals or residues in the living organisms.</p>	<p>Environmental policy and operational strategies, environmental impact assessments, ecological monitoring and regulatory means of intervention.</p>	<p>NATIONAL: Environmental policy and strategies. Legal intervention framework. EIAs for major projects. DISTRICT: Ecological monitoring. Impact assessment, by-laws. COMMUNITY: Environmental awareness.</p>
Water hyacinth	<p>During the last 5 years the Lake Victoria and Lake Kyoga systems have been infested by the non-native water hyacinth <u>Eichornia</u>. This floating weed proliferates fast and has now reached a level where large areas of the water surface periodically is totally covered. This infestation adds another dimension to the eutrophication phenomena since nutrient loadings (nitrogen and phosphorus) are rapidly converted into huge amounts of biomass. Some direct impacts from this infestation is oxygen depletion (and release of hydrogen sulphide) below the vegetation-mats as well as severe obstruction of navigation on the lakes and rivers. In Mukono district these problems have been experienced both at the Victoria and Kyoga.</p>	<p>Management strategies are not yet available for East Africa conditions and only pilot tests aiming at restricting the growth of the water hyacinth have been made.</p>	<p>NATIONAL: Eradication policy, strategy and actions coordinated internationally with upstream countries. DISTRICT: Support to national actions. COMMUNITY: None.</p>

Table 6.3 - Groundwater quantity

GROUND WATER QUANTITY (Mukono)			
IMPACT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
None			
USER REQUIREMENT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Domestic use	The domestic use of ground water in Mukono District is mainly limited by the progress of development of single sources (boreholes, protected springs etc.). The ground water resource in the northern part is however deep lying and the exploitability has a patchy distribution. This results in higher expenses for the development (50% success of drillings, 40 metres deep). The patchiness also implies that it will not be possible to reach a target of 1.5 km as a maximum walking distance for fetching water (new target at 2 km).	Demand driven planning of source development consistent with overall national policies. Management of maintenance at consumer group level, intermediate level and district level.	NATIONAL: Source development policy and strategies. DISTRICT: Promotion of demand driven source development. COMMUNITY: Participation
Livestock use	The scarcity of surface water in the northern parts of Mukono District has raised the wish to use boreholes for cattle watering as livestock is a key economic activity here.	Development of overall national policies, demand driven planning of source development and new approaches to maintenance in pastoral areas with migrations	NATIONAL: Source development policy and strategies in pastoral areas. DISTRICT: Promotion of demand driven source development. COMMUNITY: Participation.

Table 6.4 - Groundwater quality

GROUND WATER QUALITY (Mukono)			
IMPACT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Sanitation	Location of pit latrines near water sources such as springs and wells imposes a risk of faecal contamination of the source, resulting in increased risk for spreading of diseases.	Development of standards for location of latrines in relation to sources, adequate technical guidance for borehole and well construction and creation of awareness of sound hygiene and sanitation practices near boreholes and wells.	NATIONAL: Standards for latrine construction. DISTRICT: Enforcement of standards COMMUNITY: Awareness of sound hygienic behaviour near water points.
Solid waste	In the towns of Mukono District the collection system for solid wastes is not very developed. However there is a risk of contamination of the groundwater sources locally near dump sites.	Clear definition of institutional responsibility, guidelines for environmental assessment of solid waste disposal sites, regulatory means of rejecting proposed sites and guidelines for operation of solid waste deposits.	NATIONAL: Solid waste policy, strategy, allocation of institutional responsibility, guidelines for planning, design and O & M. DISTRICT: Site selection and EIA COMMUNITY: Awareness of need for solid waste management at household level.
USER REQUIREMENT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Domestic Use	In general the basic quality of the ground water resources in the district is adequate. However, a high number of non-protected springs are used in the southern part and some drillings produce water with low pH or high iron. Saline boreholes have also been reported	Monitoring of groundwater quality and enforcement of standards by closure of boreholes with substandard water quality.	NATIONAL: Drinking water standards with appropriate flexibility. DISTRICT: Groundwater quality monitoring COMMUNITY: Awareness of sound hygienic behaviour near water points.

Table 6.5 - Wetlands

WETLANDS			
IMPACT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Cultivation	The wetlands in Mukono District are widely used for cultivation of various food crops by removal of original vegetation, ridging and trenching and digging channels for small scale irrigation. These activities lower the water table in the swamps, and the swamps become more often dry in the dry season.	Overall policy for balancing conservation and development. Further, institutional responsibilities have to be defined, guidelines for development prepared, development permits introduced and legal enforcement procedures prepared.	NATIONAL: Wetland policy and strategies. Allocation of institutional responsibilities. Guidelines for development and legal framework for enforcement. DISTRICT: By-laws and development permits. COMMUNITY: Awareness of wetland development requirements.
Brick making	Brick making is a widespread activity in Mukono District. The excavation of building material from the wetlands removes the vegetation cover and diverts water for softening the clay.	Licensing of brick-makers, control of production in terms of location and capacity and means of enforcement.	NATIONAL: Guidelines and legal background for licensing of brick-makers. DISTRICT: Licensing and control COMMUNITY: Awareness of environment conscious brick-making.
Fish ponds	The establishment of fish ponds in wetlands impacts by clearing the vegetation. The production of fish affects the water quality as organic material is released from the ponds to swamp.	Licensing of fish farming, control of production and facilities and means of enforcement.	NATIONAL: Guidelines and legal background for licensing of fish farms. DISTRICT: Licensing and control COMMUNITY: Awareness of environment conscious fish farming.
Bush fires	Bush fires are commonly used in Mukono District to obtain green pastures for cattle in wetland areas. This practice has a strong impact on all plant and animal life in the wetland.	Regulations, awareness building for cattle farmers and means of enforcement.	NATIONAL: Inclusion of bush fire prevention in wetland policy and guidelines and legal framework for enforcement. DISTRICT: Control and enforcement COMMUNITY: Environmental awareness
USER REQUIREMENT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Cattle watering	The wetlands in Mukono have traditionally been a very important source for cattle watering, especially in the northern part of the district where the wetlands periodically are the only available source for this use. The various exploitation practises have reduced the water availability in the wetlands, and many now dry up during the dry season.	The balancing of the interests of cultivators and cattle farmers through an integrated wetland development plan and conservation measures and a follow-up and control of the developments.	NATIONAL: Balanced wetland development planning. DISTRICT: Follow-up on adherence to planned development. COMMUNITY: Environmental conscious development activities.

WETLANDS

USER REQUIREMENT ISSUES

RATIONALE

MANAGEMENT FUNCTIONS

MANAGEMENT LEVELS AND RESPONSIBILITIES

Environment

Intact wetland ecosystems constitute a resource of significant environmental values including regulation of flow, purification of water and the function as habitat to various plant and animal species. The main threat to the existence of this resource results from land reclamation for agricultural purposes.

The balancing of conservation requirements and development needs identifying a sustainable wetlands development policy. Further, institutional responsibilities have to be defined, guidelines for development prepared, development permits introduced and legal enforcement procedures prepared.

NATIONAL: Wetland policy and strategies. Allocation of institutional responsibilities. Guidelines for development and legal framework for enforcement.
DISTRICT: By-laws and development permits.
COMMUNITY: Awareness of wetland development requirements.

7 ASSESSMENT OF PRESENT MANAGEMENT

The existing institutions for district and community management were described briefly in Chapter 5, and the water resources issues and their related management functions were identified as they appeared in Mukono District in Chapter 6. In the following tables, water resources management in the district will be assessed with respect to significant potentials, as well as constraints, within the existing management system at district level.

The management functions are divided into three categories according to the character of the issues to be dealt with. These are:

- management issues concerning geographically localized water resources problems with relatively simple responsibility relations and management functions
- management issues concerning geographically scattered water resources problems (or causes) with unclear definitions of responsibility and complex cause/effect relationships
- management issues concerning the availability of water compared with the demand. The related management functions mainly include prioritization of funds to be used in water development projects.

It should be noted, however, that the major constraint affecting all the water management functions is financial. There are at present severe constraints on both national and district finances, with very few funds available for development purposes.

7.1 Geographically localized water resources issues

Table 7.1 - Water extraction for industry and aquaculture

MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS
Policy formulation for local water abstraction	Political system in place (RC councils and water committees) Water Officer and Fishery Officer in position as advisors	National water resources policy framework not in place Lack of guidelines for policy making
Monitoring of surface water quantities	Water Officer in position	No formulated monitoring strategy. No engineer level staff (hydrology). No extension staff. No monitoring equipment. Inadequate transport. Inadequate budget for. Monitoring costs.

MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS
Technical assessment of requirements and impacts	Water Officer in position	No guidelines for impact assessment. No engineer level staff. No environmental impact assessment expertise. Inadequate transport. Inadequate budget.
Issuing permits	Administrative system operational in district and municipalities. Water Officer in position.	Unclear interface between District and municipality authorities.
Control of fulfilment of permit conditions	Water Officer in position	No engineer level staff. No monitoring equipment. Inadequate transport Inadequate budget. Inadequate authority of DWD.
Enforcement of permit conditions	Court system (magistrate), police etc. functioning	No specific legislation.

Table 7.2 - Wastewater pollution from industry and aquaculture

MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS
Policy formulation for local water pollution	Political system in place (RC councils and water committees) Water Officer, Health Inspector and Medical Officer of Health in position as advisors	National water resources/environmental policy framework not in place Lack of guidelines for policy making Lack of local standards
Monitoring of surface water quality	Water Officer in position. Health Inspector (incl. extension service) in position Municipal Officers of Health in position System of local water committees in place	No formulated monitoring strategy. Inadequate knowledge on surface water quality. No qualified staff to dedicate for WQ monitoring. No monitoring equipment. Inadequate transport. Inadequate budget for monitoring costs. Very limited access to laboratory facilities - no test kits.
Technical assessment of requirements and impacts	Water Officer in position. Health Inspector (incl. extension service) in position. Municipal Officers of Health in position	Low theoretical knowledge on WQ impact assessment. No guidelines for impact assessment. No national or local standards. Limited budgets.
Issuing permits	Administrative system operational in district and municipalities	Unclear interface between District and municipality authorities.

MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS
Control of fulfilment of permit conditions	Water Officer, Health Inspector, Medical Officer of Health and Industry Inspectors (Ministry of Industry) in position	No formulated control strategy. Low knowledge on surface water quality. No qualified staff to dedicate to WQ discharge control. No monitoring equipment. Inadequate transport. Low budget for running costs. Very limited access to laboratory facilities. Unclear relation between ministries.
Enforcement of permit conditions	Court system (magistrate), police etc. functioning	Lack of specific legislation. Unclear responsibilities towards third parties.

Table 7.3 - Pollution from solid waste disposal

MANAGEMENT FUNCTIONS	POTENTIALS	CONSTRAINTS
Site selection based on Environmental Impact Assessment	Medical officer of Health in position in municipality	Low capacity for EIA
Implementation of disposal system	City engineer in position	Low capacity for collection and disposal

Table 7.4 - Pollution from cattle dips

MANAGEMENT FUNCTIONS	POTENTIALS	CONSTRAINTS
Extension/education on environment conscious use and discharge of chemicals, on planning of location of cattle dips and on discharge from same.	Veterinary officer (incl. extension service), Water Officer and Health Inspector in position.	Limited capacity for supervision and control Construction of soak pits gives extra costs
Assessment of impact on ground water and soil	None	Inadequate knowledge

7.2 Geographically scattered water resources issues

Table 7.5 - Adverse impacts on hydrological regime

Management functions for:		Decreased minimum flow in rivers caused by deforestation (charcoal burning)
MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS
Local policy formulation and regulations for gathering of fuelwood, timber felling and charcoal production	Political system in place (RC councils) Forestry Officer and Agricultural Officer in position for advice	National water resources/environment/forestry policy framework not in place Lack of guidelines for local policy making No Environment Officer
Cross-sectorial coordination between water, agriculture and forestry incl. technical assessments of agriculture and forestry development related to impact on the water resources	Water Officer in position. Agricultural Officer (incl. extension service) in position. Forestry Officer in position (incl. extension service). District Development Committee in place. Extension Coordinator for Agriculture, Forestry and Fisheries in place	Low theoretical knowledge on water resources impacts from agriculture/forestry activities Lack of formalised coordination regarding water aspects of agriculture/forestry projects
Incentives for alternative fuel and efficient use of traditional wood fuel	District Veterinary Officer (incl. extension service) in position. Forestry Officer (incl. extension service) in position. Agricultural Officer (incl. extension service) in position. RC's and Chiefs in place (as mobilizers). Wood plot programme started.	Charcoal is a major income generating activity. The demand of charcoal is high (Jinja/Njeru, Kampala). Land ownership, land rights and landuse policies need adjustment. Low public awareness.
Enforcement of regulations	Forestry police, Chiefs and local police in place. Court system functioning (RC and Magistrates).	Lack of specific legislation.

Table 7.6 - Agrochemical pollution

MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS
Registration of types and quantities	Agricultural Officer (incl. extension service) in position	None
Extension/education on efficient and proper handling of pesticides and fertilizers.	Agricultural Officer (incl. extension service) and Health Inspector (incl. extension service) in position	Lack of regulation and control of import of pesticides at the national level.

MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS
Environmental monitoring	Agricultural Officer (incl. extension service), Water Officer and Health Inspector (incl. extension service) in position	No formulated monitoring strategy. Inadequate knowledge on agrochemical impact on the environment. No qualified staff to dedicate to monitoring. No monitoring equipment. Inadequate transport. Inadequate budget for monitoring costs. Very limited access to laboratory facilities

Table 7.7 - Sanitation impacts

MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS
Management functions for: Local contamination of surface and groundwater due to low sanitation levels		
Latrine promotion, hygiene and sanitation education.	Health Inspector (incl. extension service) in position. RUMASA project in operation	Funding. Lack of awareness. Local beliefs and taboos. Soil conditions. Remoteness (the islands)

7.3 Issues concerning availability of water compared with demand

Table 7.8 - Demand/supply imbalance

MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS
Management functions for: Scarcity of safe water sources		
Assessment of quantity and quality incl. spatial distribution of water sources and resources	Water Officer, Community Development Officer, Health Inspector (incl. extension service) in place. RC's and water committees in place. RUMASA project operating.	Limited capacity. Inadequate transport. Limited budgets.
Policy/prioritization of development of domestic/livestock water supply	Political system in place (RC councils, water committees and District Development Committee) assisted by District Water Officer, District Health Inspector, District Veterinary Officer and Chiefs. RUMASA in operation	Weak coordination of priorities between DWD, District and projects. High demand. Local customs (cattle before people). Unwillingness to pay for O&M.
Development	Water Officer, Water committees and RUMASA project in place	Relatively limited funds. Remoteness. Limited availability of equipment.

Table 7.9 - Conservation of wetlands

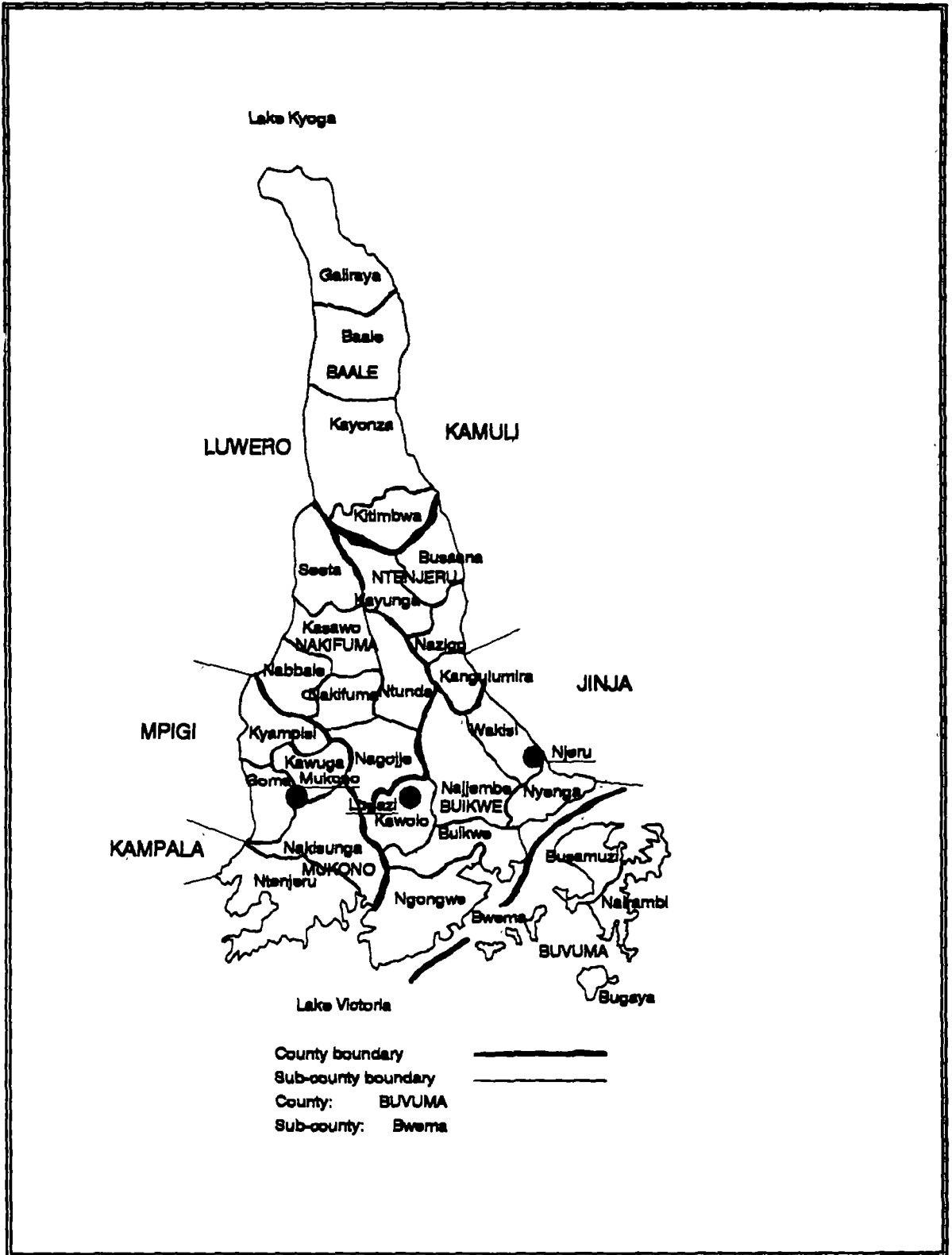
MANAGEMENT FUNCTION	POTENTIALS	CONSTRAINTS
Local policy formulation and regulations for use of wetlands including cultivation, brick-making, fishfarming, bushfiring, cattle watering and environmental protection	Political system in place (RC councils and water committees), assisted by Agricultural Officer (incl. extension service) and Water Officer	Lack of national policy on wetlands (to come). Lack of policy making guidelines.
Monitoring of water levels, wetland coverage and use	Water Officer, Agricultural Officer (incl. extension service) and Fishery Officer in position	No formulated monitoring strategy. Limited staff capacity. No monitoring equipment. Inadequate transport. Inadequate budgets.
Technical assessment of user requirements, environmental requirements and impacts	Water Officer, Agricultural Officer (incl. extension service) and Fishery Officer in position	No guidelines for impact assessment. Limited specific qualifications in wetland management. No Environment Officer.
Issuing permits	Administrative system operational in district.	Unclear interface between district, Directorate for Environment and DWD
Control of fulfilment of permit conditions	Water Officer, Agricultural Officer (incl. extension service) and Fishery Officer in position	No formulated control strategy. Limited staff capacity. No monitoring equipment. Inadequate transport. Inadequate budgets.
Enforcement of permit	Court system (RC and magistrate), police, chiefs functioning	No specific legislation.

