THE REPUBLIC OF UGANDA

UGANDA WATER ACTION PLAN

WATER RESOURCES DEVELOPMENT AND MANAGEMENT

EXECUTIVE SUMMARY

(DOC. 014)

MINISTRY OF NATURAL RESOURCES

DIRECTORATE OF WATER DEVELOPMENT

1995

UGANDA WATER ACTION PLAN

WATER RESOURCES DEVELOPMENT AND MANAGEMENT

EXECUTIVE SUMMARY

(DOC. 014)

MINISTRY OF NATURAL RESOURCES

DIRECTORATE OF WATER DEVELOPMENT

1995

THE REPUBLIC OF UGANDA

FOREWORD

Water is a major factor in the socio-economic fabric of our society as well as a determining factor in the development potential of our nation. The rapid growth in population and the increased agricultural and industrial production require adequate and safe water supply.

Although Uganda is usually considered a country well endowed with water resources, their seasonal and spatial variability causes specific problems which necessistate proper planning for the development and use of the available resources.

Conflicts are emerging on the sharing of water resources between upstream and downstream users. Upstream riparians may use the water in ways making it either inadequate or its quality unsuitable for the downstream users. In the context of the Nile Basin, Lake Victoria and the River Nile are finite shared water resources and the projected demands of the riparian nations may well exceed the resource.

Viewed within this context there is a clear need for a framework for proper water resources management, through which priorities can be established and optimal use of the nation's water resources planned. I am pleased to report that Government, through the preparation of this Water Action Plan now has provided major pillars of this framework.

The Water Action Plan provides guidelines and strategies for the protection and development of our nation's water resources and a structure for their management. It is intended to be an evolutionary and dynamic framework rather than a traditional prescriptive (top-down) "Master Plan". The guiding principles and various recommendations presented in the Water Action Plan will be instrumental in the formulation of our National Water Policy and have provided important inputs to the new draft Water Bill.

The overall objective of the Uganda Water Action Plan is:

"to manage and develop the water resources of Uganda
in an integrated and sustainable manner,
so as to secure and provide
water of adequate quantity and quality
for all social and economic needs"

The Water Action Plan defines actions leading to the establishment of an enabling environment for flexible water resource management with linkages between land and water resources. It defines management roles and identifies appropriate institutional structures for water resources management at national, district and local levels. It also reviews the currently accepted principles on transboundary waters, examines Uganda's international obligations, and argues a case for a rational and equitable utilization of the Nile waters.

In addition, the Water Action Plan presents an overview of Uganda's water resources situation as a result of a Rapid Water Resources Assessment exercise, and reiterates the need to establish reliable, up-to-date and adequate data information services to facilitate preparation of more elaborate assessments to quantify Uganda's water resource base and demands in details.

The Water Action Plan is recognized in the new water sector legislation as a flexible framework to guide the development, regulation and protection of the nation's water resources. I therefore would like to urge all stakeholders, decision-makers and resource users to be acquainted with the recommendations and strategies imbedded in the Water Action Plan.

Due to the dynamic nature of water resources issues, Government will - as also called for in the new water legislation - regularly monitor, review and update the Water Action Plan to reflect current challenges, new and emerging issues as well as available options.

The Water Action Plan study also identified a number of issues which needed to be addressed and for which an Action Programme has been proposed. This Action Programme is a pragmatic one -- fitting into our existing economic, political and social realities. Implementation of the recommended actions will require a concerted effort on the part of Government and some external assistance. However, the Action Programme is achievable and sustainable because it is moulded within the existing institutional structures - and it recognizes the general financial and human resource constraints. I would like, therefore, to take this opportunity to call upon external support agencies to support the implementation of our Water Action Plan and Action Programme therein.

Finally, I wish to thank all those who contributed in one way or another to the preparation of the Water Action Plan. I also wish to extend Government's special gratitude to Danida for the financial and technical support it has rendered during formulation of this important document which will guide us in instituting proper conservation, management and utilization of the precious water resource we have been endowed with in our rivers, in our lakes, in our wetlands and beneath us in the ground.

WATER IS LIFE - let's cherish it !

Henry Muganwa Kajura
MINISTER OF NATURAL RESOURCES

July 1995

THE EXECUTIVE SUMMARY PRESENTS AN OVERVIEW OF THE UGANDA WATER ACTION PLAN:

problems that have been addressed
principles that have guided the design
strategies that established the framework for action
the process of analysis and formulation
review of products
institutional and management structures
long and short term water resources management functions
potentials and constraints
highlights of rapid water resources assessment
commentary on international aspects
examples of issues that emerged from district studies
key water resources management procedures
actions for implementation

THE GOAL

to manage and develop the water resources of Uganda in an integrated and sustainable manner, so as to secure and provide water of adequate quantity and quality for all social and economic needs

PREFACE

The preparation of Uganda Water Action Plan is an important milestone in the process of improving the framework for water resources development and management in Uganda.

The Water Action Plan has been formulated in a project of the Directorate of Water Development of the Ministry of Natural Resources, Uganda, funded by Danida.