APPENDICES

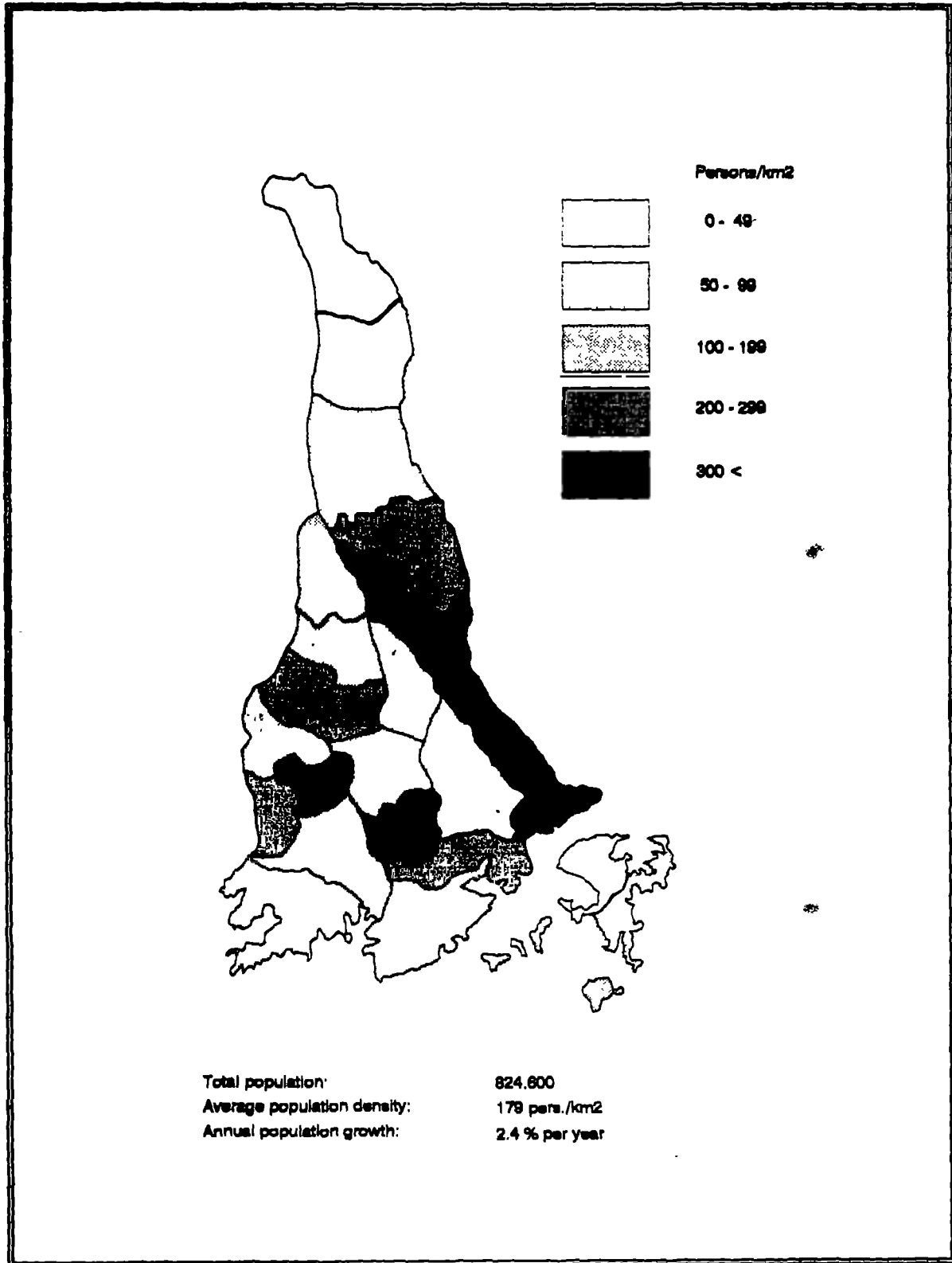
ANNEX 5

MUKONO DISTRICT

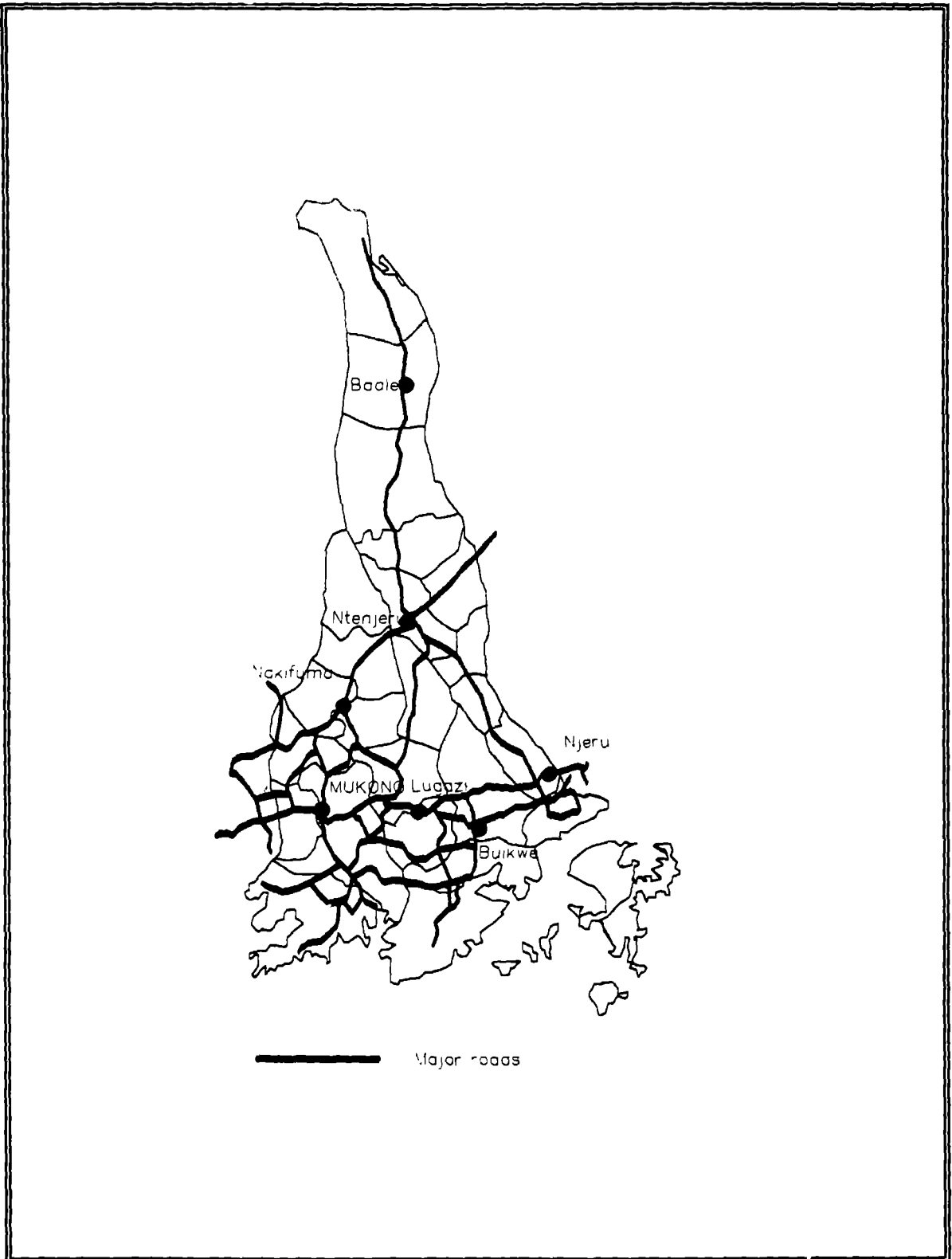
Mukono District



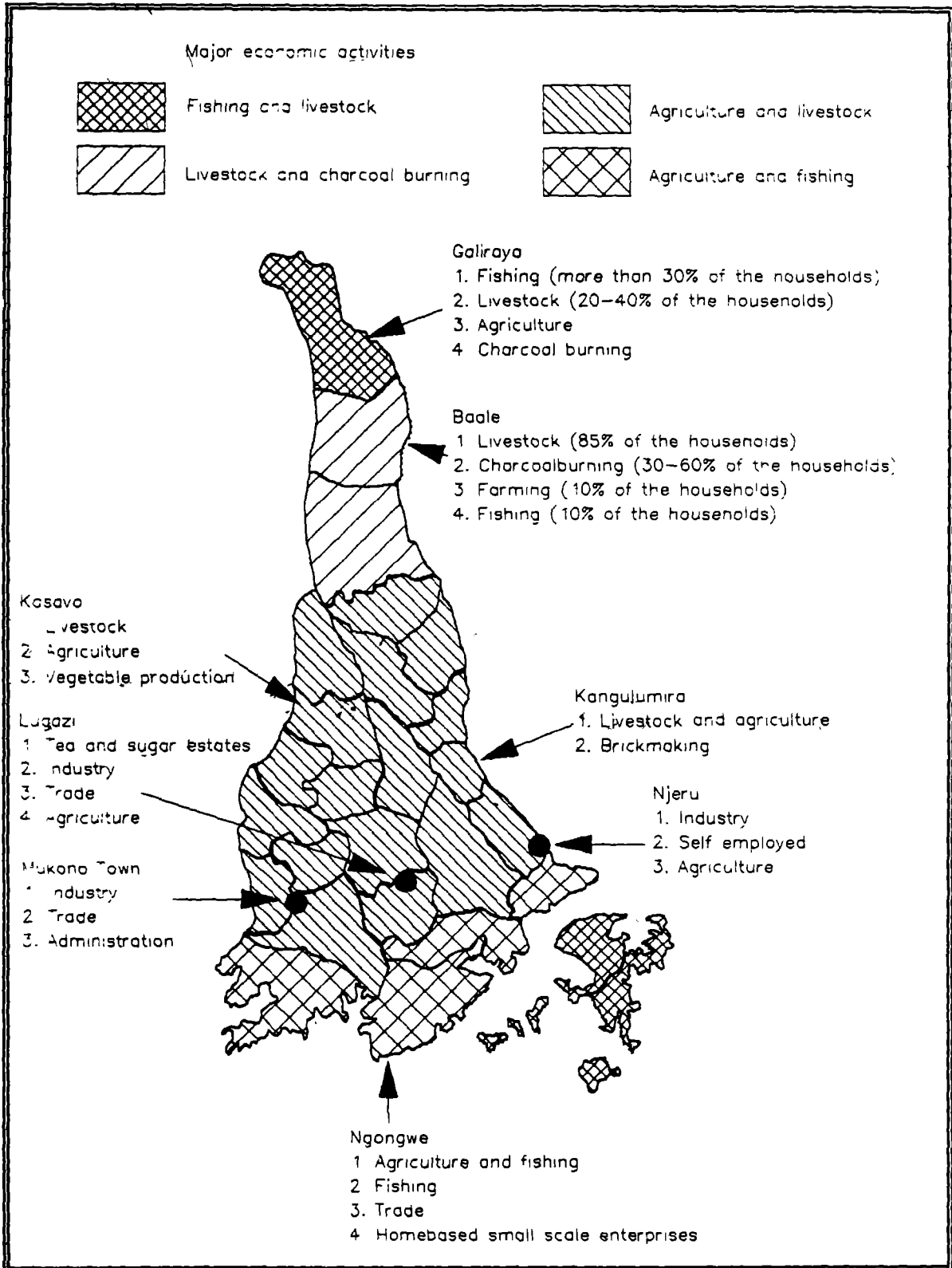
Population density



Infrastructure



Economic activities



1 GENERAL

The present land tenure situation in Uganda is a complex of various co-existing pre-colonial, colonial and post-colonial land tenure systems and land reforms. There are, also, some significant differences between what the law dictates and what goes on in practice.

2 LAND TENURE LAW

The 1975 Land Reform Decree No. 3 declared all land in Uganda to be public land - to be administrated by the Uganda Land Commission. All individual holdings were supposed to be converted into leaseholds. The lease period was meant to be 99 years for individuals and 199 years for public bodies. The 1975 Land Reform Decree No. 3 is the binding law on land tenure. However, various pre-colonial and colonial systems are still followed, both by the land administrators and by the landowners. These systems are:

- customary tenure
- mailo land
- freehold
- leasehold

3 CUSTOMARY LAND TENURE

These systems are pre-colonial, and they are the most widespread in the country. Specific regulations vary, of course, with each ethnic group and with certain localities. However, two major types of customary land tenure systems can be identified:

- specific permanent single holdings
- communal land with non-permanent holdings

The practice of having specific permanent single holdings is predominant in the southern and the eastern parts of Uganda. Each family has its own plot where it lives and cultivates the land. The head of the household decides on the use and transferability of the land. Access to land is gained through inheritance.

Communal land with non-permanent holdings is most common in the northern part of the country, but is also found in rangeland areas of the southern districts (Mbarara, Mubenda, Kiboga, Luwero, Rakai, Mukono, and Kamuli) and in the Lake Albert flats. Most of the traditional cattle are kept on communally held land. Where arable agriculture is dominant, areas of land are set aside for communal grazing and specific plots are allocated to families for homesteads and cultivation. There is no permanency in the system. Land is only retained as long as it is in use. The male elders decide who shall use a particular piece of land. Customary holders do not have any formal legal rights to the land according to the 1975 Land Reform Decree No.3.

4 MAILO LAND

The "mailo" system originates from the Buganda Agreement of 1900 between the Kabaka and the Protectorate Government. The Buganda land was divided between the Protectorate Government (Crown land and later public land) on the one hand and the Kabaka and his family and chiefs (mailo land) on the other. The mailo land was parcelled out into private and official estates. Later on, the land was surveyed and titles were given to the recipients. Customary holders became tenants of the mailo land owners. These tenants were required to pay mailo landlords for the use of the land. The system was officially abolished in 1967, and mailo land transformed into public land. In reality, the private mailo land remained as before. However, some of the mailo land has been transformed into leaseholds:

The mailo land owner enjoys full right of ownership and use of his land. Government has no access to mailo land, except in an advisory capacity. However, the mailo land owner is limited in his use of certain economic resources (minerals, for example) on his land. Government reserves the use of such to itself.

5 FREEHOLD

The term "freehold" refers to land owned by private individuals or organizations in perpetuity. By the Toro and Ankole Agreement of 1901, and the Bunyoro Agreement of 1933, the kings and their chiefs were granted land either as private or official estates. The rights to important resources remained with the Protectorate Government. Peasants on the land were transformed to tenants.

Another type of freehold land is crown land sold for development purposes. These freeholds were subject to development conditions and could be forfeited to the Colonial Governor if conditions remained unfulfilled. The 1969 Public Lands Act vested former Crown land occupied for Government purposes in the Uganda Land Commission as freehold. Crown land formerly occupied by public bodies was also vested in those bodies as freehold.

LEASEHOLD

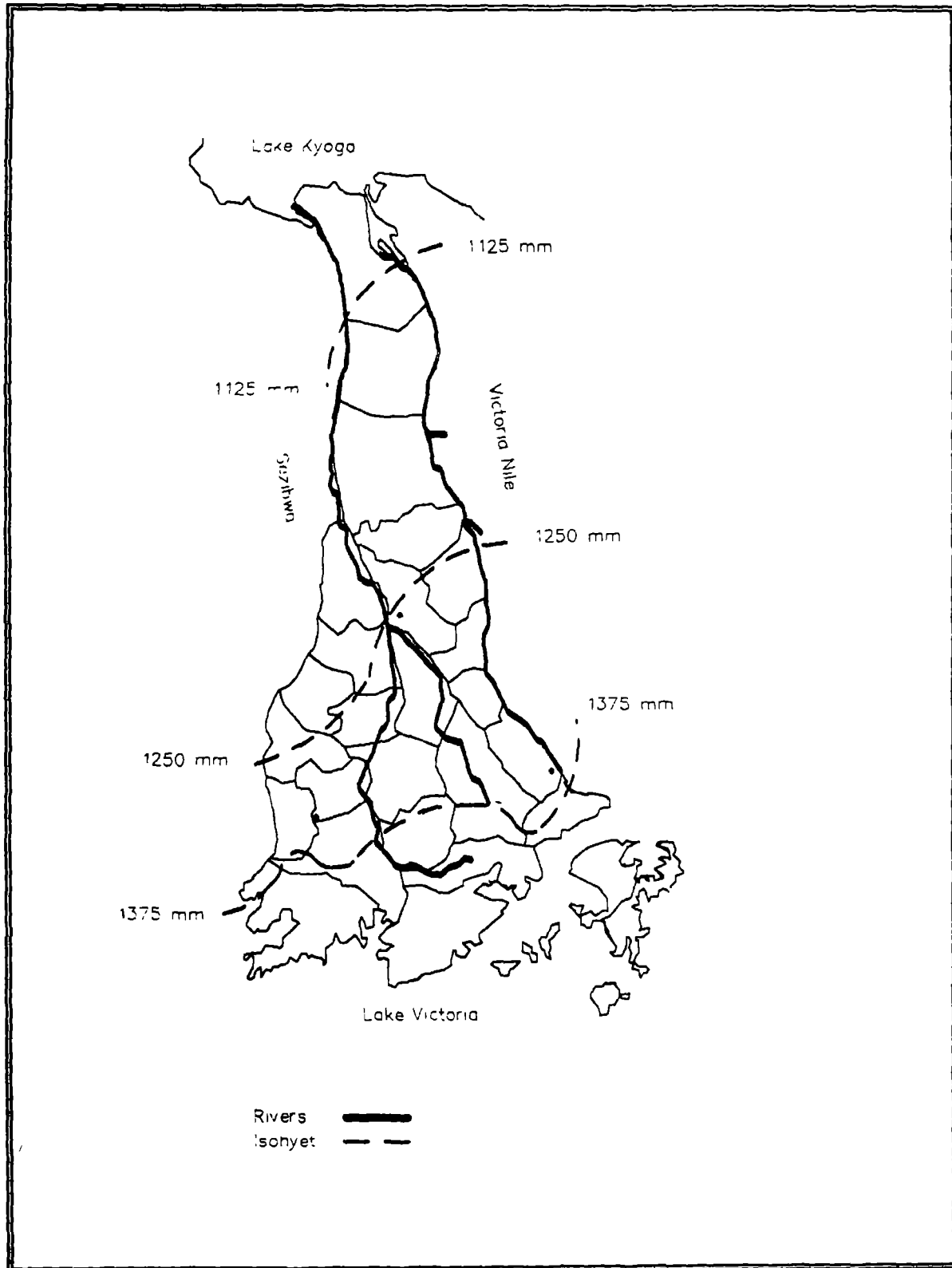
The leasehold system is based on an agreement (lease title) between the lessor (usually the government) and the lessee (a developer). Land is leased out for development. It is more common in urban areas than in rural areas. The system originates from the 1975 Land Form Decree.

There are three ways to obtain a lease:

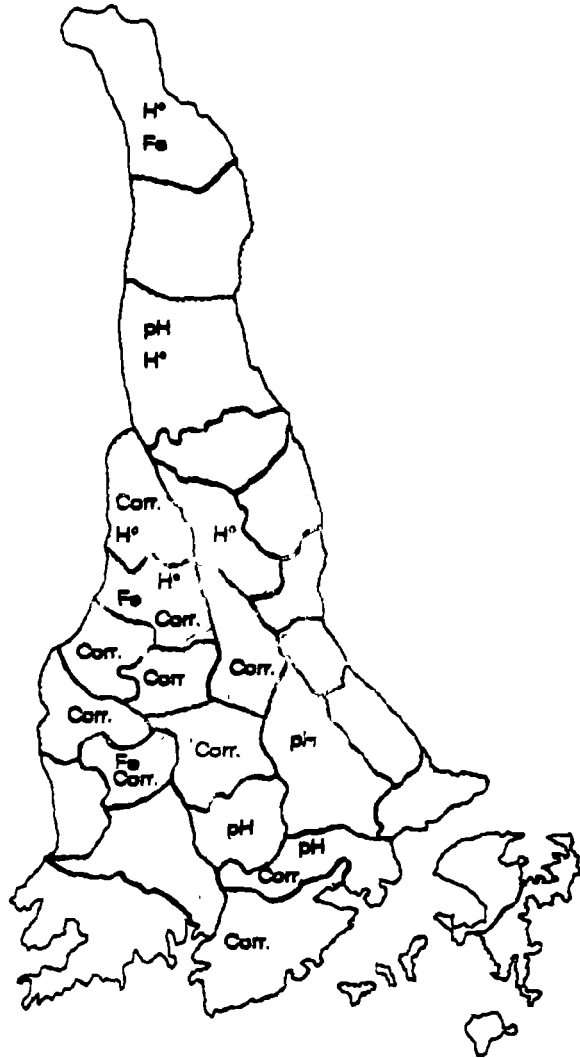
- from the Uganda Land Commission
- from an urban authority on behalf of Uganda Land Commission
- from a private individual outside Government as a private lease.

Land gazetted for a specific purpose (eg. a forest reserve) cannot be leased. The Minister's approval is required for lands exceeding 200 ha or 500 acres.

Hydrology



Groundwater quality



Groundwater quality characteristics from single sources
in Mukono District (RUWASA).

- H°: Hard water
- Fe: High Iron concentrations
- pH: Acidic water
- Carr.: Corrosive carbon dioxide

Industry profile

Nile Breweries	
Location:	Njeru
Ownership:	Privatized 2 years ago
Products:	Beer
Raw materials:	Imported malt (from Denmark, Holland and Germany), chemicals
Production capacity:	21,000,000 l/y
Actual production:	15,000,000 l /y
Yearly gross turnover (est.):	39,000,000,000 Sh
Number of employees (full capac.):	460
Number of employees (actual): of whom app. 30 are women	400
Water source (production):	Lake Victoria
Water demand production (full capacity):	578 m ³ /d
Water demand production (actual):	413 m ³ /d 70% for washing 10% for ingredients The rest for cleaning and domestic use.
Treatment:	Sand filters -> ready for washing, boilers, and domestic use. Chlor is added.
Quality of intake water:	Satisfactory after treatment
Water source (domestic):	Lake Victoria
Effluent water (full capacity):	520 m ³ /d
Effluent water (actual):	370 m ³ /d
Effluent quality:	High BOD, Detergents (from cleaning) and acid.
Waste water treatment:	No treatment
Receiving water:	The Nile
Comments: The brewery has planned to expand the production to 45,000,00 l beer/y, within the next 5 years. In addition there are plans for production of soft drinks in the future. No awareness of either the potential threats from Water Hyacinths or the content of BOD. The production highly fluctuates due to market variations	

Industry profile

Nyanza textile industry (NYTIL)	
Location:	Njeru
Ownership:	Uganda Governm. to be privatized
Products:	Cotton textiles dyed and printed
Raw materials:	Ugandan cotton chemicals, dyes
Production capacity:	31,000,000 m/y
Actual production:	8,000,000 m/y
Yearly gross turnover (est.):	7,200,000,000 Sh
Number of employees (full capac.):	6,000
Number of employees (actual): of whom app. 100 are women	2,000
Water source (production):	Lake Victoria
Water demand production (full capacity):	18,000 m ³ /d
Water demand production (actual):	4800 m ³ /day 90% for washing 10% for steam production
Treatment:	Sand filters
Quality of intake water:	Satisfactory after filtering
Water source (domestic):	NWSC piped water
Effluent water (full capacity):	16,000 m ³ /day
Effluent water (actual):	4,200 m ³ /d
Effluent quality:	Rich in starch dyes, NaOH....
Waste water treatment:	3 ponds sedimentation
Receiving water:	The Nile
<p>Comments:</p> <p>The factory is well equipped (modern machines) but fails to compete against imported textiles on the Ugandan market (the total market is estimated at 50,000,000 metres/year).</p> <p>The effluent treatment reduces mainly BOD from starch, soluble chemicals are discharged to the river.</p> <p>The factory operates under the Factory Act and is inspected once a year by an officer from the ministry for industries (mainly safety and health aspects). Operation licence has to be obtained from Njeru TC each year when the factory is inspected by the TC health officer.</p>	

Industry profile

Sugar Corporation of Uganda Ltd. (SCOUL)	
Location:	Lugazi
Ownership:	Private
Products:	Refined Sugar
Raw materials:	Sugar canes grown at own estate
Actual production:	2,000 tonnes/day
Yearly gross turnover (est.):	?
Number of employees (actual): 99% men	7,000 + 4,000 in fields
Water source (production):	River Musambya
Water demand production (actual):	5,600 m ³ /day for washing canes
Treatment (production water):	No?
Quality of intake water:	Satisfactory after filtering
Water source (domestic):	River Musambya 432 m ³ /d + 6 boreholes
Treatment (river water for domestic use):	Aeration, flocculation, clarification, sand filtering (out of operation)
Effluent water (actual, est.):	Factory says 216 m ³ /d (80% of intake = 4,400 m ³ /d)
Effluent quality:	High BOD due to cane wash, cellulose matter, cane juice and molasses waste (130,000 mg/l, NEAP 1992), pH 5,
Waste water treatment:	none
Receiving water:	River Musambya
<p>Comments:</p> <p>The factory plans to expand the production to 5,000 tonnes per year. This will create a water demand higher than the actual flow in the river which is estimated at 12,000 m³/d. Alternative sources will then be needed.</p> <p>The company experiments with alternative productions such irrigated cultivation of roses and vanilla. The factory operates under Lugazi Town Council jurisdiction.</p>	

1 GENERAL

The most distinctive and vital feature of politics in Uganda is the hierarchial system of Resistance Councils and Committees. This RC system was originally set up in the bush by the National Resistance Movement (NRM) during the civil war. The purpose then was to maintain links with the civilian population; after 1986 it has become the main mechanism through which local grievances can be expressed and officials, at all levels, can keep contact with the public.

2 THE RC STRUCTURES

2.1 Local level

All adults (those of 18 years and more) in a village or a sub-ward constitute the RC 1. The members of the Council elect the nine member RC 1 Executive Committee.

RC 1 committee members within a parish or a ward compose the RC 2, which elects the nine member RC 2 Executive Committee. The RC 3 at sub-county or town level is composed of members of the RC 2 committees. The members of the RC 3 elect the RC 3 Executive Committee. The process is continued at county or municipality level, the RC 4. (But the RC 4 is generally not active except in municipalities.) The RC 5, at district level, consists of two elected representatives from each RC 3 and one elected female representative from each RC 4. The RC 5 elects an Executive Committee from among its own members.

Each RC Executive Committee consists of a Chairman, Vice chairman, Secretary - and Secretaries for Finance, Security, Youth, Women, Information, Mobilization and Education. The total number of committee members in Uganda is over 350,000. The committees are elected every second year.

2.2 National level

The membership of the National Resistance Council is as shown in the following table.

Table 1.1 - Composition of the National Resistance Council

THE NATIONAL RESISTANCE COUNCIL	
NO. OF REPRESENTATIVES	ORIGIN OF REPRESENTATIVES
	The historical members (constituted in the bush during the resistance war)
1 from each county	Representatives elected from every county, by councillors of all RC 3 (sub-county) councils
10	The National Resistance Army (NRA)
1 from each district	Female representatives elected from every district by councillors of the RC 5 (District)
5	Youth representatives elected from the National Youth Organisation.
3	Workers' representatives, representing all the workers elected by the National Workers' Organisation
20	Presidential nominees
1 from each Division of Kampala	Representatives from each Division of the city of Kampala, elected by councillors of all wards in the division
1 from each municipality (2 from Jinja)	Representatives from each municipality

Policy is formally made by the National Executive Committee of the National Resistance Movement. The NEC comprises:

- the historical members of the NRC
- one representative from each district elected by the NRC, from among the RC 5 representatives.
- ten presidential nominees, from among the members of NRC.

3 POWERS AND RESPONSIBILITIES

The NRM has always tended to increase the authority of the RCs. They have been given powers to hear domestic and land disputes, try minor misdemeanours, maintain law and order, develop and maintain infrastructure. And they are encouraged to set up local defence units. All levels of the RC system can pass by-laws. The RC 3 and RC 5 have been given corporate legal status, so they can engage in economic as well as political activities (which means that they are entitled to sell services in competition with the private sector). They are also used as implementing agencies by donors and NGOs. In performing their judicial, service delivery and development roles, the RCs coexist with the administrative system.

3.1 RC Courts.

Resistance Committee Courts are courts established by the Resistance Committee (Judicial Powers) Statute of 1988. The RC Courts comprise the nine members of the RC Executive Committee. RC Courts exist at RC 1, RC 2 and RC 3 levels.

The jurisdiction of the RC Courts is within civil cases and customary law. They are supposed to deal with cases concerning, for example, debts, contracts, trespass, land disputes relating to customary tenure, marital disputes. The RC Courts have no powers to try criminal cases, though they may arrest an offender and hand the offender to the police. Every suit should be instituted in a court within the local limits. Where a defendant objects to the jurisdiction of the court, the case should, if the objection is upheld, be referred to a higher court.

Court proceedings are held in an open place, where members of the public can enter and listen to the proceedings. Every question arising before court should be determined by consensus; in default of a consensus, it is determined by a majority vote of the members sitting - provided that, where decisions are made by voting, the chairman does not have an original vote, but, in cases of equal votes, he has a casting vote.

In cases of infringement of by-laws, the RC Court can impose a fine or any other penalty authorised by the particular by-law. All cases brought before the RC 1 Court have rights of appeal to RC 2 and RC 3 levels. If a case is not settled satisfactory at the RC 3 level, it can, in certain circumstances, be brought to the Magistrates Court, Grade I.

3.2 Water committees

Initially, the RC system did not contain any special institutional arrangements for the management of water resources. Now, however, there are many groups and committees set up for the management of water sources and facilities.

3.2.1 RC 1 Village Water Committees

Two responsible residents in the village, a man and a woman, living near the water source (borehole, spring, well, etc.) are charged with the responsibility for the day-to-day care of the utility. These two belong to a larger "Users' Committee", but they have specific assignments, such as keeping order at the point source and collecting users' fees. The Users' Committee acts as a sub-committee of the Village Water Committee within the RC 1, and it is responsible to the RC 1 Committee. The caretakers should normally report to the RC 1 Committee. In areas where the RUWASA project is operating, the Users Committees are permitted to report directly to the RC 3 Water and Health Committees.

3.2.2 RC 3-Sub-county Water and Sanitation Committees

These are sub-committees of the RC 3, in charge of water and sanitation. Their main functions are to coordinate and supervise the work of the Users Committees - to receive progress reports from these committees and to take appropriate action. They can organize meetings for disseminating information to the community or for training committee members and water facility attendants.

3.2.3 RC 5 District Water and Sanitation Committees

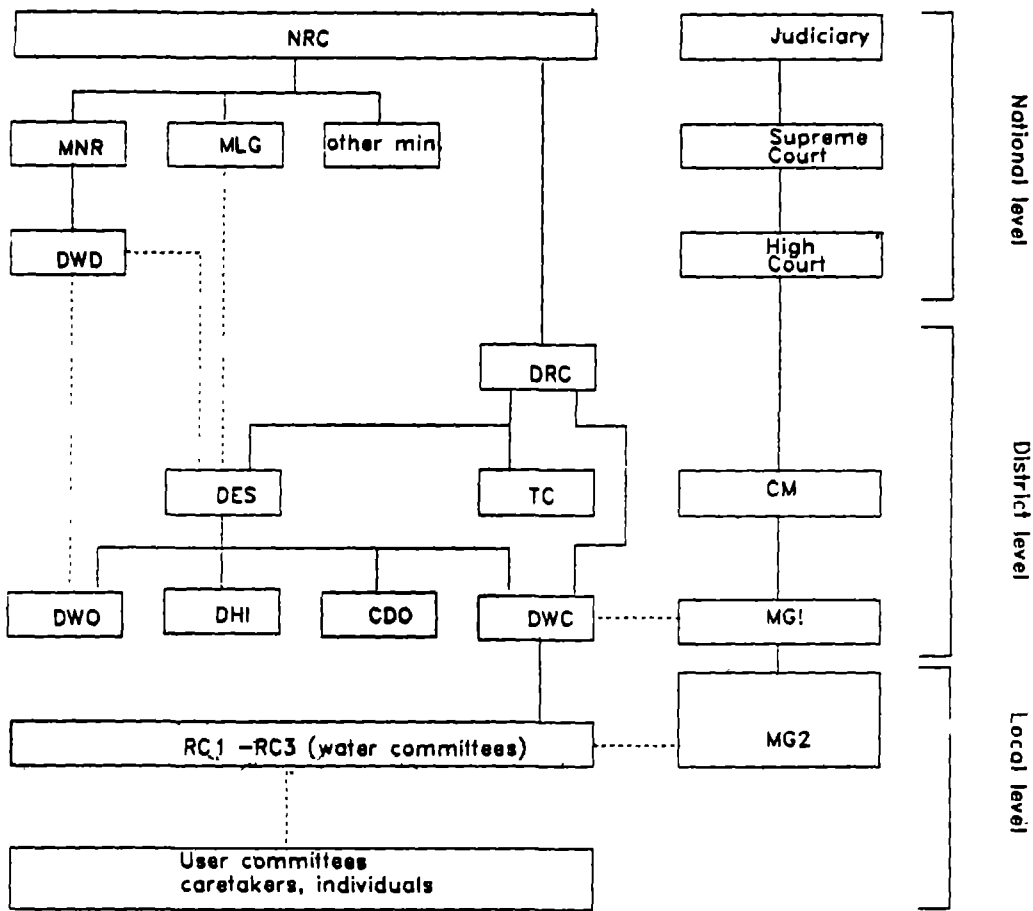
These committees are sub-committees of the District Resistance Councils charged with the overall policy formulation and guidance in matters relating to water supply and sanitation within the district. They register, monitor and coordinate NGOs who are active in the water and health sector. They report to the RC 5, which, as the district parliament, debates policies, designs strategies, passes budgets and approves programmes.

4 LINKS TO THE ADMINISTRATIVE SYSTEM

The RC system has always co-existed with the administrative system, but, sometimes, there have been uncertainties concerning the demarcation of tasks. The ongoing decentralization programme is expected to eliminate any such "boundary" issues.

The Resistance Councils have acted as legislative bodies, while the Local Government Administrations have assumed the executive role. Now, the Chairman of the RC 5 will replace the appointed DA as the political head of the district. All locally-based Ministry staff will become accountable to the DES, who is the administrative head of the district - responsible to the Council rather than to the Ministry of Local Government. The DA remains, but becomes a "Representative of the Central Government" - with a responsibility for overall security and defence.

Administrative levels

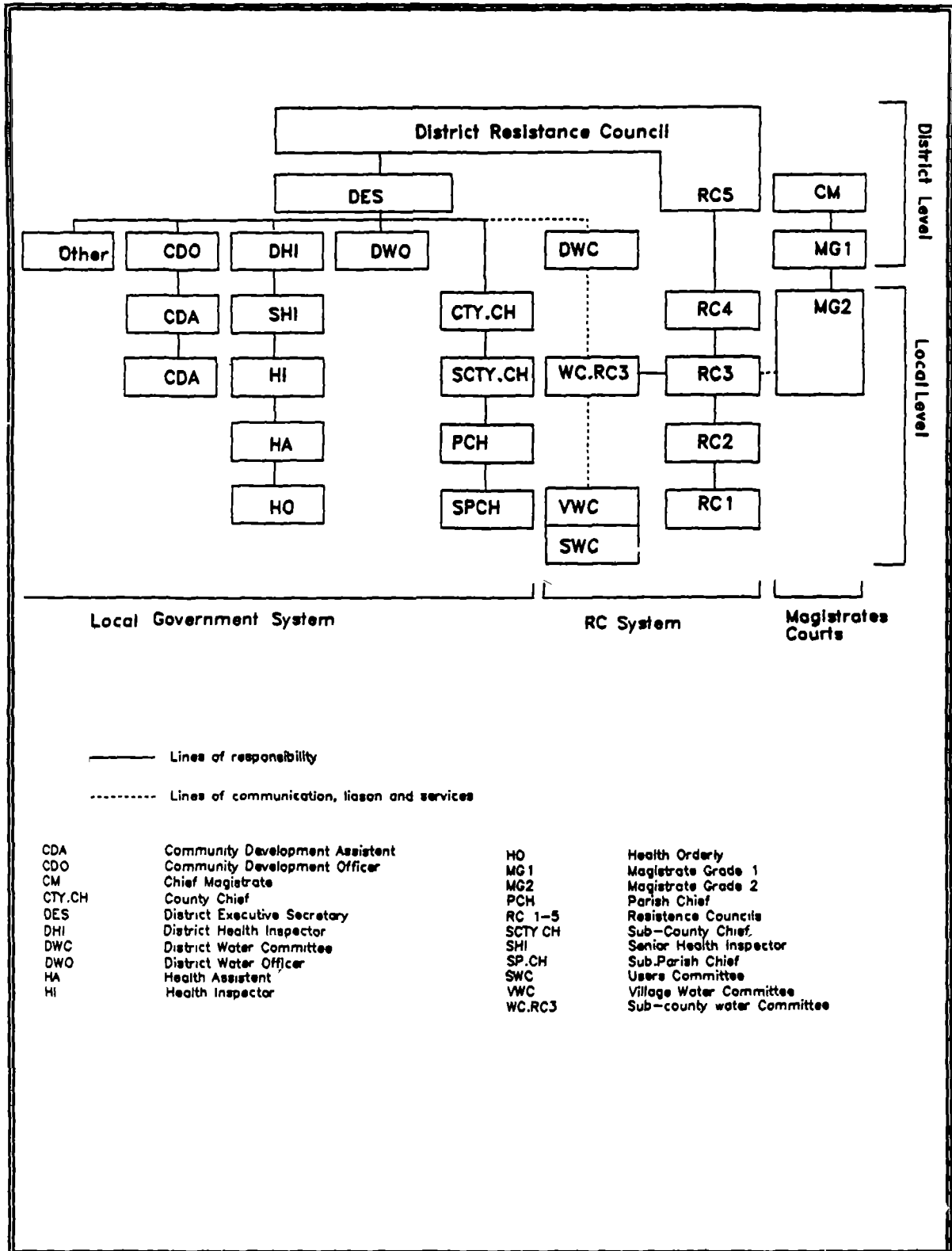


— Lines of responsibility
 - - - - - Lines of communication, liason and services

Notes: 1 Lines of responsibility from district level will conform to decentralization directives
 2 WPC policies, guidelines and standards will be communicated to the DRC through the relevant ministry - Ministry of Local Government
 3 The Ministry of Finance and Economic Planning, as one of the related ministries, has a special role in setting national financial guidelines and budgets

MG I	Magistrates Court Grade I	CDO	Community Development Officer
MG II	Magistrates Court Grade II	CM	Chief Magistrate
MLG	Ministry of Local Government	DES	District Development Secretary
MNR	Ministry of Natural Resources	DHI	District Health Inspector
NRC	National Resistance Council	DRC	District Resistance Council
RC 1-5	Resistance Council 1-5	DWC	District Water Committee
TC	Town Clerk	DWD	Directorate for Water Development
		DWO	District Water Officer

District level and local level institutions



ANNEX 6

SPECIAL STUDY - HOIMA

INSTITUTIONAL CAPACITY ANALYSIS - HOIMA DISTRICT**LIST OF CONTENTS****Abbreviations**

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APPENDIX 2.1 Hoima District (administrative boundaries)

LIST OF ABBREVIATIONS

AVSI	International Service Volunteer's Association
DWD	Directorate of Water Development
DWO	District Water Officer
IFAD	International Fund for Agricultural Development
KFW	Kreditanstalt Für Wiederaufbau
NGO	Non-Governmental Organization
UNICEF	United Nations Childrens Fund
WATSAN	National Water and Sanitation Programme (a UNICEF programme)

1 INTRODUCTION

1.1 Background

A first phase of "Water Action Plan for Water Resources Development and Management" (WATER ACTION PLAN PHASE I) was prepared February to May 1993. The major components were:

- draft water resources policy
- draft rapid water resources assessment
- draft institutional & management study
- international study

In the period from June to November 1993 follow-up work was carried out during the "Consolidation Phase I" which also comprised preparatory activities for Phase II. These activities were preliminary data collection and information gathering in five districts selected as pilot areas for studies to be undertaken under Phase II. The Consolidation Phase I activities were undertaken by the project counterpart staff.