The water Action Plan was prepared by an integrated team of Ugandan and Danish water resources experts working under the co-direction of the Director of Water Development acting as the National Team Leader and a Danish Team Leader. The Danish water resources experts were recruited from the Water Quality Institute, COWIconsult, the Nordic Consulting Group and the Danish Hydraulic Institute, and the work in Uganda was undertaken during the period March 1993 to June 1994.

The multi-disciplinary nature of the Water Action Plan required an active involvement from representatives of several sectors. Thus, representatives from relevant institutions and ministries were forming a decision level Interministerial Committee and a working level Task Force. These groups of Ugandan top-level administrators and professionals provided guidance during the process.

Likewise participants in a broad-based workshop and a national seminar discussed the draft Water Action Plan and provided valuable comments.

The comprehensive and realistic Water Action Plan has been prepared thanks to the outstanding and highly dedicated efforts from all involved and the assistance from Danida.

THE PROBLEM

Freshwater is a finite and vulnerable resource. It is vital for sustaining life, for promoting development, and for maintaining the environment. Yet all over the world, rapid population growth, increased agricultural and industrial activities, and habits of "environmental carelessness", are causing a serious depletion and degradation of the available water resources - forests are cut down, soils are eroded, wetlands are drained, water sources dry up, rivers and lakes are polluted. And, too often, attempts to rectify the situation rely ineffectively on single-sector and top-down strategies.

At first sight, Uganda might well seem an exception. At least 15% of the country is water! But large tracts in the north-east and south-west are semi-arid, and everywhere there can be problems caused by periods of drought, by uncertainties over the timing of the wet seasons - and by variations in the flow of streams. Furthermore, there are worrying cases of degradation caused by both natural and human factors. The spread of the water hyacinth along the shores of Lake Victoria is an example of the first; the discharge of industrial wastes into the lake is an example of the second.

Human activities are having an increasing impact on both the quantity and quality of available water. Deforestation, overstocking and more intensive cultivation of the land are affecting the hydrology and the water balance - which can lead to flooding or drought problems, as well as to land degradation, soil erosion and siltation. As demands increase on water sources, so do the potentials for conflict - between, for example, the upstream factory that discharges wastes that pollute the drinking water of a downstream community.

The overriding consideration must be to secure enough water of an acceptable quality to provide for the sustenance and health of Uganda's people. But there are, also, a number of ways in which the water resources are crucial to the country's economic development: hydropower is the major source of energy; fishing in the lakes is a main commercial activity; irrigation schemes, livestock and fish-farming could maximise agricultural potentials; tourism is attracted by the beauties of Uganda's landscape.

So the need for a Water Action Plan becomes clear - the need for an institutional framework within which priorities can be determined and optimal uses planned.

Fortunately, Uganda's decentralised decision making structures offer the chance of multi-sectoral and coordinated approaches to the management of the water resources - at the national, the district, and the community levels.

THE PRINCIPLES

The Water Action Plan has been formulated in the light of certain principles about water resources management that were derived in the series of meetings that led up to the United Nations Conference on Environment and Development, convened in Rio de Janeiro 1992:

Principle 1: Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment
What is needed is a holistic approach to water resources management - one which links economic and social development to the protection of natural ecosystems.

Principle 2: Land and water resources should be managed at the lowest appropriate level
Decisions and actions concerning water resources management should be taken by those who are affected by them. Depending on the nature of the issues, the forum might be a household, a meeting of two community groups, or an international river basin committee.

Principle 3: The Government has an essential role as an enabler in a participatory, demand-driven approach to development
Legislation, structures and procedures should make up a framework within which there can be maximum participation, by all interested parties, in the analysis of problems and the taking of actions.

Principle 4: Water should be considered as a social and economic good, with a value reflecting its most valuable potential use
To encourage conservation and protection, the true economic value of water resources should always be taken into account when prioritizing potential uses - without infringing the basic right of all people to have access to clean water at affordable prices.

Principle 5: Water and land use management should be integrated
The planning of both land and water development projects should take into account the interrelationships - and the fundamental way in which ecosystems regulate both water quantity and quality.

Principle 6: Women play a central part in the provision, management and safeguarding of water
Though women are so obviously active in providing and using water, they are far less involved in its management. Special efforts should be made to facilitate women's effective participation in decision-making forums concerned with water resources.

Principle 7: The private sector has an important role in water management
Also, special efforts should be made to sensitise private sector resource managers to the benefits of sound use of water - because, collectively, these managers have a significant impact on water resources.

STRATEGIES
FOR WATER RESOURCES MANAGEMENT

The guiding principles were taken forward in designing a strategy for water resources management which addressed three main considerations: creating an enabling environment, building institutional structures, and establishing priorities and planning procedures.

CREATING AN ENABLING ENVIRONMENT:

- Government agencies will set the water resources management framework, monitor, mediate and enforce, rather than implement water resources activities.
- The Water Resources Statute, and its associated regulations, will ensure adherence to the National Water Resources Policy.
- Regulatory controls will be introduced only in response to clear needs.
- Costs of administering regulations will be balanced against potential benefits.
- Regulations will be kept at a level consistent with the capacity to enforce them.
- Regulatory controls will be combined with economic incentives, to influence individuals and organizations towards sound management of water resources.
- Guidelines and tools for efficient water resources management will be developed and made available to appropriate institutions and community groups.
- The Water Action Plan will be a continuous process of coordinating the preparation of policies, laws, regulations, guidelines and standards; advising on institutional development and training programmes; providing a framework for prioritizing and coordinating water resources development activities.