The Project Document entitled "Water Action Plan for Water Resources Development and Management" (WATER ACTION PLAN PHASE II) describes the second phase of the project to develop a Water Action Plan for Uganda. The work on the Phase II started in November 1993. The second phase will produce among other items:

- an outline proposal for appropriate local water resources management levels based on district studies
- an outline proposal for management procedures providing the administrative machinery at national and district level with guidelines for sustainable water resources management

District studies which would support such proposals are carried out in each of five selected pilot districts comprising Arua, Mbarara, Mukono, Mbale and Moroto. These studies comprise reconnaissance level evaluations of sociologic and economic conditions which combines to give the background for assessments of water uses and demands. The water uses and demands are compared to available water resources in terms of quantity and quality.

An unequal distribution of demands and resources leads to the identification of a number of water resources issues and cases which require management strategies and capabilities at different levels (national level, district level, community level). Based on the existing institutional and judicial framework, management potentials and constraints are evaluated.

1.2 Special districts studies

Three special district studies have been carried out in Tororo District, Kabale District and Hoima District, as a supplement to the studies in the five pilot districts.

Tororo District was visited in order to study wetland rice irrigation and drainage, Kabale District was visited in order to study the interaction between land and water management (soil erosion in particular) and Hoima District was visited in order to make an assessment of institutional capacities.

1.3 Hoima district visit

This study concerns district capacity in water resources management. It took place in Hoima District on 21-22 March 1993.

A number of relevant departments were visited. These departments were Health, Community Development, Agricultural Extension, and Veterinary Services as well as the Directorate of Water Development office. Other relevant departments, from which it was not possible to collect information, are Forestry and Fisheries.

Chapter 2 summarizes in a tabular form the main characteristics of Hoima District - in terms of location, population, economic activities and facilities for water supply and sanitation.

Chapter 3 focuses on financial resources, manpower, equipment and transport that could be used in water resources management, as well as the extension resources in various departments that have a relation to water resources.

2 DISTRICT SUMMARY

Table 2.1 - Location and Area of Hoima District

LOCATION AND AREA	
Location	Hoima District borders Kibale District in the south, Kiboga District in the east, Masindi District in the north and Lake Albert in the west. (Ref. Appendix 2.1)
Area	Total area: 5,492 km ² Land area: 3,146 km ²

Table 2.2 - Key population characteristics of Hoima District

POPULATION	
Total	1991: 197,851 persons
Population growth	1969- 1980: 2.2% per year 1980- 1991: 3.0% per year Uganda 1980- 1991: 2.5% per year
Population density	1980: 45 pers./km ² 1991: 63 pers./km ² Uganda 1991: 85 pers./km ²
Ratios	Urban pop: 4,616 pers. 2.3% Rural pop: 193,235 pers. 97.7% Uganda urban pop: 11.3% Uganda rural pop: 88.7% Male: 99,547 Female: 98,304 Sex ratio M/F: 101.3% Uganda sex ratio: 96.5%

Table 2.3 - Economic activities in Hoima District

ECONOMIC ACTIVITIES	
Sources of income	The vast majority of the population are mainly depending on agriculture. Fishery on Lake Albert is another major source of income.

Table 2.4 - Water supply and sanitation in Hoima District

WATER AND SANITATION		
WATER		
Type of water supply	No. of people	%
Piped water inside	809	0.4
Piped water outside	1,884	0.9
Borehole	12,644	6.4
Protected well/spring	38,022	19.3
Open well/spring	113,334	57.6
Stream/river	14,984	7.6
Lake/pond/dam	14,042	7.1
Other	232	0.1
Not stated	270	0.6
Total	197,080	100.0
SANITATION		
Type of sanitation	No. of people	%
Water borne not shared	672	0.3
Water borne shared	318	0.2
Pit latrine not shared	116,413	59.1
Pit latrine shared	32,239	16.4
None	11,460	23.3
Other	95	0.0
Not stated	1,393	0.7
Total	197,080	100.0

3 DISTRICT ADMINISTRATION

The district will be decentralized starting in the 1994/95 financial year. At present the district administration and finances are somewhat mixed together with those of the central government departments present in the district. Some staff are paid by the central ministries and others by the district within one department, although the staff of a department like DWD is solely paid by the central department.

Decentralization will mean that staff in all departments will be responsible to the District Resistance Council through the District Executive Secretary, and that finances from the central government will be transferred to the district as a block grant so that the district decides its own expenditure priorities.

In 1992/93 the district revised budget was US\$ 315,000,000. This included the following allocations:

District Council*	35,000,000
Health	22,000,000
Public Works	30,000,000
Education	5,000,000
Community Development	2,300,000
Water	500,000

* The figure includes 21,000,000 for Council members as various allowances.

The above figures give a rough idea of the priorities expressed in the budget. They do not reflect expenditure, which apparently was much less. Various departments complained they had not received the allocated amounts. Accounts were not available during the visit.

In general, about 60% of the budget was allocated to staff costs in one form or another, and much of the rest was for recurrent expenditure such as office expenses and fuel for vehicles. Very little was allocated for development purposes. The district expected that the bulk of development funds would come from central government and donor projects. In fact in the water related sectors, it appears that only donor projects were providing finance and materials for development.

A general impression is that the district administration and its departments lack systematic data on existing resources of all kinds and on financial flows. Information is only available on activities that are taking place in the current year.

Departments are not used to budget control or accounts, and the district budgets are characterized by lack of realism - they are increased dramatically each year without regard to a realistic assessment of income. Such a budgeting practice is probably caused by the impression that over-budgeting is required so that when the Ministry of Finance cuts the budget request the district will still end up with a reasonable amount. This expectation is

seldom realised. The budgeting practice will have to change completely when the district receives a pre-determined block grant.

3.1 Directorate of Water Development

3.1.1 Staff

The district water department staffing position is as follows:

Established posts:

District Water Officer (Dip.Eng)	1
Field Officer, Springs/wells (Dip.Eng)	1
Storekeeper	1
Temporary post (since 1990):	
Clerical Officer (actually a geo. tech.)	1
Group Employees - waterworks and urban;	
Water Pump Attendants	2
Artisans	6
Office Attendant	1
Porters.(cleaners, slashers)	4
Group Employees - rural	
Drilling Rig Operator	1
Mechanics (borehole repair)	2
Artisans	1
Askari	1
Group Employees - rural and urban	
Drivers	2
Copy Typist	1

Total	25

There were a total of 35 employees until the retrenchment exercise of 1993. There is an organisation chart showing 69 positions, which is what the DWO thinks is necessary.

Group employees are non-technical, without the security of established posts. This category is being phased out of government, so all posts will be established posts.

3,1.2 Transport/Equipment

1 Toyota Landcruiser (about 1987)	-	operational
1 Bedford lorry (about 1986)	-	operational
1 IFA lorry	-	non-operational
1 motorcycle	-	" "
1 motorcycle	-	operational

Borehole maintenance equipment exists in an operational state but is borrowed from Masindi.

3.1.3 Budget

There is no budget or accounts. The DWO uses the funds which come infrequently from DWD for specified purposes. It appears that funds come only for fuel for the vehicles, the waterworks generator and for some allowances.

3.1.4 Activities

Apart from running the waterworks, the Water Department participates in three donor funded programmes, all of which are involved in aspects of rural water and sanitation: Hoima District Integrated Community Development Programme (IFAD funded), the UNICEF WATSAN programme, and AVSI (an Italian NGO programme).

All three programmes receive counterpart funds from central government, including some for water activities, funded directly from the ministry and not through DWD. As a percentage of total programme funds, they are very small. The programmes then utilize the district staff and equipment in implementation. The Hoima district administration is also supposed to contribute. US\$ 500,000 was budgeted in 1992/93, but apparently not allocated.

The Water Department staff receive some allowances from IFAD on an irregular basis. Activities, such as spring protection and borehole rehabilitation, for the donor funded projects are usually facilitated by materials in kind, eg. fuel, pumps, spare parts, tools. The water office is selling spare parts supplied by UNICEF for U2 and U3 pumps to source committees.

The Ministry of Natural Resources is channelling funds for water development through projects at the present time, and not through local DWD offices. This makes the local offices dependent on the existence of external projects if they are to be able to function.

3.1.5 Committees

The WATSAN programme established water source committees. Committees had a two day training, caretakers one day and pump mechanics two weeks. The pump mechanics were selected by the committees, and no qualification, such as being a bicycle mechanic, was required. The committees were encouraged to ensure participation of women. No figures are available on women members.

There are water committees at the sub-county level, but their purpose is unclear. A District Management Committee chaired by an Assistant District Executive Secretary coordinates the rural water supply activities in the district.

3.1.6 Waterworks

Built in 1952, it will be rehabilitated under the Seven Towns Project financed by KFW. Emergency rehabilitation has taken place so that it functions when there is power available. At present there are electric power cuts 3 days a week and every night. The last time fuel was available for the stand-by generator was in May 1993.

The waterworks will need to be heavily subsidized by the district or town administration until it and the distribution system is fully rehabilitated and expanded. An efficient billing and collection needs to be created and the customers have to get used to paying their bills. Even then the viability of the system may be questionable.

3.2 Community Development Department

The department has 4 professional staff at headquarters, two Senior Community Development Assistants in charge of counties, and 12 Community Development Assistants in charge of sub-counties. In addition there are 13 Community Development Supervisors in the sub-counties.

There is one operational vehicle and a number of operational motorcycles at the county and sub-county levels. Funds for fuel and repair are scarce, so the staff are in fact not very mobile.

The staff assist the donor funded rural water and sanitation programmes in community mobilization and formation of committees.

3.3 Health Department

The Health Inspectorate has 5 staff at the county level, including 3 Assistant Health Educators. At the sub-county level there are six Health Inspectors and 11 Health Orderlies (who have no formal, only on-the-job training). Duties of these staff include the spreading of messages about water and sanitation, latrine promotion, inspection and control of springs. In addition staff of 21 sub-dispensaries and 3 dispensaries spread health messages during weekly mobile clinics. Transport is by bicycle.

Most of the sub-dispensary staff are employed by the district. This year they have had a delay in payment of salaries of 8 months.

The water, community development, and health activities regarding water supply activities are coordinated by the District Management Committee.

3.4 Agriculture Department

Out of a total of 32 trained agricultural staff 17 are posted at the county and sub-county levels. The rest are in headquarters, a Farm Institute or an agricultural workshop. Extension messages follow a set pattern of subjects, one of which is control of soil erosion. Transport, and funds for operation and maintenance, is inadequate as in most other departments.

3.5 Veterinary Department

Out of a total trained staff of ten, four are posted at the county and sub/county levels. The department promotes animal health and marketing, and is not involved with environmental messages.

4 CONCLUSIONS

In spite of retrenchment it is probable that the district in general is very over-staffed in relation to the resources available for development activities. A rationalized and unified extension service across departmental boundaries could result in spreading common environmental messages including management of water resources. However, it is unlikely that after decentralization the district will move quickly to rationalize its administration, and probably will not do so unless it receives external assistance for the process.

Government salaries are so low (for example, about US\$ 17,000 per month of a District Water Officer) that there is little motivation to do anything unless extra allowances or other benefits are provided.

Water supply projects will continue to be funded from the national level, and very few funds will be available for other activities.

The urban water supply system in Hoima town will continue to be a financial burden on local resources for a number of years.

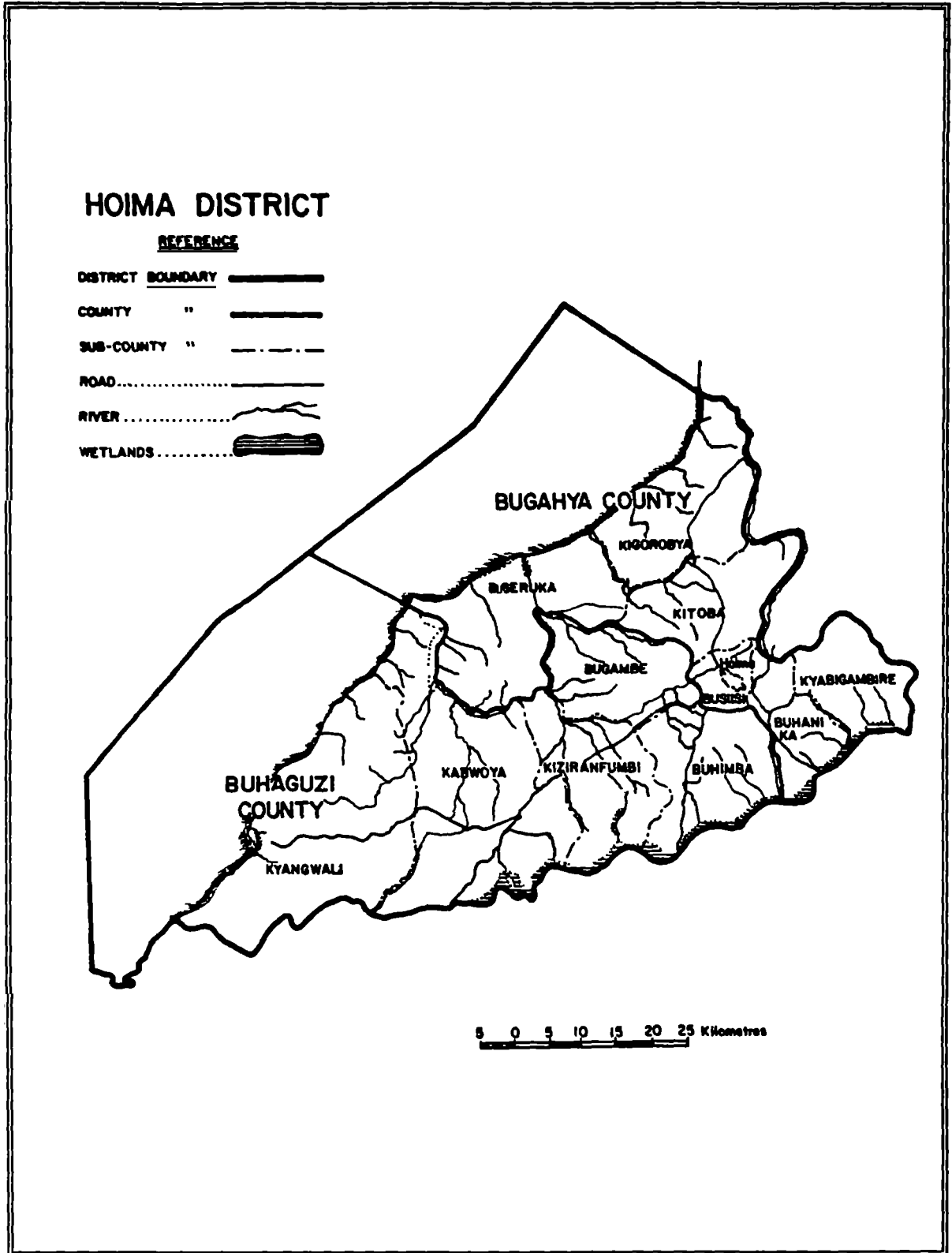
Water resource management functions will not be seen as a priority in the district as there are no issues that are perceived to be pressing. If water resource management functions are to be carried out in the short-term it is probable that they will have to be donor project funded, or they will not be done at all. Sustainability then becomes a problem that will have to be dealt with.

APPENDIX

ANNEX 6

HOIMA DISTRICT

Hoima District



ANNEX 7
SPECIAL STUDY - KABALE

KABALE SPECIAL DISTRICT REPORT**LIST OF CONTENTS**

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APPENDIX 2.1 Kabale District (administrative boundaries)

LIST OF ABBREVIATIONS

AEP	Agricultural Extension Programme
AO	Agricultural Officer
DAO	District Agricultural Officer
DES	District Executive Secretary
DHI	District Health Inspector
DFO	District Forest Officer
DMO	District Medical Officer
DRC	District Resistance Council
DWO	District Water Officer
ICRAF	International Centre for Research in Agroforestry
IDA	International Development Agency
NGO	Non-Governmental Organisation
SWIP	South-West Integrated Health and Water Programme
UES	Unified Extension Service
USCAPP	Uganda Soil Conservation and Agroforestry Pilot Project

1 INTRODUCTION

1.1 Background

A first phase of the "Water Action Plan for Water Resources Development and Management" (WATER ACTION PLAN PHASE I) was prepared from February to May 1993. The major components were:

- draft water resources policy
- draft rapid water resources assessment
- draft institutional & management study
- international study

In the period from June to November 1993 follow-up work was carried out during the "Consolidation Phase I" which also comprised preparatory activities for Phase II. These activities were preliminary data collection and information gathering in five districts selected as pilot areas for part of the studies to be undertaken under Phase II. Consolidation Phase I activities were undertaken by the project counterpart staff.

The Project Document entitled "Water Action Plan for Water Resources Development and Management" (WATER ACTION PLAN PHASE II) describes the second phase of the project to develop a Water Action Plan for Uganda. The work on Phase II started in November 1993. The second phase will produce:

- an outline proposal for appropriate local water resources management levels based on district studies
- an outline proposal for management procedures specifying the administrative framework at national and district levels, with guidelines for sustainable water resources management

District studies to support such proposals were carried out in each of the five selected pilot districts; Arua, Mbarara, Mukono, Mbale and Moroto. The district studies do not describe the characteristics of a district in detail by giving a comprehensive geographical profile. The focus is on management of water resources and issues related to water resources. Further, it will be apparent that it was not the objective of the studies to propose solutions to problems but rather to identify the present and possible future problems in order to recommend a framework within which such problems can be approached.

The five pilot district studies were supplemented by visits to other districts with particular dominant features (wetland cultivation, aquaculture, soil erosion etc). The present report is the documentation of such a visit.

1.2 District visit with a focus on soil erosion impact on water resources

Kabale District was visited by a study team from 9 to 11 March, 1994. The main purpose was to study the impact of soil erosion on the water resources and assess the management mechanisms related to this issue. Thus, only limited information on other features of the district was collected.

One day was used for interviews and discussions as well as for the collection of statistics from the District Administration Headquarters in Kabale Town: while the remaining two days were used for field visits.

Field visits were made to various water intakes: the hydro power station at Maziba, the ICRAF Research site at Kachwekano District Farm Institute, Muko Forest Reserve, Lake Bunyonyi and a number of farmers.

During the field visits, the team was accompanied by officers from the district administration acting as resource persons as well as guides.

The summaries and results from this brief special district study are presented in the following chapters.

Chapter 2 summarizes in a tabular form the main characteristics of Kabale District of relevance for land management, soil erosion and water resources.

Chapter 3 describes the available water resources, water use and the land use practice in the district briefly. This is followed by an assessment of the severity of erosion in terms of its impact on water resources and how that influences the water demands and uses.

Chapter 4 describes briefly the present institutions involved in land and water management, and identifies possible institutional and legal management tools that are applicable. This leads up to Chapter 5 which, in a tabular form, identifies issues and corresponding management functions and levels related to the impact of soil erosion on the water resources in the district.

2 DISTRICT SUMMARY

The main features of Kabale District have been summarized below. Only information which has relevance to soil erosion and its impact on the water resources and which provides general background necessary for the understanding of the characteristics of Kabale District have been included.

Table 2.1 - Physical features of Kabale District

PHYSICAL FEATURES.																			
Location	Kabale is situated in the south-eastern area of Uganda. It borders Kisoro in the west, Rukungiri in the north, Ntungamo in the north-east and the Republic of Rwanda to the south. (Ref. Appendix 2.1)																		
Area	1827 km ²																		
Relief	The whole district is characterized by steep slopes, especially the the south western part which is of volcanic origin. The altitudes vary from 1219 to 2347 m above sea level.																		
Soil	Humid ferralitic soils originating from pre-Cambrium rocks, moderate to very acid. When the organic matter decreases due to erosion these soils becomes very susceptible to erosion. In the western part of the district the soils originate from pleistocene volcanic material and are less acid and less susceptible to erosion. The texture is loamy.																		
Landcover	<table> <tr> <td>Total area:</td> <td>1827 km²</td> </tr> <tr> <td>Land area :</td> <td>1695 km²</td> </tr> <tr> <td>Forest cover (estimate):</td> <td>300 km²</td> </tr> <tr> <td>Swamps (estimate):</td> <td>60 km²</td> </tr> <tr> <td colspan="2">Estimated area of agricultural land:</td> </tr> <tr> <td>Arable land:</td> <td>1200 km²</td> </tr> <tr> <td>Area under cultivation (estimate):</td> <td>960 km²</td> </tr> <tr> <td>Area under annual crops (estimate):</td> <td>600 km²</td> </tr> <tr> <td>Area under perennial crops (estimate):</td> <td>360 km²</td> </tr> </table>	Total area:	1827 km ²	Land area :	1695 km ²	Forest cover (estimate):	300 km ²	Swamps (estimate):	60 km ²	Estimated area of agricultural land:		Arable land:	1200 km ²	Area under cultivation (estimate):	960 km ²	Area under annual crops (estimate):	600 km ²	Area under perennial crops (estimate):	360 km ²
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Area under cultivation (estimate):	960 km ²																		
Area under annual crops (estimate):	600 km ²																		
Area under perennial crops (estimate):	360 km ²																		
Climate	<p>The district is located in the dry to moist subhumid zone.</p> <p>Rainfall: The average annual rainfall vary from 830 mm to 1180 mm with the highest amount in the south western part. There are only small seasonal variations: June-August and December-February are the drier seasons.</p> <table> <tr> <td>Mean annual rainfall (Kabale Town):</td> <td>994 mm</td> </tr> <tr> <td>Mean annual potential evaporation:</td> <td>1400 mm</td> </tr> <tr> <td>Mean annual temperature:</td> <td>14 °C</td> </tr> <tr> <td>Mean annual max. temperature:</td> <td>23 °C</td> </tr> <tr> <td>Mean annual min. temperature:</td> <td>10 °C</td> </tr> </table>	Mean annual rainfall (Kabale Town):	994 mm	Mean annual potential evaporation:	1400 mm	Mean annual temperature:	14 °C	Mean annual max. temperature:	23 °C	Mean annual min. temperature:	10 °C								
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Mean annual max. temperature:	23 °C																		
Mean annual min. temperature:	10 °C																		

Table 2.2 - Key population characteristics of Kabale District

POPULATION			
Total population	1991: 417,200 persons		
Population growth	1969-1980:	1.3% per year	
	1980-1991:	2.2% per year	
	Uganda 1980-1991:	2.5% per year	
Population density	1980:	194 pers/km ²	
	1991:	246 pers/km ²	
	Uganda 1991:	85 pers/km ²	
Ratios	Urban pop:	29,246 pers.	7.0%
	Rural pop:	387,972 pers.	93.0%
	Uganda urban pop:		11.3%
	Uganda rural pop:		88.7%
	Male: 197,695 pers.	Female: 219,523 pers.	
	Sex ratio (M/F):		90.1%
	Uganda sex ratio (M/F):		96.5%

Table 2.3 - Main economic activities in Kabala District

ECONOMIC ACTIVITIES	
Main source of income	Agriculture is the main source of income, - there is only little industry in the district.
Livestock	<p>The numbers given below are from the Livestock Census 1991. The numbers are subject to considerable uncertainty. Apart from the ranges established in the drained swamp areas, each household only have few livestock.</p> <p>Cattle: 51,000 Goats: 78,800 Sheep: 35,000 Pigs: 8,900</p>

3 SOIL EROSION IMPACT ON WATER RESOURCES

3.1 Water availability and water use

3.1.1 Water resources

The border between the south-eastern part of the Kabale District and Rwanda follows a watershed. Thus almost all of the district drains towards north-west to Lake Edward via the main rivers, Kiruruma and Ruhuma. The latter drains Lake Bunyonyi, which is the second deepest lake in Africa and the only major lake within the district.

Large parts of the valley bottoms were formerly swamps, occupying approximately 15 % of the District. However, about 80 % of them are now drained. A large percentage of the former swamp area is used for grazing of exotic cattle. Also, cultivation has taken place, but in some areas, e.g. the upper part of Kiruruma swamps, oxidation of ferrous sulphide following the drainage has created very acidic soils, resulting in complete crop failure.

Due to the favourable climatic conditions with a relatively high amounts of rainfall and a relatively low potential evaporation - combined with the steep topography - springs are abundant almost all over the district.

3.1.2 Domestic water use

Most of the rural population (approx. 80 %) get their water from protected or non-protected springs or gravity schemes originating from springs. Boreholes cover most of the remaining parts and only few people get their water supply directly from rivers or streams.

Most of the water for the water supply for Kabale town is pumped from Lake Bunyonyi (approx. 60 %), whereas the remainder comes from the gravity scheme at Kiyooru, supplemented with 27 protected springs and a few boreholes. The supply is often interrupted as the pumping of water from Lake Bunyonyi is dependent on a power supply.

The South-West Integrated Health and Water Programme (SWIP) has been operating in the district since 1987, and now approximately 40 % of the population get water from protected sources (25 % from protected springs, 10 % from gravity schemes and 5 % from boreholes). Most of the springs have good yields with an average value of 1.5 l/s. Phase II of the SWIP project ends in 1995, but with an extension of another 5 years, it is expected that 80 % of the population can collect water from protected sources by the year 2000. The future activities will concentrate on gravity schemes.

3.1.3 Livestock consumption

The estimated livestock in the district are 51,000 cattle, 8,900 pigs and 113,000 goats/sheep. However, these numbers are subject to much uncertainty.

The livestock water supply in Kabale District depends on surface water resources, primarily streams, swamps and drainage water from reclaimed swamps. The water requirements for livestock depend on the breed. The local breed of cattle need about 35 litres per day; whereas the exotic species prevailing on the grassland in the drained swamps need up to 80 litres daily. Presently, there is adequate water for livestock.

3.1.4 Water for agriculture

Due to the moist climatic conditions, with relatively low potential evapotranspiration, and topographical conditions in most of the district that do not favour establishment of irrigation schemes, and due to the fact that most of the drained swamps are used for pasture, rainfed agriculture accounts for almost 100% of the cultivated area. As about 90% of the population in the district are small scale farmers, the availability of water for agriculture is crucial for the living conditions in the district. Two crops are normally grown a year - during the two rainy seasons - and the rainfall conditions are relatively favourable for rainfed agriculture. But the accelerated erosion which takes place in the most of the district is a serious threat, as it has resulted in increased surface runoff - leaving a decreased amount available for crop production.

3.1.5 Hydropower

A mini-hydropower station at Maziba, supplied with water from the Kiruruma River, has a capacity of 1.0 MW, adequate to supply the whole Kabale town with electricity. The study team was told that the station was closed down temporarily due to siltation of the reservoir, but during a visit to the site, it appeared that it was closed due to rehabilitation of the turbines and the electrical installations.

3.2 Landuse practice

3.2.1 Forestry

It is believed that almost the entire district was covered by bamboo or mahogany and other hard-woods until 500 years ago, but due to the originally fertile soils and adequate rainfall most of the area is now intensively cultivated and only about 15% of the area remains as forest. The Impenetrable Forest makes up about 50 percent of the forest area; whereas the remaining part is the Government Forest Reserves at Echuya, Muko, Kiriima and Mafuga. These are all plantations, dominated by Cypress, Pines and Eucalyptus. Within the last 3-4 years these forest reserves have been severely attacked by

insects, especially the Cypress species, and it is estimated that more than 25 % of the trees have died. Thus, a lot of felling has been necessary and this is taking place at a higher speed than the staff are able to replant the damaged areas. Outside these Forest Reserves, there are only few trees. But, due to the shortage of fuelwood, some tree planting, mainly the fast growing species, Black Wattle, has been undertaken by the local communities in the district. Also, a number of private Eucalyptus woodlots exist.

3.2.2 Agriculture

The land use in Kabale is categorized as a montane land use system, but it differs from systems in other mountainous areas, e.g. the area around Mt. Elgon, as annual crops are dominant. It is estimated that only 20 % of the area is covered by perennial crops. Due to the high altitudes, bananas can only be grown in the lower parts - mainly in the eastern part of the district - where the temperature is sufficiently high. Coffee has failed due to very heavy antestia infestation and 'hot and cold' disease. Due to the decreasing soil fertility and lower rainfall compared to the equatorial zone and the other mountainous zones, sorghum is the main crop followed by beans, maize, and sweet potatoes. In the western part of the district, where the soils are from volcanic material, Irish potatoes are the main crop. The most common cash crops are ca bages, peas, Irish potatoes, and to some extent, wheat and pyrethrum.

The very high population density (up to 880 persons per km² in some areas) has a definite effect on the land use practices. Cultivation is continuous, mainly with two crops a year. The most common rotation system is sorghum, often intercropped with beans, followed by either maize or sweet potatoes. Only in the western part of the district, where the population density is not yet that high, fallow cultivation is practised by some tenants. Almost every small plot of land, right from the hill top to the valley bottom, is cultivated despite the steepness of the slopes, often ranging between 30 % and 40 %. The high population density has led to excessive land fragmentation with an average of 0.25 ha per head, often consisting of 10-20 plots scattered around, too tiny to be economically viable - and complicating implementation of proper conservation measures. The land tenure system in the district is freehold, where the head of the household decides on the use and transferability of the land. The new generations gain access to land through inheritance.

3.2.3 Soil and water conservation practices

Due to the potential for accelerated erosion, terracing became an enforced practice under by-laws established in 1945, and during the subsequent 5-10 years most of the area was terraced. However, most of the conservation practices were neglected when the by-laws were no longer enforced. Most of the structures exist today but they are often inefficient and unstable, as they mostly are left without vegetation. Furthermore, many of them are being removed in order to increase the arable area and to make use of the relatively fertile soil from the bunds which has been left fallow for a long period. Cattle

encroaching the plots when searching for grass and crop residues have also contributed to this destruction.

3.3 The extent of soil erosion and its impact on water resources

The extent and severity of soil erosion is usually assessed in relation to decline in soil fertility resulting in decreased crop yields. However, in the context of the Water Action Plan soil erosion will primarily be evaluated in terms of impact on water resources. However, the decline in soil fertility will not be totally neglected, as it may cause accelerated erosion and thereby increase the negative impact on the water resources.

3.3.1 Extent, type and causes of soil erosion

Soil erosion is prevailing in almost the whole district and is mainly due to cultivation of very steep slopes, generally without appropriate conservation measures. Exceptions are the more gentle sloping areas in the north eastern part bordering Ntungamo, where bananas are grown and Ikumba sub-county in the North-western part, of which the major part is covered by the Impenetrable Forest Reserve; while the remaining part of the sub-county is still having a good soil structure and fertility as over-utilization has not yet taken place.

Almost the whole district is very hilly and consists mainly of flat-topped ridges which quickly steepen to 10-30 % on the middle parts and then often decline to 5-10% on the lower parts. In the steepest parts of the district the average slopes varies between 30-40 %. With such a topography the area is prone to erosion and 50 % of the area is estimated to be too steep to be cultivated without risk of serious accelerated erosion. Thus, as most of the area is cultivated it is not surprising that Kabale is ranked first among districts most severely affected by soil erosion in the 1993 Annual Report from the Soil Conservation Section within the Ministry of Agriculture, Animal Industry and Fisheries. According to this report, more than 80 % of the district was experiencing erosion.

This is very much in accordance with the observations made during the visit to the district. Sheet erosion was observed almost all over the areas visited and rill erosion could be seen in most areas. It was especially apparent in the steepest areas, e.g. the areas around Lake Bunyonyi and in Rwamucucu, Bubaale, Kitumba, Muko and Maziba sub-counties. In the V-shaped valleys that run down between spurs of side ridges, huge amounts of water collect during heavy rainstorms, have created a lot of gullies that often continue all the way down to the water sources. Due to the prevailing unstable convex slopes, landslides were seen at several locations where these slopes were heavily cultivated.

Lack of maintenance of the old soil conservation structures has made them inefficient in protecting the fields against soil erosion on the steep slopes, and continuous cultivation

with two crops a year leaves the fields bare and exposed at the onset of the rains. Cultivation to the very top of the slopes for a long time has resulted in accelerated erosion which has exposed the parent material or left only a very shallow soil column at the upper parts of the slopes. Thus, during heavy rains, very little infiltration takes place and excess surface runoff creates floods and severe erosion in the lower part of the slopes and the valley bottoms. Burning of plant residues, which is a common practice, has further aggravated the situation.

3.3.2 The impact of soil erosion on the water resources and their utilization

The most pronounced impact of soil erosion on the water resources in terms of quality is siltation and increased turbidity of water bodies. This was especially obvious at the rivers/streams in Rwamucucu sub-county where not only silt and sand but also gravel and even larger stones, branches and small banana trees were deposited. In Lake Bunyonyi large amounts of sediment are deposited as well, but due to the great depth of the lake this siltation is only evident in areas of shallow water depths.

During heavy rains the gravity scheme at Kiyooro, which uses surface water, has to be closed as the water carries too much sediment - resulting in very high turbidity. Thus a technician is stationed there permanently to close the supply during heavy rain in order to avoid siltation of pipeline and reservoir tanks, and ensure that the highly turbid water does not reach the consumers. This situation is precarious as the water supply from Kiyooro is supposed to replace the supply from Lake Bunyonyi, during periods without power. For instance, during the visit to the district, most of Kabale town was without a water supply, as there was no electricity and it had just rained heavily.

Siltation was also apparent at the dam upstream of the mini-hydropower station at Maziba, but not to such an extent that desilting of the dam had been necessary. However, the turbines are normally stopped every third month for removal of silt, and suspended sediment results in increased wear of the turbine wheels. Consequently, the station has decided to start buying land from farmers who cultivate right down to the river banks.

Despite the severe erosion in the district, most of the rural water supply is not seriously affected by turbidity as about 40 % originates from protected springs. However, several protected springs are said to have been closed or moved due to siltation, but two closed springs visited were established in technically unsuitable low lying areas next to river banks. In 1993 the District Health Inspector undertook more than 700 tests of water from protected springs, and the water was considered safe for 86 % of the tests. Faecal contamination from both humans and animals was reported to be a problem at some of the unprotected springs, and surface runoff played a major role in this contamination. Despite the large number of water quality analyses for protected springs and boreholes, not one single analysis was undertaken from streams and non-protected springs, which makes it difficult to assess the impact of soil erosion on these water sources quantitatively.

Regarding contamination caused by artificial fertilizers and agrochemicals, this is not considered to be a problem in the area, as almost none of the small-scale farmers use either of these inputs, mainly because they cannot afford to buy them. However, one should be aware of the use of acaricide in the cattle dips. Although the used water containing the acaricide normally is transferred to a pit hole contamination of adjacent water sources may take place via seepage as these cattle dips are often located next to a stream in order to have easy access to water.

The accelerated erosion taking place in the district is having a negative effect on the water quantity from the springs as the increased surface runoff allows less water to infiltrate. Reduced thickness of the soil layer and decreased infiltration capacity caused by poor soil structures will further aggravate the situation. As an abundant number of springs is not yet utilized, there will still be sufficient water for domestic use, but at extra cost when, for example gravity schemes are no longer able to cover the demand for which they were designed and water therefore has to be obtained from additional sources.

4 PROPOSED TOOLS FOR INTEGRATED WATER MANAGEMENT

4.1 Introduction

The water available in various water bodies (streams/rivers, groundwater reservoirs, lakes/reservoirs, wetlands etc.) originates from rainfall via the soil surface, on which a particular land use is practised. This land use practice will control:

- to which of the water bodies the rainfall will be directed
- when and at what velocity the rainfall is directed to the water body
- the condition (quality) of the water entering the water body

Hence, it is obvious that water management necessarily also includes land management to the extent that land management measures affect the quantity and quality of the water resources. In the following, "integrated water management" refers to water management where land management is included to the extent that it is important for the water resources.

In Kabale District, land management should play a major role in water management as the land, due to the very steep slopes prevailing, is very fragile with respect to human activities. Cultivation of the steep slopes causes soil erosion and influences the hydrological cycle. Thus, integrated water development and management is essential, among other things, to ameliorate the detrimental effects of soil erosion on the water resources. This chapter looks into possible management tools in terms of institutional, legal and technical interventions.

First there is a short description of the institutions involved in land and water management in Kabale District - on a district as well as local levels. The present cross-sectoral collaboration is discussed and a proposal for improved integrated water management in the district is given. Finally, a few technical and legal measures to reduce the detrimental effects of soil erosion on the water resources are proposed.

4.2 Institutions involved in land and water management

Kabale District is among one of the 10 districts where the decentralization policy of the government has been implemented. As an element of the decentralization many government employees (especially graduates) have been transferred from national HQ and posted to district level. This have strengthened the capabilities of the Government Departments at district level. Due to these transfers of staff, most Heads of Departments were new in position when the district was visited. Budgets for the various departments now have to be approved at district level and all the departments now have to refer to the

district through the District Executive Secretary (DES), which probably will have an important influence on the collaboration between the different departments as discussed in Section 4.2.3.

4.2.1 Water management aspects

The functions of water resources management in the district falls under the District Water Officer (DWO). The formal duties of the DWO include identification of water projects, demand forecasts, hydrological data collection, supervision of the implementation of water schemes (including supervision of NGO water programmes), etc. Due to the decentralization the DWO, like all the other Heads of Department, reports on a day to day basis to the DES and not to the Ministry of Natural Resources, as was the situation before the decentralization.