BUILDING INSTITUTIONAL STRUCTURES:

- A Water Policy Committee (WPC) will provide the mechanism for cross-sectoral policy decisions at the national level - as well as for policy development in relation to the shared water resources of the Nile Basin.
- WPC will work in close collaboration with other policy making bodies, such as the proposed National Environment Management Authority (NEMA) and the Ministry of Finance and Economic Planning.
- A WPC Secretariat will be established within the Directorate of Water Development.
- An integrated approach will be promoted by concerned government agencies and NGOs for the implementation of water development projects.
- An integrated approach to extension services will be developed.
- Water resources management functions will be delegated to the lowest appropriate levels - based on existing Resistance Council structures.

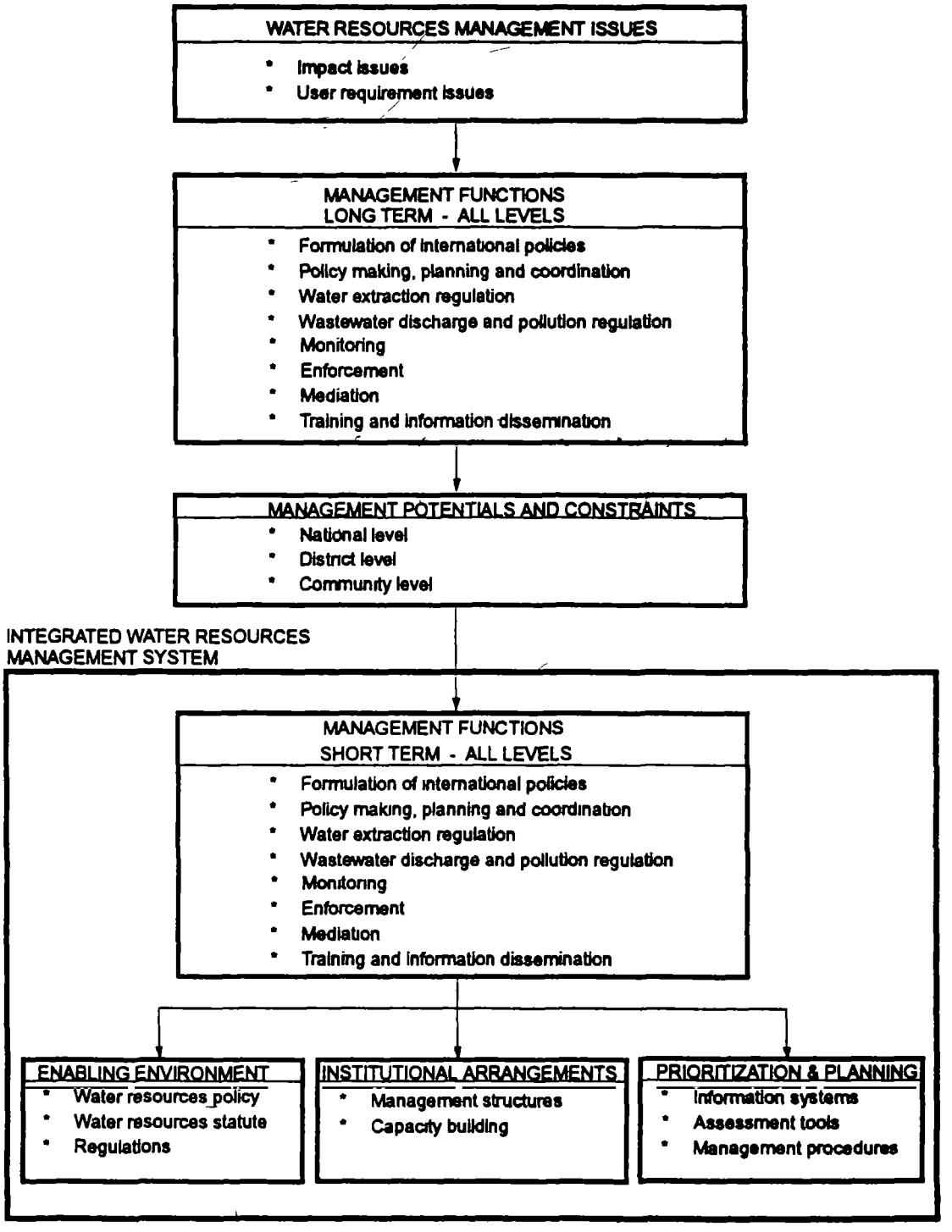
- River basin authorities will be established only in response to clear needs.
- Private sector involvement will be promoted.
- The participation of women will be enhanced.
- Capacities will be developed at the national, district and community levels - to plan and initiate soil and water conservation activities, to monitor the use of water resources, and to enforce regulations.
- Public awareness will be raised about the impacts of water quality on health.

ESTABLISHING PRIORITIES AND PLANNING PROCEDURES:

- First priority will be given to providing water of adequate quantity and quality to meet domestic needs.
- The allocation of water to meet the needs of irrigation, livestock, industry and other demands, will be made considering the economic, social and environmental values of water.
- The planning of water use will be based on the sustainable yields of sources.
- Water quality management will focus on minimizing pollution by specifying appropriate water quality and effluent discharge criteria.
- Linkages to land use management will be taken into account.
- Water resources management will be coordinated between districts within the same watersheds.
- Soil and water conservation measures, agricultural and forestry practices will be seen as integral to water resources planning.
- The important linkages between wetlands, surface water regimes and water quality will necessitate an integrated conservation and development strategy.
- In major water resources conservation or development projects, consideration will be given to the trade-offs between economic or social benefits and environmental costs; and the Environmental Impact Assessment process will be used.
- Opportunity and environmental, as well as direct, costs will be taken into account when establishing project priorities.
- Tariff systems, fees and charges will be designed to provide incentives for water conservation and minimum wastage.
- Adopting a "polluter pays" principle, fees and penalties will be assessed and levied on the volume, chemical and biological composition of the discharge -so pollution reduction at source will be encouraged.
- The allocation of water for use within Uganda will take into account international obligations.
- Regional cooperation in the development, management and equitable use of shared water resources will be promoted.

THE PROCESS

Work on the Water Action Plan, as illustrated in the following diagram, has been a process of analysing water resources issues that need attention, identifying necessary long term management functions, and, following an assessment of potentials and constraints, developing a short term management strategy in relation to all functions, which creates an enabling environment, builds institutions and designs prioritization and planning mechanisms.



THE PRODUCTS

The outcomes of the Water Action Plan are policy statements; institutional structures; procedures, regulations and guidelines; databases - a series of tools needed in the effective management of water resources. These are the tools that are presented in the main Water Action Plan documents.

WATER ACTION PLAN: MAIN REPORT
A synthesis of the key points of the Water Action Plan, comprising the water resources management framework, the action programme and a guide to the implementation and monitoring of the plan.

WATER RESOURCES POLICY
A definition of a water resources policy, with its associated management strategies; outline of areas for further policy developments; first draft of a water supply and sanitation policy.

RAPID WATER RESOURCES ASSESSMENT
An estimate of the occurrence in space and time of both surface and groundwater resources in Uganda - and a tentative assessment of the water requirements and water resources development trends.

INSTITUTIONAL AND MANAGEMENT ASPECTS
An identification and analysis of water resources institutional structures, management functions and tools; presentation of both short and long term strategies for water resources management - and the implied capacity building programmes.

INTERNATIONAL ASPECTS
A commentary on Uganda's position in the Upper Nile Basin, in relation to water resources; a brief history of the main international issues, from Uganda's perspective; an analysis of the implications of Uganda's location as both a lower and an upper riparian.

ANNEX REPORT, VOLUME 1: DISTRICT STUDIES
Collation of studies on the water resources issues and management capacities of five districts - Arua, Mbale, Mbarara, Moroto, Mukono - and studies on particular topics for Hoima, Kabale and Tororo.

ANNEX REPORT, VOLUME 2: GROUNDWATER DATABASE
A description, specification and manual for the development of a groundwater database.