The department, which only comprises the DWO, 2 field officers (responsible for gravity schemes and springs, respectively) and two field assistants (acting as foremen during construction of gravity schemes, spring protection, etc.), work closely with SWIP on planning and implementation of gravity schemes and spring protection.

The District Medical Officer (DMO) is, apart from routine duties, the main district programme manager for SWIP. However, his day-to-day work is mainly undertaken by the District Health Inspector (DHI).

The DHI is directly responsible to the DMO, and the functions of rural water development are undertaken here. The water committees report to him via the sub-county water and health committees. Trained health inspectors are stationed in each county but it has not been possible to station trained staff on sub-county level. The DHI is also responsible for the water quality analyses, which mostly are carried out by the Health Inspectors.

The SWIP activities are mostly undertaken by staff seconded by the DWO and DMO/-DHI and the project is therefore well integrated within the government system. A Project Implementation Committee acts as a coordinating unit. Due to the availability of funds, transport, etc. the project has enabled a lot of activities to be undertaken within the water and sanitation sector in the district.

On the local (village) level each water source (except for the major urban supply schemes) has a Users Committee, which is a sub-committee under the RC 1 Council, and is linked to the district administration through the Sub-county Water and Health Committee. The Users Committee solves local conflicts that might arise regarding the use of the source. Two residents living nearest to the source are charged with the day to day running to ensure that no misuse takes place, and that any malfunction is reported so that repair can be undertaken.

4.2.2 Land management aspects

The Department of Agriculture and the Department of Forestry are the two main district based institutions related to land management.

The Forest Department is headed by the District Forest Officer (DFO). Apart from the DFO, the department consists of 4 Assistant Forest Officers, each responsible for one of the four forest reserves and 15 forest guards, one stationed in each sub-county. After the Impenetrable Forest Reserve became a national park in 1991 it was no longer run by the department, as it is under the Ministry of Tourism, Wildlife and Antiquities. Due to severe shortage of transport (only two motorcycles and some few bicycles) and funding, hardly any extension is carried out and the activities are limited to:

- the running of the two nurseries belonging to the department, which are used for replanting of the forest reserves, and
- the control of charcoal burning on public land, which has proved to be very difficult with the present logistical support

Since the Farm Forestry Project (financed by CARE) withdrew in 1991, no forestry projects are undertaken by NGOs or other organisations.

The Agricultural Department is headed by the District Agricultural Officer (DAO). The department is well staffed with a total number of 44 employees, including 3 Agricultural Officers (AO) and 11 Assistant Agricultural Officers, of which one is appointed as Soil Conservation Subject Matter Specialist. Recently, the Unified Extension Service (UES) has been introduced in the district. The aim is that each extension worker should have a broad knowledge about agriculture, animal husbandry and fisheries and cover all these issues in the parish or sub-county where he/she is stationed. Most of the extension work is concentrated on sound agricultural practice. So far very few goal-directed soil & water conservation extension activities have been undertaken but by the beginning of this year the DAO has made a strategy proposal for a comprehensive soil and water conservation programme, which is intended to be carried out in collaboration with especially the forestry unit, but also the Water Department. The proposal includes the establishment of a soil and water conservation committee to coordinate the activities. However, the proposal has not been discussed with the other departments yet, and the project which has a yearly budget of US\$ 20-25 mill. is dependent on funding from the district council. Despite the adequate staffing situation the extension is not very effective due to logistic constraints. Transport is inadequate and the low salary and lack of funding for field allowances have created some reluctance among the extension workers. The SIDA-financed Uganda Soil Conservation and Agroforestry Pilot Project in Mbarara may extend its activities to Kabale. If this happens, some of the logistic constraints will be solved.

4.2.3 Present collaboration between land and water management related institutions

In recent years there has been very little collaboration between the three departments (Agriculture, Forestry and Water), and the Water Department has not had any collaboration with either of the other two. This is, among other things, due to the fact that the Water Department has been very weak at district level prior to decentralization, as most activities have been directed and carried out from the Headquarter in Kampala. The fact that all three departments now refer to the DES, and also get their funding from the District Council, will promote a closer cross-sectoral collaboration.

The Agriculture and the Forestry Departments have as yet no coordination of extension activities related to agroforestry and soil and water conservation, simply because none of the departments have any considerable extension activities regarding these issues. However the departments have initiated a joint activity on land consolidation as the widespread land fragmentation is regarded as a major constraint for economic development and establishment of sustainable land use practices.

It was apparent that most of the officers from the Agricultural and Forestry Departments met during the visit were little aware of the interactions between land and water management e.g. use of pesticides and fertilizers in paddy fields and valley bottom cultivation, cultivation on river banks, etc. This is a result of the lack of cross-sectoral collaboration and can also, to a certain extent, be ascribed to the training systems. The courses at the faculty of Agriculture at Makerere University were concentrated on pure agricultural issues, and less attention was given to the environmental effects of agricultural practises.

4.3 Proposals for improved and integrated land and water management

In Kabale district only a few soil conservation measures are practised, no comprehensive extension on soil and water conservation issues are undertaken, and there is no linking of the land and water management plans and practice. This is, among other things due to:

- limited cross-sectoral collaboration
- lack of awareness among officers and extension workers about the interactions between land use practice and water resources
- lack of awareness among farmers about the importance of soil conservation measures and the negative effects of soil erosion on the water resources
- severe logistic constraints within most of the departments

4.3.1 Cross-sectoral collaboration

In order to establish proper management of water resources at the lowest appropriate level it is important to ensure that the organisational system allows initiatives to be taken at the lowest level, and that responsibilities and duties are clearly defined, both for user groups and within the Government-system. The relevant committees for integrated land use planning and water management could be:

- at the local level, Users Committees are established to ensure that no misuse or damage of the source takes place. These committees could act as a kind of local environmental committee as well, ensuring that appropriate land use is practised upstream of the source. The user committee could also, together with the RC 1, act as an enforcement authority, if needed.
- at the district level, a cross-sectoral coordinating unit could be the District Health and Environmental Committee, which is one of the compulsory committees under the decentralization statute. The committee should include technical staff from the water, agriculture and forest departments, NGOs working in the district as well as political representatives from the District Resistance Council (DRC).

The District Health and Environmental committee should be responsible for awareness raising among farmers and coordination of proposals and requests from local groups, technical evaluation of proposals and organization of training and information to groups to enable these to implement proper land use and agricultural practice. It is important that traditional conservation practices and indigenous environmental knowledge is not disregarded. Bottom-up communication is very important in the planning of e.g. soil and water conservation measures. Some measures might be preferred by researchers and officers from a technical point but when it comes to implementation by the farmers, economic considerations, availability of e.g. grasses and tree species and how time-consuming the measures are, become very important factors.

Implementation of improved land use is undertaken by farmers, assisted through advice by the Government departments and extension services.

Establishment of non-cultivated strips along rivers/streams and planning of major water schemes are obvious issues where a cross-sectoral unit provides guidelines for local groups of farmers. Similarly, when a water source has been identified and approved by the DWO to be suitable for a major gravity scheme, the local authorities and users group, as well as the agronomist and forester should be involved in the evaluation of the suitability of the catchment area of the possible scheme. The work should result in a plan for proper land management to be implemented as part of the scheme, in order to protect the source in terms of water quality and quantity. The plan must include a specification of the responsibilities, authority and economic frames for the local Users Committee.

4.3.2 Training needs and awareness raising

One can not expect a subsistence farmer to protect water sources, - which he in some cases might not even use himself, unless he can see that he is benefitting e.g. through better crop yield. In order for the local farmers to be able to manage local resources properly and benefit effectively as well, farmers need to be trained, both with respect to particular farming techniques, but also with respect to organizing the local committees.

Thus, it is very important to have well-trained staff, extension workers as well as officers, who can give qualified suggestions e.g. on how to combine soil and water conservation measures with measures to improve or at least maintain the soil fertility, - otherwise the farmer soon loses interest. During the visit to Kabale District and other districts it was felt that the knowledge among officers and extension staff on these issues is inadequate. Therefore, there is a need for additional training of staff. Since 1989 it has been the aim to place a graduate Soil and Water Conservation Officer in each district. However, this has not been possible in Kabale District, as in most other districts, due to lack of funding and lack of qualified personnel. Therefore an already employed Ass. Agricultural Officer, with little specialisation in Soil and Water conservation, has been transferred to this position.

The IDA-financed Agricultural Extension Program (AEP) being implemented in 10 pilot districts includes monthly training (1-5 days) of extension workers by the Subject Matter Specialists (e.g. on soil and water conservation). If this training is to be proper and effective it is important that the officers carrying out the training are well-qualified. The AEP has allocated some funds which enable officers to go for additional training. It is also important that experience gained from research stations, universities, etc. is passed on and utilised by the district staff, and that some kind of collaboration is established (see section 4.5). The training should to some extent be coordinated with other departments, so that cross-sectoral training of farmers can take place.

4.3.3 Logistic constraints

Joint extension activities between departments can also help overcome some of the constraints regarding transport, as vehicles can be shared by staff going to the field together.

However, with the limited possibilities of funding for the government sector, it can be foreseen that logistic constraints may hinder the possible adaption and implementation of a more integrated land and water management. Thus, it might be relevant to establish a donor financed Soil and Water Conservation Project in the area, which can provide some logistic inputs and assist in additional training of farmers and government staff.

4.4 Proposed management tools

4.4.1 Technical tools

In a large part of Kabale the slopes are often so steep that they should be left un-cultivated, but, this is not very realistic with the present population density and growth rate. Even comprehensive soil and water conservation measures will not be able to reduce the erosion rates sufficiently. On the less steep slopes (slope < 25 %), contour ploughing/cultivation, planting of grasses on bunds along contours and sound agricultural practices aiming at maintaining a high organic matter content, would in most cases reduce the soil erosion rates significantly. The possibility of establishing a cover crop (e.g. beans) which could protect the soil at the onset of the rains and be harvested early in the new growing season should be looked into.

Tree planting in the most steep catchment areas, and the introduction of agroforestry practice on steep slopes should be promoted. However, the tree species should be carefully selected. In areas where water is scarce, or areas which are the catchment for water supply schemes, tree species with a high water consumption, e.g. Eucalyptus should be avoided. The agroforestry species should also be carefully selected, as the suitability of species depend very much on the local climatic conditions. In addition the selected species should preferably be multi-purpose species, e.g. fruit trees, trees for production of timber and fuelwood, etc. Experience gained from the ICRAF research stations and on-farm trials will give valuable informations. During the field studies it was observed that a few of the protected water intakes were surrounded by a hedgerow of *Euphorbia tirucalli*. The carcinogen, 4-deoxyphorbol, has been found not only in the euphorbia itself, but also in extract from nearby soils, vegetables and drinking water. Establishment of un-cultivated strips along rivers/streams is an effective way of reducing inflow of silt to the rivers.

4.4.2 Legal tools

By-laws can be a means to ensure proper land and water management, but have the disadvantage that they are likely to be neglected if the farmers do not realize the importance and benefit. If enforcement is necessary this should be undertaken by local authorities, preferably by the user committee and the RC 1, but always preceded by awareness building. Hence, if by-laws should be used as a tool it is important that:

- awareness is raised about the importance and benefits of the by-laws
- local enforcement takes place

Cross-sectoral collaboration among extension staff as well as involvement of local people are equally important as illustrated by the following example:

During discussion with the DWOs in Kabale as well as the other districts visited the importance of a 3 to 6 metres un-cultivated zone along river banks was emphasized. For the DWO alone, it might be difficult to go out and convince the farmer who may only own one ha, to leave e.g. 6 meter of his field along the adjacent stream uncultivated. The farmer might think that a major part of his land now will become non-productive. But if the DAO can advise the farmer to grow Napier grass which could serve as fodder for his two cows and serve as feed security during dry periods, the farmer might realise that apart from getting more clean water he can also improve his livestock practice and thereby raise his income. The combined effort of the DWO and DAO make it much easier to convince the farmer about the importance as well as the benefit of such a un-cultivated zone.

4.5 Examples of and results from soil & water conservation projects in the district

Despite the fact that Kabale District is probably the district most severely affected by soil erosion, no NGOs or agencies are undertaking any soil and water conservation projects in the area. The CARE-financed Farm Forestry Project, which was started in 1988 but stopped abruptly in 1991, concentrated on the establishment of Eucalyptus woodlots and nurseries to supply seedlings, and did not have any major soil and water conservation activities, and the project hardly had any impact, mainly due to the short project period.

In August 1992 a Danida Identification Mission visited the district and came up with a proposal for an Agroforestry project in Kabale and Kisoro districts. However, nothing has taken place since then. The SIDA-financed Uganda Soil Conservation and Agroforestry Pilot Project (USCAPP) which presently is undertaken in Mbarara will possibly be extended to Kabale district, although there is some uncertainty as to whether this will take place.

The International Centre for Research in Agroforestry (ICRAF), has established experimental stations at three sites within Uganda. One of these is located in Kabale. A comprehensive research program is undertaken. Some of the experiments have demonstrated the potential use of contour hedgerows for erosion control. Recently, some on-farm trials have been initiated in order to see the effect of these measures when carried out by farmers, and how they pursue them.

It is important that the knowledge gained at ICRAF and other research stations is passed on to officers and extension staff within the government department who have to advise the farmers. Thus, it is proposed that a close collaboration should be established between ICRAF and the Agricultural and Forestry Departments.

5 ISSUES, MANAGEMENT FUNCTIONS AND RESPONSIBILITIES

5.1 Introduction

Based on the findings from the visit to the district a number of water related key issues have been identified. The issues fall into two categories:

- impact issues
- user requirement issues

The impact issues are derived from human activities affecting water resources negatively with regard to quantity or quality. The negative effects can either concern other direct uses or relate to environmental degradation.

The user requirement issues are derived from inadequate matching of user requirements and the available water resources (quantity and/or quality).

Such situations require interventions, based on rational decisions and operational management functions, in order to obtain a stable and sustainable beneficial use of the water resource. The process is shown in Figure 5.1 below.

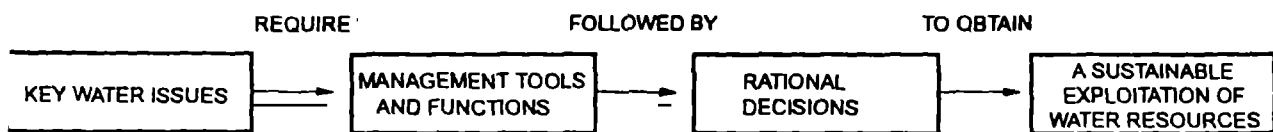


Figure 5.1 - Water resources issues management process

The present chapter describes the issues related to land management - and soil erosion in particular - that have been identified as well as the rationale behind the selection. Management functions necessary to approach and tackle the issues, and tools for intervention in the district is also briefly described here.

The identified issues have been grouped under the following headings:

- surface water quantity
- surface water quality
- groundwater quantity

As it is not assessed to be significantly affected by land use, groundwater quality is not included.

The issues identified may not all be perceived by the district population as being critical issues for which interventions are required. Some of the problems, for instance those related to water quality and environment, can in many cases not be observed directly but require specialized investigations for exact identification and description. They can, however, be just as potentially damaging as those which are obvious to the observer.

For each issue identified the rationale behind its inclusion as an issue is given. Further, a tentative listing of management functions necessary to approach the issue is given and finally the functions are distributed as responsibilities at different management levels (national, district or community level).

Table 5.1 - Surface water quantity

SURFACE WATER QUANTITY (Kabale)			
IMPACT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Rainfed agriculture	Inappropriate cultivation practice and soil degradation has resulted in decreased infiltration and increased runoff, thus decreasing the minimum flow and increasing the peak flows during heavy rains	Raising awareness among farmers, extension workers and officers on the importance of soil and water conservation measures, sound agricultural practice and the interactions between land processes and water resources. Training at all levels on the above-mentioned issues. Enforcement of by-laws if appropriate and necessary. A nationwide soil and land suitability survey. Establishment of non-cultivated zones along streams/rivers. Implementation of soil and water conservation measures. Special protection of catchment areas, used for water intakes, through proper land use planning and control. Monitoring of water quality, inclusive of sediment load.	NATIONAL: Nationwide soil and land suitability survey. More cross-sectoral courses in the education system. Support to training of district staff on soil and water conservation. DISTRICT: Assistance and advice to and training of farmers on soil and water conservation and sound agricultural practices. Establishment of necessary by-laws. Cross-sectoral collaboration and planning. Support to Users Committees. COMMUNITY: Enforcement of by-laws, awareness of the importance and implementation of soil and water conservation measures. Establishment of environmental committees (probably working within existing Users Committees)
USER REQUIREMENT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
NONE (presently) due to abundant amounts of water			

Table 5.2 - Surface water quality

SURFACE WATER QUALITY (Kabale)			
IMPACT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Rainfed agriculture	<p>Inappropriate cultivation, results in very high turbidity and siltation (and in some cases faecal contamination) of streams, rivers and pipelines and causes technical problems as well. Inappropriate cultivation includes:</p> <ul style="list-style-type: none"> - cultivation on very steep slopes without conservation measures - cultivation on or close to river banks - over-utilization of the soil with two crops a year and no fallowing periods - burning of bush and dry vegetation 	<p>Raising awareness among farmers, extension workers and officers on the importance of soil and water conservation measures, sound agricultural practices and the interactions between land processes and water resources. Training at all levels on the above-mentioned issues. Enforcement of by-laws if appropriate and necessary. A nationwide soil and land suitability survey. Establishment of non-cultivated zones along streams/rivers. Implementation of soil and water conservation measures. Special protection of catchment areas, used for water intakes, through proper land use planning and control. Monitoring of water quality, inclusive of sediment load.</p>	<p>NATIONAL: Nationwide soil and land suitability survey. More cross-sectoral courses in the education system. Support to training of district staff on soil and water conservation through strengthening of the Soil and Water Conservation Section within the Ministry of Agriculture, Animal Industry and Fisheries. DISTRICT: Assistance and advice to and training of farmers on soil and water conservation and sound agricultural practice. Establishment of necessary by-laws. Cross-sectoral collaboration and planning. Support to Users Committees. Monitoring of water quality (including sed. load) at all types of water sources for domestic use. COMMUNITY: Enforcement of by-laws, awareness of the importance and implementation of soil and water conservation measures. Establishment of environmental committees (probably working within existing Users Committees)</p>
Deforestation	<p>Increased surface runoff and soil erosion caused by some types of deforestation (especially felling of whole slopes at one time, and encroachment of protected areas) result in increased turbidity and siltation at water sources.</p>	<p>Raising awareness about and establishment of proper and sustainable practice for forest, plantation and woodlot management. Effective protection of Forest Reserves. Development of alternatives to fuelwood. Establishment of private woodlots.</p>	<p>NATIONAL: Establishment of effective policy and management for protection of Forest Reserves. DISTRICT: By-laws regarding burning. Assist in promotion and establishment of alternative fuel sources, and proper management of trees on communal land and in private woodlots COMMUNITY: Enforcement of by-laws. Establishment of private woodlots.</p>
USER REQUIREMENT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Domestic use	<p>Although no monitoring is undertaken of non-protected water sources in the district the pollution from various sources make them questionable as drinking water sources and thus create severe health hazard to the users. Closing down of gravity schemes using surface water during periods with high turbidity result in periodical scarcity of water, for instance in Kabale Town.</p>	<p>Monitoring of water quality. Coordination between upstream/downstream land use practice and water demands, - especially for domestic use. Establishment of alternative sources and protection of existing water sources for domestic water use. Establishment of necessary by-laws.</p>	<p>DISTRICT: Sediment load monitoring. Establishment of by-laws. Cross-sectoral collaboration to ensure better coordination of land use planning and demand for water (e.g. construction of water schemes) COMMUNITY: Awareness of water quality-health relations.</p>