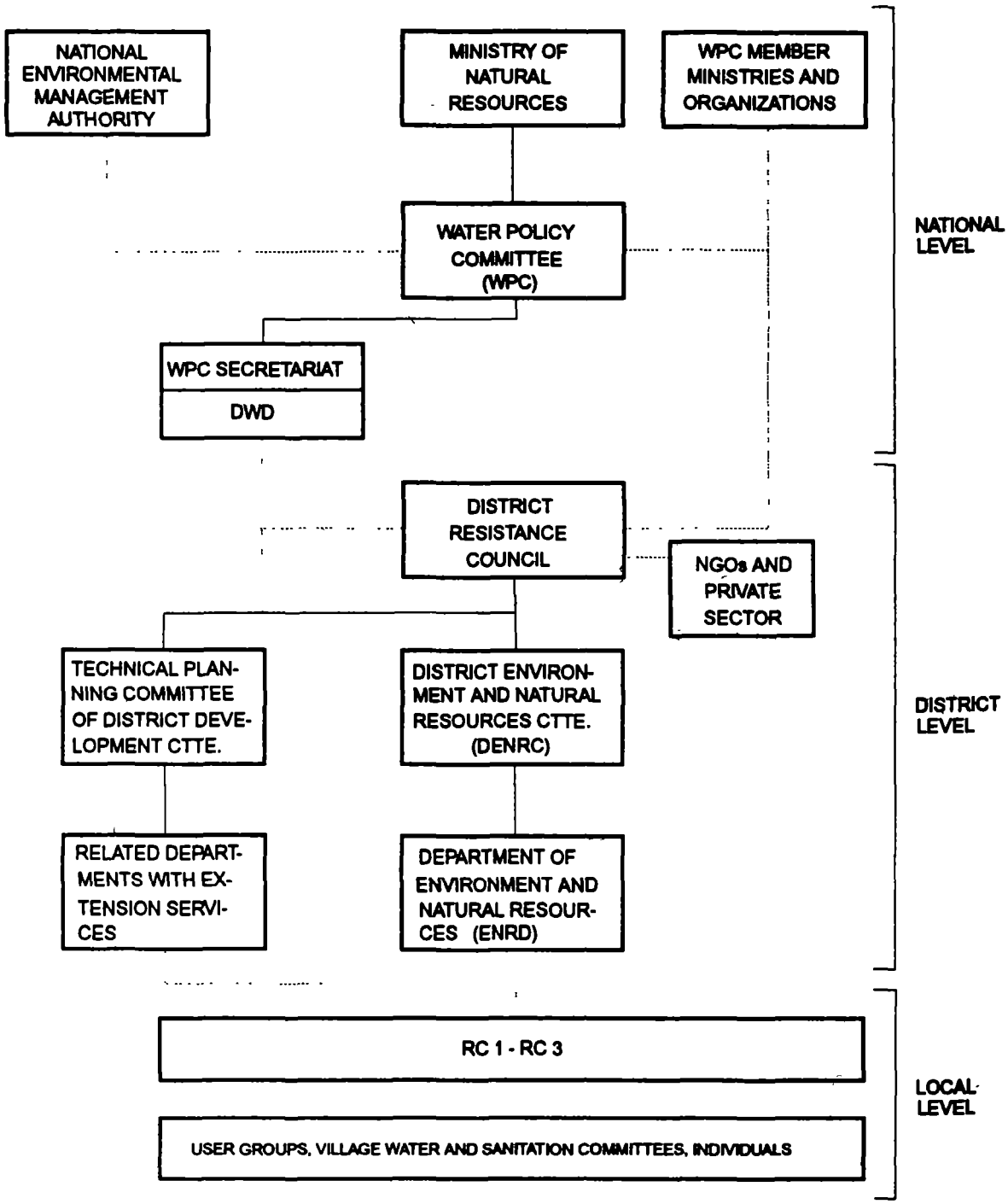
ANNEX REPORT, VOLUME 3: MANAGEMENT ASPECTS
Background for the preparation of regulations supporting the Water Resources Act; guidelines for district water resources management; procedures for processing and issuing permits.

ANNEX REPORT, VOLUME 4: PROJECTS AND ACTIONS
Descriptions of water resources development plans and projects; guidelines for prioritization, conducting impact assessments, updating and coordination; catalogue of water resources related projects and actions.

Other outputs have been an updating of the surface water resources database, an updating of the groundwater database - including training - and the identification of two projects basic to water resources management.

INSTITUTIONAL AND MANAGEMENT STRUCTURES

The proposed institutional structure for water resources management:



——— LINES OF RESPONSIBILITY

····· LINES OF COMMUNICATION, LIAISON AND SERVICES

NOTE: LINES OF RESPONSIBILITY FROM DISTRICT TO NATIONAL LEVEL WILL CONFORM TO DECENTRALIZATION DIRECTIVES
CTTE. : COMMITTEE

MANAGEMENT FUNCTIONS AND LEVELS

The target for the long term:

FUNCTIONS	NATIONAL LEVEL	DISTRICT LEVEL	COMMUNITY LEVEL
Formulation of international policies	Through WPC: Defining Uganda's position with regard to cross-border issues of water quantity and quality.		
Policy making, planning and coordination	Through WPC: Formulating national priorities for water and land resources. Setting water quality standards. Mediating on water resource issues.	Through RCs and district administrations: Framing and upkeeping by-laws, standards and guidelines. Establishing a database. Coordinating extension programmes.	Through RCs: Framing by-laws on water-related issues of direct concern to local communities. Managing the use of, eg. wetlands and forests.
Water extraction regulation	Through DWD: Specifying water volumes for which districts can allocate extraction permits.	Through district water offices: Processing applications and issuing drilling and extraction permits.	
Wastewater discharge and pollution regulation	Processing wastewater discharge applications and issuing discharge permits.	Commenting on applications in relation to district development planning. Monitoring permit holders.	Through user groups: Assisting in the monitoring of potentially harmful discharges. Framing and enforcing local rules.
Monitoring	Monitoring water flows and water quality. Managing surface water, groundwater and water quality data banks.	Assisting in monitoring wastewater discharges. Checking groundwater for possible contamination.	Monitoring the condition and use of water resources and facilities. Reporting misuse and infringements.
Enforcement	Enforcing wastewater standards and regulations through a permit system.	Imposing sanctions when permits, by-laws or regulations are not being followed.	
Mediation	Through WPC: Acting as final administrative mediation body for water disputes and for settling institutional disputes.	Through DENRC or Magistrates Courts: Mediating disputes over water rights and uses.	Through Elders, Chiefs and village RC courts: Mediating water resource disputes.
Training and information dissemination	Through DWD: Developing water resources management training workshops and materials for extension staff. Developing materials for public information on water resources management issues.	Through ENR Dept: Conducting workshops for extension workers on water resources management issues. Conducting educational activities on water resources issues, for the general public.	