Table 5.3 - Groundwater quantity

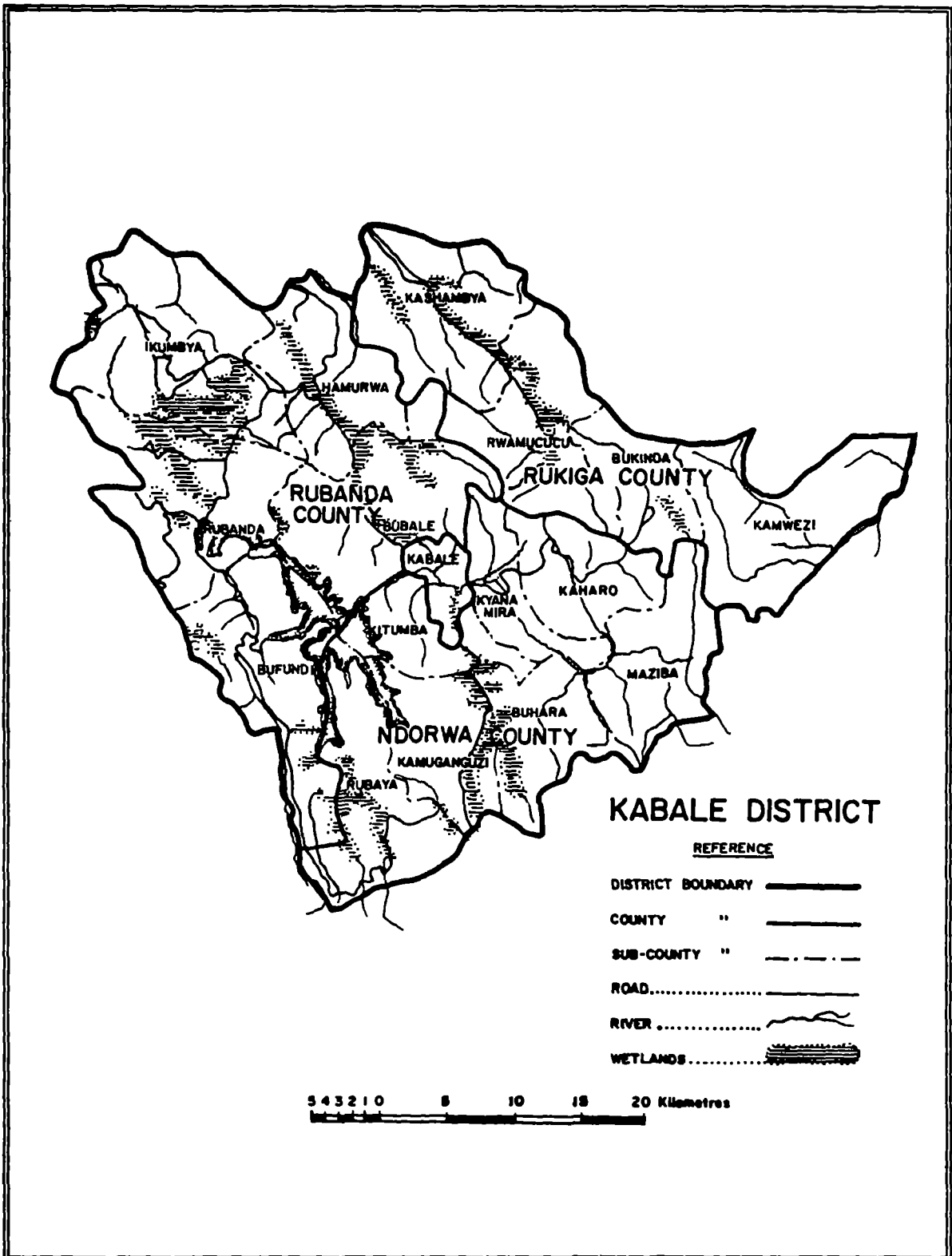
GROUND WATER QUANTITY (Kabale)			
IMPACT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
Land use	Inappropriate cultivation practice and poorly planned and illegal felling of trees have resulted in decreased infiltration rates and thus decreased groundwater recharge.	Raising awareness among farmers, extension workers and officers on the importance of soil and water conservation measures, sound agricultural practice and the interactions between land processes and water resources. Training at all levels on the above mentioned issues. Enforcement of by-laws if appropriate and necessary. A nationwide soil and land suitability survey. Establishment of non-cultivated zones along streams/rivers. Implementation of soil and water conservation measures. Special protection of catchment areas, used for water intakes, through proper land use planning and control.	NATIONAL: Nationwide soil and land suitability survey. More cross-sectoral courses in the education system. DISTRICT: Assistance and advice to and training of farmers on soil and water conservation and sound agricultural practice. Establishment of necessary by-laws. Cross-sectoral collaboration and planning. Support to Users Committees. COMMUNITY: Enforcement of by-laws, awareness of the importance and implementation of soil and water conservation measures.
USER REQUIREMENT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVELS AND RESPONSIBILITIES
NONE (presently) due to abundant amounts of water			

APPENDIX

ANNEX 7

KABALE DISTRICT

Kabale District



ANNEX 8
SPECIAL STUDY - TORORO

WETLAND IRRIGATION IN TORORO DISTRICT**LIST OF CONTENTS**

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1 INTRODUCTION

1.1 Background

A first phase of "Water Action Plan for Water Resources Development and Management" (WATER ACTION PLAN PHASE I) was prepared February to May 1993. The major components were:

- draft water resources policy
- draft rapid water resources assessment
- draft institutional & management study
- international study

In the period from June to November 1993 follow-up work was carried out during the "Consolidation Phase I" which also comprised preparatory activities for Phase II. These activities were preliminary data collection and information gathering in five districts selected as pilot areas for studies to be undertaken under Phase II. The Consolidation Phase I activities were undertaken by the project counterpart staff.

The Project Document entitled "Water Action Plan for Water Resources Development and Management" (WATER ACTION PLAN PHASE II) describes the second phase of the project to develop a Water Action Plan for Uganda. The work on the Phase II started in November 1993. The second phase will produce among other items:

- an outline proposal for appropriate local water resources management levels based on district studies
- an outline proposal for management procedures providing the administrative machinery at national and district level with guidelines for sustainable water resources management

District studies which would support such proposals are carried out in each of five selected pilot districts comprising Arua, Mbarara, Mukono, Mbale and Moroto. These studies comprise reconnaissance level evaluations of sociologic and economic conditions which combines to give the background for assessments of water uses and demands. The water uses and demands are compared to available water resources in terms of quantity and quality.

An unequal distribution of demands and resources leads to the identification of a number of water resources issues and cases which require management strategies and capabilities at different levels (national level, district level, community level). Based on the existing institutional and judicial framework, management potentials and constraints are evaluated.

1.2 Special districts studies

Three special district studies have been carried out in Tororo District, Kabale District and Hoima District, as a supplement to the studies in the five pilot districts. Originally, it was assumed that the visits to the five selected districts would be followed by short visits (1 to 2 days) to five more districts in order to ascertain that the range of conditions had been experienced.

During the course of the study it was found that the scope of water resources management related conditions was adequately covered by the five selected districts. It was, therefore, found much more beneficial for the Water Action Plan to let expert staff pay longer visits to districts in which typical management issues were of significant importance.

Tororo District was visited in order to study wetland rice irrigation and drainage, Kabale District was visited in order to study the interaction between land and water management (soil erosion in particular) and Hoima District was visited in order to make a closer study of institutional capacities.

1.3 Tororo District visit

Tororo District was visited by a study team during the period from 10 to 12 January, 1994. The purpose of the visit was to study issues and management mechanisms related to wetland cultivation. Thus, only limited information on other features of the district was collected.

During the visit interviews/ discussions as well as collection of statistics in the District administration headquarters took place. Field visits were made to Doho Rice Scheme and various farmer groups involved in wetland rice cultivation.

The summaries and results from this study are presented in the following chapters.

Chapter 2 summarizes in a tabular form the main characteristics of Tororo District - in terms of physical features, population and economic activities. The wetlands are described in Chapter 3: while Chapter 4 gives an overview of consumer categories, water uses, especially the use of wetlands. The technical and institutional aspects of wetland management are described in Chapter 5, while identification of issues and management functions and levels are presented in Chapter 6. Chapter 7 gives an assessment of the present management capacities, related to the identified management functions.

2 DISTRICT SUMMARY

Table 2.1 - Physical features of Tororo District

PHYSICAL FEATURES.	
Location	Tororo is situated in the eastern region of Uganda. The district borders the districts of Pallisa in the north, Mbale in the north east, Iganga in the west, Lake Victoria in the south and Kenya in the east. (Ref. Appendix 2.1)
Area and land cover	Total area: 2,634 km ² . Land area: 2,336 km ² . Estimated swamp area: Permanent swamps: 120 km ² Seasonal swamps: 100 km ² Area suitable for cultivation: 1981 km ² Area under cultivation: 630 km ²
Climate	Rainfall: The average annual rainfall (pre-1970) was 1465 mm. Records from the last five years show variations between 1332 mm in 1989 to 1542 mm in 1990. There are two rainy seasons. The main rainy season falls from March to June, while the minor rainy season is from August to November. Temperature: The average temperature (1932-73) was 22.4 C, with a monthly maximum of 30.7 C and monthly minimum of 15.4 C and the absolute extremes of 36.4 C and 10.4 C. Annual evaporation: The average evaporation (1961-73) was 1972 mm with monthly evaporation ranging from 108 to 234 mm.

Table 2.2 - Key population characteristics of Tororo District

POPULATION	
Total	1991: 555,574 persons
Population growth	1969-80: 2.2% per year 1980-91: 2.8% per year Uganda 1980-91: 2.5% per year
Population density	1980: 174 persons/km ² 1991: 238 persons/km ² Uganda 1991: 85 persons/km ²
Ratios	Urban population 1991: 63,657 11.5% Rural population 1991: 491,917 88.5% Uganda urban pop 1991: 11.3% Uganda rural pop 1991: 88.7% Males 1991: 273,220 49.2% Females 1991: 282,354 50.8% Sex ratio M/F: 96.8% Uganda sex ratio M/F: 96.5%
Migration	10% of the people living in Tororo were born outside the district. The Doho rice scheme has attracted people from outside Tororo to settle in the district. Cattle traders from the Karamoja region pass through Bunyole County on their way from Pallisa District to cattle markets in the south. They are allowed to graze and water their animals in the swamps along the cattle route.

Table 2.3 - Main economic activities in Tororo District

ECONOMIC ACTIVITIES			
Main source of income	Economic activity	Total	%
	Subsistence farming	441,957	79.9
	Commercial farming	2,277	0.4
	Petty trading	22,077	4.0
	Formal trading	6,324	1.1
	Cottage industry	1,927	0.3
	Property income	2,646	0.5
	Employment income	55,780	10.1
	Family support	15,312	2.8
	Other	1,011	0.2
	Not stated	3,999	0.7
	Total	553,310	100.0
Sources of income	80% of the population in the district are mainly dependent on subsistence farming. About one third of the rural households are involved in household based cottage industry, including processing of cash crops.		
Agriculture in Bunyole and West Budama counties.	<p>Dry land farming: The main subsistence crops are cassava, millet and few a vegetables and bananas. The main cash crop in the area used to be cotton.</p> <p>Wetland farming: In recent years cotton has been replaced as the main cash crop in the area by paddy rice, grown in the seasonal swamps. There are 1-2 growing seasons depending on the second rains (Aug.-Nov.)</p>		
Livestock	Livestock	Nos. livestock	
	Cattle	248.670	
	Pigs	24.000	
	Sheep	59.970	
	Goats	142.180	
	Most of the livestock is found in Bunyole County and West Budama County.		
The seasonal swamps are used for grazing during the dry season.			

3 WATER RESOURCES

3.1 Introduction

The main surface water resources in Tororo district are Lake Victoria in the south and the main perennial rivers of Malaba, Manafwa and Namatala draining into Lake Kyoga and River Sio, from Kenya, draining along the border into Lake Victoria. The lower reaches of all the rivers are covered by long stretches of permanent swamps while the tributary valleys are seasonally flooded swamps. In general more than 90% of the district is drained by the three main rivers Malaba, Manafwa and Namatala into. The rivers Malaba and Sio are transboundary rivers with part of their upstream catchments in Kenya.

3.2 River basins

The three main rivers all originate from Mount Elgon at an altitude of more than 4000 m. (in Mbale district) and drain its south western quadrant.

Therefore they all benefit from the high rainfall regime (>2000 mm) in the mountains, and flow patterns are similar. The average slopes in the high altitude areas of the catchments are very steep (>20%) decreasing sharply between 2000 - 1300 m contour, so that by the time the rivers enter the low lying Tororo district the slopes are very gentle - eventually dropping to 0.23% in their lower reaches. The rivers meander along these lower reaches through extensive swamps and eventually join as one as they exit Tororo District and flow northwards to Lake Kyoga.

The hydrological characteristics of the rivers are very similar and show cyclic variations in the yearly flows. The monthly flow patterns show minimum flows in the dry months January-March and June-July and increased flows in the wet seasons of April-May and August-November. The first peak is higher than the second and the pattern follows the seasonal rainfall variations.

Due to the steep mountain slopes, intensive cultivation and the reported deforestation in the catchments, the rivers carry large sediment loads which varies with the season, - with the highest sediment load during the rainy season. However, there is no data on the sediment load of the rivers and generally their water quality is not being monitored.

3.3 Permanent swamps

Due to the flat topography (0.2%) at the lower reaches of the main rivers, extensive stretches of swamps have been formed. The total area of the permanent swamps is roughly estimated (from 1:250,000 maps) to be 120 km². They are mostly located along River Malaba (80 km²) in West Budama county and rivers Manafwa and Namatala (40 km²) in Bunyole county.

The predominant vegetation in the swamps is papyrus and the soils are reported to be sandy clay loams of alluvial deposits. The permanent swamps are mainly fed by the perennial rivers, though direct rainfall is of significance too. Therefore the annual and monthly variations of water regime in these swamps are expected to follow the same pattern as the hydrological regime of the rivers. In fact, it was reported that the papyrus is seasonally burnt in the dry season to clear areas for grazing, presumably when the water table in most parts of the swamp is below the soil surface. However, there is no monitoring of the flow regime in the swamps apart from upstream gauging stations.

The main hydrological effects of the swamps relate to their large water retaining capacity which reduces the river peak flows, settles sediment and increases evaporation. However, there is no data downstream to quantify these effects, though the effect on the sediment loads was apparent.

The swamps are important ecosystems supporting a high level of biological diversity.

3.4 Seasonal swamps

Due to the general low relief topography in Tororo district most of the valleys are wide and flat with gentle slopes and prone to seasonal flooding. The yearly and seasonal variation in the level of flooding corresponds to the variations in rainfall and the swamps are thus normally flooded twice a year. (April-May and August-November). However, due to local rainfall shortage during the August-November period, flooding may not always occur.

Six extensive seasonal swamps have been identified in West Budama, Bunyole and Samia-Bugwe counties (ref. Appendix 3.1) and it is estimated (from 1:250,000 topographic map) that the total seasonal flooded area is about 100 km².

In addition to seasonal flooding due to direct rainfall and surface run off, two of the major seasonal swamps at Doho in Bunyole and in Samia-Bugwe are seasonally flooded by rivers Manafwa and Sio respectively.

4 WATER USERS AND USE OF WETLANDS

4.1 Domestic water use

The most important sources of water for household consumption in the rural areas are open wells, springs, streams and rivers. People living near the swamps collect water there for domestic consumption. The most common sources of water supply in the urban areas are open wells, springs, boreholes and piped water.

Table 4.1 - Water source use

SOURCE	NUMBER OF PEOPLE					
	RURAL		URBAN		TOTAL	
	NOS.	%	NOS.	%	NOS.	%
Piped water inside	1,443	0.3	4,827	7.7	6,270	1.1
Piped water outside	9,724	2.0	11,655	18.7	21,379	3.9
Borehole	18,757	3.8	21,763	34.9	40,520	7.3
Protected well/spring	32,868	6.7	6,400	10.2	39,268	7.1
Open well/spring	364,514	74.3	14,358	23.0	378,872	68.5
Stream/river	42,421	8.6	2,444	3.9	44,865	8.1
Lake/pond/dam	18,428	3.7	329	0.5	18,757	3.4
Other	0	0	315	0.5	315	0.1
Not stated	2,735	0.6	329	0.5	3,064	0.5
Total	490,890	100.0	62,420	99.9	553,310	100.0

Source: Housing and population census, 1991.

4.2 Livestock consumption

The total no. of animals in the district are 248,670 heads of cattle, 59,970 sheep, 142,180 goats and 24,000 pigs. The water demands for animals are greatest in Bunyole and West Budama.

The most common sources for watering cattle are rivers, streams, dams and ponds. Those who live within 5-6 km from the wetlands usually bring their cattle there for watering.

Seasonally flooded wetlands are also an important source of livestock grazing in the dry season, and extensive burning is reported around the middle of the dry season to achieve sprouting of new grass.

4.3 Wetland cultivation

Traditionally, small patches of wetland have been cultivated for traditional food crops, and, during the past fifty years, also for rice.

Cultivation of paddy rice picked up as a systematic commercial venture in the 1970s, undertaken by farmers living along the swamps. Similarly, growing of vegetables has intensified, especially in Samia County. Paddy rice is mainly grown in the rainy season, using controlled flooding, while vegetables are mainly grown in the dry season, through diversion of permanent streams to seasonally dry land.

No information exists on the extent of wetlands cultivation, but in the few areas registered by the District agricultural office (apart from Doho rice scheme) about a third of the seasonal swamp area was actually cultivated. If this is a general pattern, and the Doho scheme is added, a conservative estimate may give some 30-40 km² of swampland under rice cultivation in the counties of Bunyole and West Budama. With an average holding of 0.2-0.4 ha this would mean that about 25% of the households in the two counties are involved.

5 WETLANDS RESOURCES MANAGEMENT

5.1 Technical management of irrigation schemes

The two types of rice cultivation in the wetlands have different levels of water management. The government - established Doho irrigation scheme has a more or less fully controlled water regime, whereas other seasonally flooded wetlands are cultivated with no elaborate control of the water regime apart from some drainage of excess flood water.

5.1.1 Doho Rice scheme

The Doho scheme is one out of three larger rice schemes in Uganda. (Ref. Appendix 5.1)

Rice growing in the Doho scheme started in 1942 to support the Second World War effort and picked up in 1972 under the government production campaign and posting of extension workers.

However, the farmers faced the problem of excessive flooding from River Manafwa (the source of water for irrigation in Doho) which originally seasonally flooded the area. The Doho cooperative rice scheme was established in 1984 with the assistance of the People's Republic of China. The initial phase involving the construction of the infrastructure was completed in 1989.

The scheme has changed a wetland that was seasonally flooded by an overflow from River Manafwa into an 8 km² irrigated paddy rice scheme that is protected from direct river inundation by:

- earth embankment along River Manafwa to protect the scheme and the villages from floods. The levee is 2 m high and designed for protection against 1:20 year flood.
- an intake canal with maximum capacity of 2.6 m³/s.
- sluice gates for controlling the flow of water to the farm with maximum capacity of 2 m³/s
- the main canal for supplying water to the whole scheme
- sub-canals and field canals for supplying water to the blocks and fields respectively
- a canal for draining excess water.

Since construction the flood regime in the Doho scheme has been completely under control, though the villages behind the embankment have been flooded once in 1991 with a flood of 45 m³/s. It is feared that if the maximum recorded flood of 82 m³/s in the Manafwa river recurs, the whole scheme could be flooded.

Secondly the flood protection measures have deprived the scheme area of the benefits of deposition of nutrient rich sediments which earlier came with the floods. The initial yields of 7500 kg/ha in 1988/89 have reportedly decreased. It was claimed that the main reason for the reduced yield is loss of fertility, but hazards such as pests and rats have also caused crop reduction. Only a minority of the farmers uses artificial fertilizers. No monitoring of the effect of the use of fertilizers is being undertaken and the use could lead to further problems of pollution. The nitrogen fixating Azoola has been introduced as fertilizer and it will spread in the area through the waterways.

Water shortages have not been experienced, but comparing the peak demand of 2 m³/s with the daily recorded minimum flow of River Manafwa at 0.4 m³/s, shows that water shortage is a potential risk. Considering the potential upstream demand for irrigation of 2 km² by a private developer and for 100 fish ponds, there is need to regulate the use of the resource among the different users especially during times of short age. One possibility is to regulate the cropping pattern of the users to ensure an adequate distribution of peak demand periods. The available resource may, however, still call for a reduction in scope of the existing and planned water demanding activities.

5.1.2 Cultivation in the other seasonally flooded areas

Outside the Doho scheme the group farmers cultivate parts of the seasonal swamp areas. The method of water management involves digging a main longitudinal canal (up to 1 m wide) through the whole length of the swamp and lateral canals into the fields. To flood the fields the main canals are blocked and the fields flooded (8-10 cm) for 4 months except when weeding is required. Thereafter the main canals are opened and the fields drained before harvesting. Maintenance of the main canal, and setting of times of flooding and drainage, requires cooperation between cultivators along the whole length of cultivated swamp.

It was noted that, despite the canal, the flood regime is not completely controlled and the fields are often deeply flooded during heavy floods. Similarly, there is no way to retain water in cases of seasonal scarcity of rain.

5.2 Institutional aspects of wetlands management

At present there seems to be no authority at District level coordinating activities related to wetlands. Tororo District officials complained about the present uncertainty and lack of clear guidelines for the use of wetlands, which is further confounded by an unclear legal

status regarding land-tenure in general to which access to wetlands is often related. (Ref. Appendix 5.2)

There is a clear trend in Government policy to restrict the use of wetlands in order to enhance conservation and environment protection. However, no clear operational strategy or legal instrument exist so far to support such restrictive policy. In Tororo District a small scale irrigation development programme exists under the Ministry of Agriculture. This programme aims at supporting the small farmers in the District in developing the swamps for rice cultivation.

Within the programme of the District Agricultural Office only the large Doho rice scheme has been developed so far. Three smaller groups of rice farmers have been selected under the programme. They are presently being mobilized to enable them to contribute and receive support to establish sustainable and more elaborate structures, than what they have already developed on their own. Many more groups of farmers are taking up rice cultivation in the swamps in the northern part of the District. A clear wetlands policy is, however, required before such programmes could commence full scale.

5.2.1 Tenure systems regarding the wetlands

All wetlands and swamps in the District are, in principle, public property. In practice this means that they are under customary tenure, which may vary a lot from one ethnic group to another, giving variations in patterns in a district with several ethnic groups.

In the northern part of the District, mainly Bunyole County, where swamps reach the largest extent, customary tenure means partly owned. When there is an owner of an area, he can allocate the area to whoever he wishes for cultivation, usually against a fee related to seasonal yields. The owner may evict the tenant, and while there are practices related to evictions, these place the tenant in a very weak position. How "ownership" was originally established is not quite clear, but it most often follows ownership (allocated by clan elders) of dryland adjacent to smaller swamps. However previous cultivation in the swamp may also help to establish an ownership claim.

Such ownership claims are not always well documented, as in the case of the Nakwiga irrigation group, where one person's claim to the whole swamp was rejected by the RC courts. In the Pamanyango group, however, with some 30 members nobody questioned the ownership of all the land by four of the members. Some even have written tenancy contracts. In the Doho scheme all previous owners and tenants were evicted and compensated, and could then apply for plots in the presently Government owned scheme.

The relatively recently acquired economic importance of the swamps probably explains the rather uncertain ownership situation. Anybody who opens up and cultivates a field can apparently claim ownership. However, allocation of large plots of uncultivated swamps no longer seems to take place.

Disputes over landownership are taken to the RC courts, where clan-elders appear as the most important witnesses.

Activities such as livestock watering and grazing, fishing and occasional growing of vegetables, can still take place anywhere in the swamps, irrespective of ownership - as long as it does not interfere with paddy cultivation. As dry season grazing, which was the traditional use of the seasonal swamps, is becoming scarce, some farmers try to acquire enough swamp land to be able to fallow it and thus keep a fodder reserve. Herdsmen, fishermen, or vegetable growers are often being marginalized by rice cultivators.

5.2.2 Management

Cultivation groups

Present day commercial rice cultivation in the wetlands requires common action among farmers to construct and maintain small scale drainage structures to prevent excessive flooding of the fields. Rice farmers therefore organize themselves in groups with 30-50 members, each growing some 0.8 ha on average (varying from 0.1 to 2 ha). Most groups have an informal structure, where decisions on joint activities and scheduling for the growing season are taken in plenary meetings. They also have a group leader, chosen by consensus, who meets with neighbouring group leaders to coordinate drainage work and maintenance of bunds. The groups have no system for distributing irrigation water in times of shortage.

The group structure has no links with the RC system or the Local Government administration.

Formal structures of the Nakwiga group and the Doho scheme

The Nakwiga group and the Doho schemes have more formalized structures; the latter being very sophisticated in order to be able to run the physical water management system described above.

The Nakwiga group is registered as a cooperative with an executive committee, which makes it credit-worthy. The growers under the Doho scheme also form a cooperative, but the whole scheme has until recently been run exclusively by government employed management (a staff of 12), with participation by growers only at the level of the smallest distribution canals.

Farming practices and schedules must comply with decisions by the scheme management and regulations which growers agree to follow. Failure to comply may lead to expulsion, as does failure to plant in two consecutive seasons. Access is by application for plots that may become vacant, or by renting informally from existing holders of plots, some of whom have as many as 12 ha, while the majority have only 0.1 ha. Plots are allocated to individuals, not households, and many women have their own plots, thus being members in their own right.

Recently it has become necessary to introduce an irrigation fee, initially to cover direct maintenance of the canals. At the same time, a Management Committee has been established comprising not only growers representatives and management, but also the chairmen, the councillors and the chiefs from the two sub-counties from which most of the scheme members comes. The chairman of the cooperative society, the County Executive Officer and the County Agricultural Officer are also members. The Management Committee elects a chairman and treasurer who together with the Officer in Charge (manager) form an executive committee. The main responsibilities of the Management Committee is related to cost-sharing, scheme economy and conflict resolution.

While the scheme thus has an elaborate system of management of land, water, production, and economy internally, no framework exists for coordinating basin wide, upstream/downstream interests or invoking environmental considerations.

6 ISSUES, MANAGEMENT FUNCTIONS AND RESPONSIBILITIES

6.1 Introduction

Based on the findings from the visit to the district a number of key issues related to wetlands have been identified. The issues fall into two categories:

- impact issues
- user requirement issues

Impact issues are those derived from human activities affecting the wetlands negatively and the user requirement issues are derived from inadequate matching of user requirements and the available water resources.

Such situations require interventions, based on rational decisions and operational management functions, in order to obtain a stable and sustainable beneficial use of the wetland and water resource. The process is shown in Fig 6.1 below.

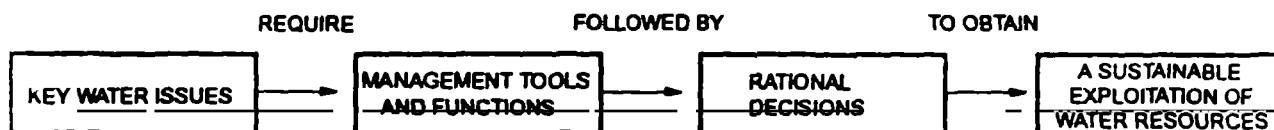


Figure 6.1 - Wetland issues management process.

Table 6.1 describes the issues that have been identified as well as the rationale behind the selection. Management functions necessary to approach and tackle the issues and tools for intervention in the district are also briefly described here.

Table 6.1 - Wetland Irrigation Issues

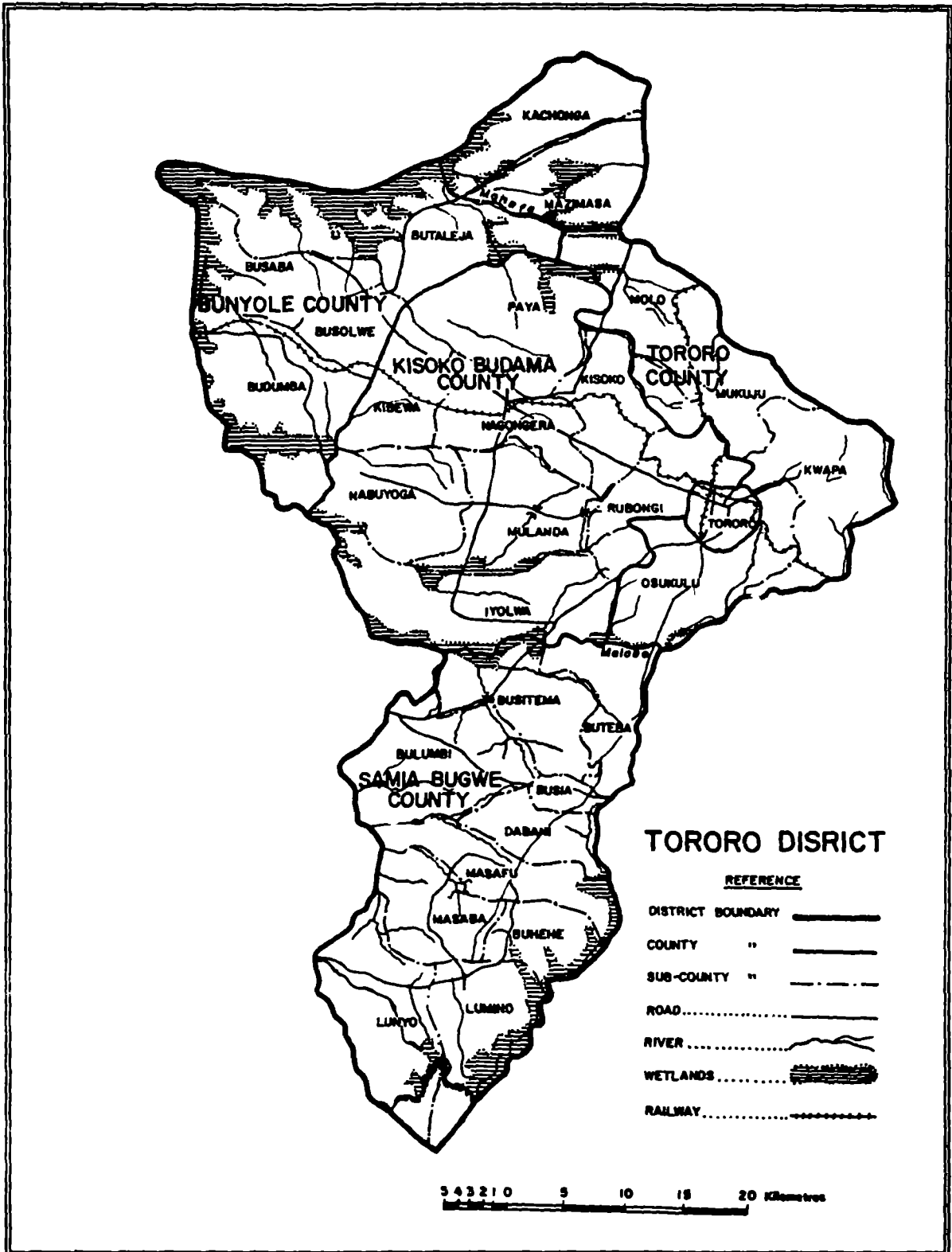
SURFACE WATER QUANTITY (Tororo)			
IMPACT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVEL AND RESPONSIBILITY
Drainage	The construction of main drainage canals and laterals to the individual plots will lead to increases in peak runoff and faster drying up of seasonal swamps in the dry season. The length of the dry season will increase and other uses are likely to be affected.	Overall policy for balancing of wetland conservation and development. Preparation of operational guidelines for development, definition of institutional responsibilities for the development, permits and legal enforcement. Monitoring of water level variations in swamp areas, locally and for the overall swamp area.	NATIONAL: Policy and strategies. Allocation of responsibilities. Legal framework. Wetlands information system. DISTRICT: Monitoring undertaken by local government institution. COMMUNITY: Awareness of wetland development requirements.
USER REQUIREMENT ISSUES	RATIONALE	MANAGEMENT FUNCTIONS	MANAGEMENT LEVEL AND RESPONSIBILITY
Irrigation demands	Diversion of rivers to satisfy irrigation demands will lead to reduction in the flow during the growing season(s) and other uses are likely to be affected.	Overall policy for balancing of wetland conservation and development. Operational guidelines for development, institutional responsibilities, permits and legal framework. Detailed and locally operated mechanisms are needed to ensure upstream and downstream coordination of irrigation schedules with water availability.	NATIONAL: Policy and strategies. Allocation of responsibilities. Legal framework. DISTRICT: Coordination/regulation of major diversions from rivers and swamps. COMMUNITY: Coordination of minor diversions
Environment	Intact wetland ecosystems constitute a resource of significant environmental value including regulation of flow, purification of water and the function as habitat for various plant and animal species. Apart from some impact on the natural ecosystem only little is known about the environmental effects of wetlands.	Management requires the balancing of conservation requirements and development needs identifying a sustainable wetlands development policy based i.a. on research on the environmental impact of utilization of wetlands. Further, institutional responsibilities have to be defined, guidelines for development prepared, development permits introduced and legal enforcement procedures prepared.	NATIONAL: Wetland policy and strategies. Allocation of institutional responsibilities. Guidelines for development and legal framework for enforcement. DISTRICT: By-laws and development permits. COMMUNITY: Awareness of wetland development requirements.

APPENDICES

ANNEX 8

TORORO DISTRICT

Tororo District



MAJOR IRRIGATION SCHEMES IN UGANDA
APPENDIX 5.1
Major irrigation schemes in Uganda

SCHEME	DISTRICT	SOURCE	MAIN CROPS	POTENTIAL IRRIGABLE AREA (ha)	PRESENT IRRIGATED AREA (ha)	PRESENT WATER USE per year mill. m ³	ULTIMATE WATER USE per year mill. m ³
Mubuku	Kasese	Sebwe/- Mub. Res.	R, V, A	1,000	550	4.81	7.60
Kibimba	Iganga	Kimbimba Res.	Rice	1,000	700	8.40	12.00
Doho	Tororo	Manafwa River	Rice	1,000	1,000	12.00	12.00
Kiige	Kamuli	Lake Nabigaga	Citrus	200	60	0.42	1.40
Ongom	Lira	Owemeru/- On. Res	citrus	40	40	0.28	0.28
Odina	Soroti	Lake Kyoga	Citrus	200	-	-	1.40
Labori	Apac	Lake Kyoga	Vegetables	120	-	-	0.93
Atera	Apac	Lake kyoga	Rice, vegetables	120	-	-	0.93
Acoro	Kitgum	Agoro River	Rice, vegetables	100	-	-	0.77
Olweny	Lira	Lake Kwania	Rice	800	-	-	9.60

1 GENERAL

The present land tenure situation in Uganda is a complex of various co-existing pre-colonial, colonial and post-colonial land tenure systems and land reforms. There are, also, some significant differences between what the law dictates and what goes on in practice.

2 LAND TENURE LAW

The 1975 Land Reform Decree No. 3 declared all land in Uganda to be public land - to be administrated by the Uganda Land Commission. All individual holdings were supposed to be converted into leaseholds. The lease period was meant to be 99 years for individuals and 199 years for public bodies. The 1975 Land Reform Decree No. 3 is the binding law on land tenure. However, various pre-colonial and colonial systems are still followed, both by the land administrators and by the landowners. These systems are:

- customary tenure
- mailo land
- freehold
- leasehold

3 CUSTOMARY LAND TENURE

These systems are pre-colonial, and they are the most widespread in the country. Specific regulations vary, of course, with each ethnic group and with certain localities. However, two major types of customary land tenure systems can be identified:

- specific permanent single holdings
- communal land with non-permanent holdings

The practice of having specific permanent single holdings is predominant in the southern and the eastern parts of Uganda. Each family has its own plot where it lives and cultivates the land. The head of the household decides on the use and transferability of the land. Access to land is gained through inheritance.

Communal land with non-permanent holdings is most common in the northern part of the country, but is also found in rangeland areas of the southern districts (Mbarara, Mubenda, Kiboga, Luwero, Rakai, Mukono, and Kamuli) and in the Lake Albert flats. Most of the traditional cattle are kept on communally held land. Where arable agriculture is dominant, areas of land are set aside for communal grazing and specific plots are allocated to families for homesteads and cultivation. There is no permanency in the system. Land is only retained as long as it is in use. The male elders decide who shall use a particular piece of land. Customary holders do not have any formal legal rights to the land according to the 1975 Land Reform Decree No.3.

4 MAILO LAND

The "mailo" system originates from the Buganda Agreement of 1900 between the Kabaka and the Protectorate Government. The Buganda land was divided between the Protectorate Government (Crown land and later public land) on the one hand and the Kabaka and his family and chiefs (mailo land) on the other. The mailo land was parcelled out into private and official estates. Later on, the land was surveyed and titles were given to the recipients. Customary holders became tenants of the mailo land owners. These tenants were required to pay mailo landlords for the use of the land. The system was officially abolished in 1967, and mailo land transformed into public land. In reality, the private mailo land remained as before. However, some of the mailo land has been transformed into leaseholds.

The mailo land owner enjoys full right of ownership and use of his land. Government has no access to mailo land, except in an advisory capacity. However, the mailo land owner is limited in his use of certain economic resources (minerals, for example) on his land. Government reserves the use of such to itself.

5 FREEHOLD

The term "freehold" refers to land owned by private individuals or organizations in perpetuity. By the Toro and Ankole Agreement of 1901, and the Bunyoro Agreement of 1933, the kings and their chiefs were granted land either as private or official estates. The rights to important resources remained with the Protectorate Government. Peasants on the land were transformed to tenants.

Another type of freehold land is crown land sold for development purposes. These freeholds were subject to development conditions and could be forfeited to the Colonial Governor if conditions remained unfulfilled. The 1969 Public Lands Act vested former Crown land occupied for Government purposes in the Uganda Land Commission as freehold. Crown land formerly occupied by public bodies was also vested in those bodies as freehold.

The leasehold system is based on an agreement (lease title) between the lessor (usually the Government) and the lessee (a developer). Land is leased out for development. It is more common in urban areas than in rural areas. The system originates from the 1975 Land Reform Decree.

There are three ways to obtain a lease:

- from the Uganda Land Commission
- from an urban authority on behalf of Uganda Land Commission
- from a private individual outside Government as a private lease.

Land gazetted for a specific purpose (eg. a forest reserve) cannot be leased. The Minister's approval is required for lands exceeding 200 ha or 500 acres.



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