FUNCTIONS, POTENTIALS, AND CONSTRAINTS

A display of potentials for water resource management in Uganda, and of the constraints - other than the general ones of lack of finance, transport and equipment.

FUNCTIONS	POTENTIALS	CONSTRAINTS
Formulation of international policies	Establishment of the Water Policy Committee has been agreed	Lack of formal agreements between the countries of the Nile Basin. Lack of reliable information on the quantity and quality of shared water resources.
Policy making, planning and coordination	Legislation on water resources and supply has been drafted. Establishment of the Water Policy Committee has been agreed. NEMA has been established. DWD has staff with experience of water resource management issues. DWD has been restructured to focus on advisory and supervisory roles. Decentralization opens up opportunities for a more rational reorganisation of cross-sectoral agencies and extension services.	Low capacity at the district level for conducting environmental impact assessments. Inadequate knowledge of water resource management issues among extension officers. Economic pressures, such that environmental concerns are over-ridden. Lack of adequate structures for coordination across extension services.
Water extraction regulation	Regulations and management procedures are drafted. Capacity requirements at national level are low. The local administrative system is established in all districts.	Shortage of staff at district level with engineering qualifications. Unclear interface between district, municipal authorities, and DWD. Lack of monitoring equipment.
Wastewater discharge and pollution regulation	Staff with necessary knowledge exist within DWD HQ. Required administrative structures and procedures at national level are relatively uncomplicated. District Water Officers can assist in monitoring activities.	Shortage qualified staff at district level to deploy for discharge control. Lack of monitoring equipment. Very limited access to laboratory facilities.
Monitoring	"Rehabilitation of Water Resources Monitoring and Assessment Services" has been agreed. DWD HQ has staff with required qualifications. District Water Officers can assist in monitoring activities.	No formulated monitoring strategy. No agreed standards. Lack of staff at district level with engineering qualifications. No qualified staff at district level to deploy for general WQ monitoring. Lack of monitoring equipment. Limited access to lab. facilities.
Enforcement	Regulations are drafted. RC and Magistrates Courts are in place and functioning.	Possible adverse public and political priorities and pressures.
Mediation	Elders, the Administrative Chiefs, as well as the RC and Magistrates Courts, all could have a role. WPC as final admin. appeal body.	
Training and information dissemination	Training Section of DWD will be strengthened. The RC system ensures a high degree of community participation Extension services reach right down to the village level - with opportunities for Water Officers collaborating in the design and delivery of environmental messages	Shortage of qualified staff who could carry out educational programmes concerned with the management of water resources. Lack of coordination between extension agencies, so that harmonised information on water resource management issues can be disseminated and discussed

SHORT TERM MANAGEMENT FUNCTIONS

The target for the first five years, considering the constraints and potentials for water resources management:

MAIN FUNCTIONS	NATIONAL LEVEL	DISTRICT AND COMMUNITY LEVELS
Formulation of international policies	Establish Water Policy Committee, its Secretariat, and its International Sub-committee.	
Policy making, planning and coordination	Set national priorities for water and land resources. Revise policy, laws and regs. Liaise with NEMA. Ensure plans and projects conform to national policies, standards and guidelines. Advise Minister on decentralization of national functions and on appeals regarding water extraction and discharge licensing. Mediate disputes between government bodies concerning water resources issues.	Establish an Environment and Natural Resources Committee plus its administrative department - or other structure with same functions. Define district priorities. Make relevant by-laws and regulations which address the priority problems. Integrate district extension services. Establish a database of water resources. Promote the management role of women in water resources.
Water extraction regulation	Establish a unit within DWD for processing applications and issuing permits for water extraction - as per regulations.	Identify large water users for licensing. Set up procedures for commenting on applications. Establish a database of water sources. RC committees comment on water extraction applications.
Wastewater discharge and pollution regulation	Establish unit within DWD for administering wastewater discharge permits as per regulations.	Identify wastewater dischargers for licensing. Establish procedures for administering the licensing. RC committees to report on pollution problems.
Monitoring	Measure flows & water quality. Monitor permit holders. Process information collected at monitoring stations. Disseminate water resources data to relevant users.	Observe performance of permit holders and report misuse to DWD. Strengthen monitoring capacity.
Enforcement	Through the special unit set up within DWD, enforce regulations for water extraction and wastewater discharge.	
Mediation	WPC to act as final administrative agency for mediation between government institutions regarding water resources issues.	DENRC to act as mediating body for disputes that cannot be resolved at lower levels. RCs, RC Courts, Chiefs and Elders to act in settling local disputes.
Training and information dissemination	Strengthen Training Section within DWD, in order for it to support districts in relation to national legislation, regulations, policies and standards.	Train extension agents in the integrated extension approach to water and land management, and in disseminating integrated environmental information.

RAPID WATER RESOURCES ASSESSMENT

The rapid assessment has provided, an approximate picture of the available water resources in the country - as a support to overall planning and as an indicator of priority areas within which more detailed investigations should be carried out. Three major water resources planning units were considered: the Upper Nile system, the Ugandan catchments, and the groundwater sources.

The Upper Nile system

The equatorial lakes and the Nile, which make up the "Upper Nile system", represent a huge water resource - and a potential for numerous development activities. Although Lake Victoria provides the water supply of the three large towns - Kampala, Entebbe and Jinja - this represents only approximately 0.2% of the lake's outflow. Furthermore, no large scale irrigation is expected within the Ugandan terrain bordering the lake in the near future. Nevertheless, one of the main concerns will be to maintain the lake as a storage reservoir which can yield the consistently high outflows needed for the generation of hydropower. More critical, however, is the issue of pollution: not from Uganda alone, but from all the upper riparian countries. The present problem caused by the rapid spread of the water hyacinth is exacerbated by the deteriorating water quality. Such deterioration could seriously affect water supplies, jeopardise fishing, and impede the development of a tourism industry.

Fishing and tourism are potentials of the other two very large lakes, Albert and Kyoga, and they too would suffer from water quality changes. Lake Kyoga might well be a sustainable source for irrigation projects. As for hydropower, only a small fraction of the vast potential of the River Nile from Lake Victoria to the Sudanese border is being tapped.

The Ugandan catchments

Whereas the dominant source of large urban water supplies is surface water, the smaller towns and rural areas are, and will continue to be, dependent on groundwater. Throughout the country, livestock are usually provided for from surface water sources. In general, though the surface water resources will be able to satisfy urban and livestock demands into the foreseeable future, the distribution pattern is such that there will be competition for water in certain cases - particularly where there are large annual variations in river flows or where streams are not perennial.

It is difficult to predict the trends of irrigated agriculture in the country - and therefore be able to estimate the demands irrigation will put on surface water sources. The economic and social feasibility of large scale irrigation compared with alternative agricultural practices is not obvious - so demands for irrigation water are not likely to be significant in the near future. Fish ponds are on the increase in Uganda, and the current estimate is that there are about 2000 working ponds. The water requirements - and the possibilities of organic pollution - may become increasingly significant issues.

In addition to Kampala, Entebbe and Jinja, only 10 towns have waterborne sewerage systems; other areas are served by combinations of septic tanks and pit latrines. In areas of low dry-season runoff, effluents are often not properly diluted; so downstream water intakes can be polluted and, without adequate and reliable treatment mechanisms, serious health hazards occur.

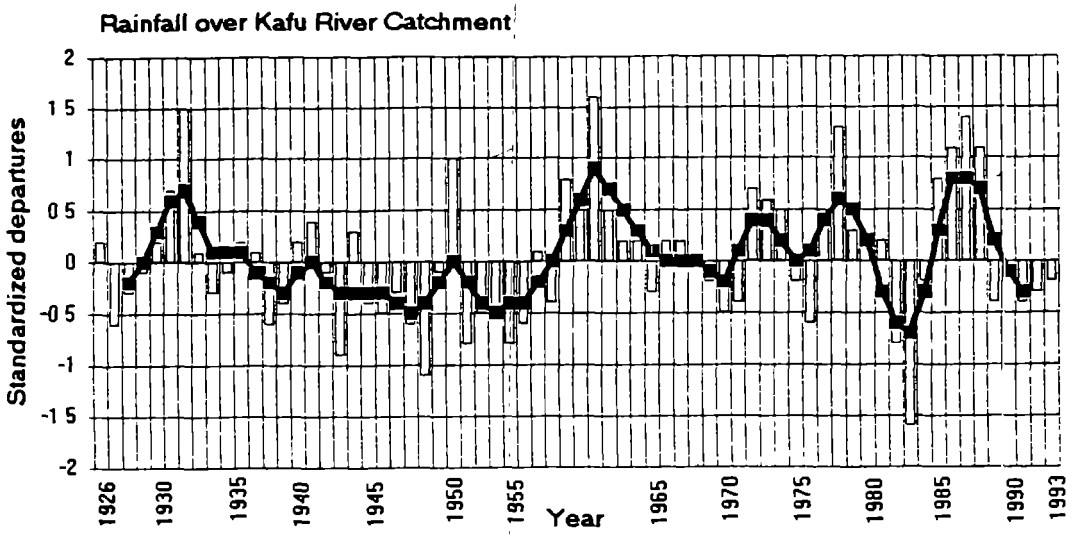
Groundwater resources

Though it seems - from recent surveys, calculations of recharge rates, and estimates of developments - that groundwater resources can, over most parts of Uganda, meet the demands in rural areas, in more densely populated places the deep groundwater, even when supplemented with shallow wells and springs, may not meet supply requirements, without significant per capita costs.

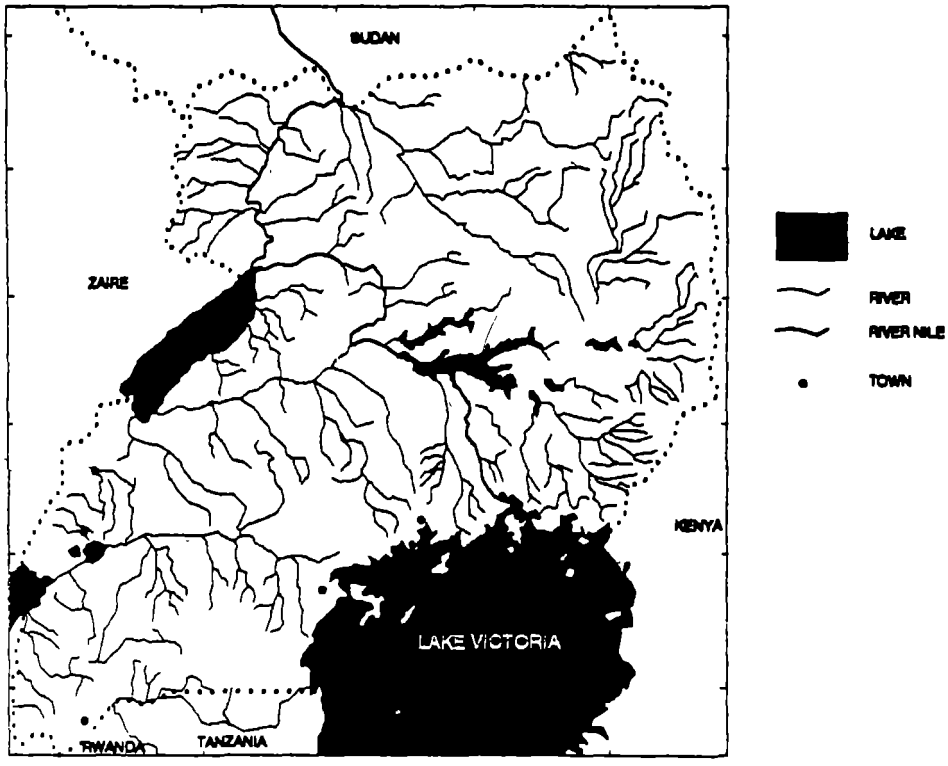
Corrosiveness is a widespread problem, and worryingly high fluoride concentrations occur in certain locations.

Some examples

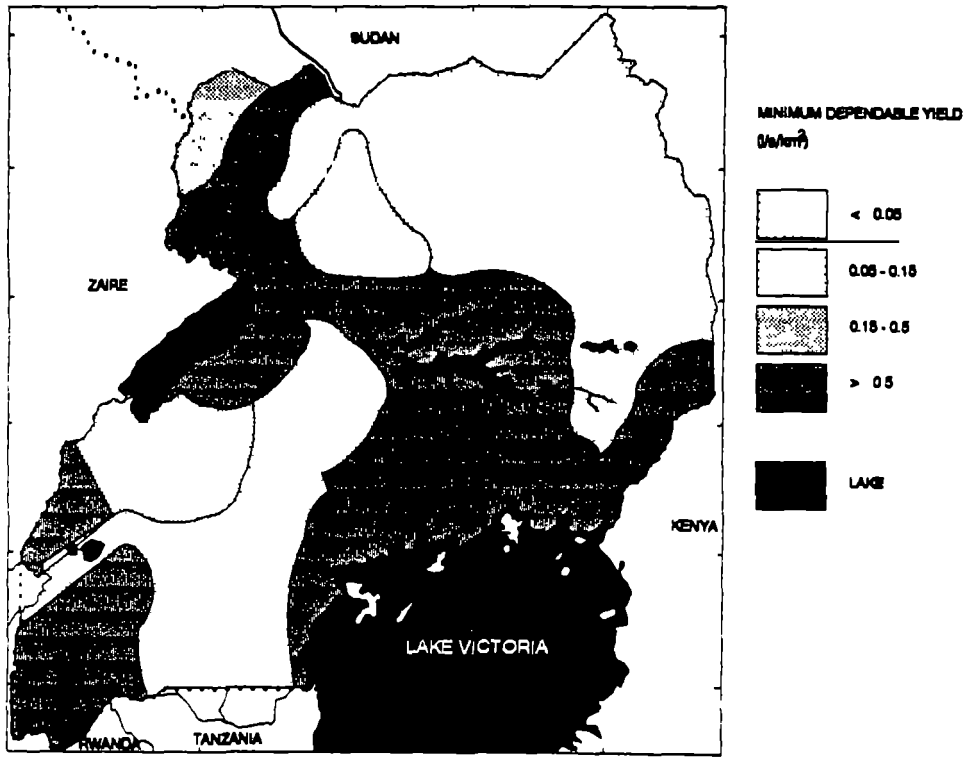
The findings of the rapid water resources assessment have been illustrated in a series of graphs and maps. Three of them are adapted and shown below. The first shows long-term variations in rainfall over a central catchment in Uganda. The long term variations show a cyclical behaviour, and present departures from the norm are much less serious than those experienced in the forties, fifties and early eighties. The observations are in harmony with the general pattern of Lake Victoria level variations, and it can be assumed that the graph is representative of much larger areas of Uganda.



The figure below shows the general drainage pattern within Uganda:



The third figure shows the variation in minimum dependable yield within the Ugandan territory. The minimum dependable yield is defined as the one in five year minimum monthly flow.

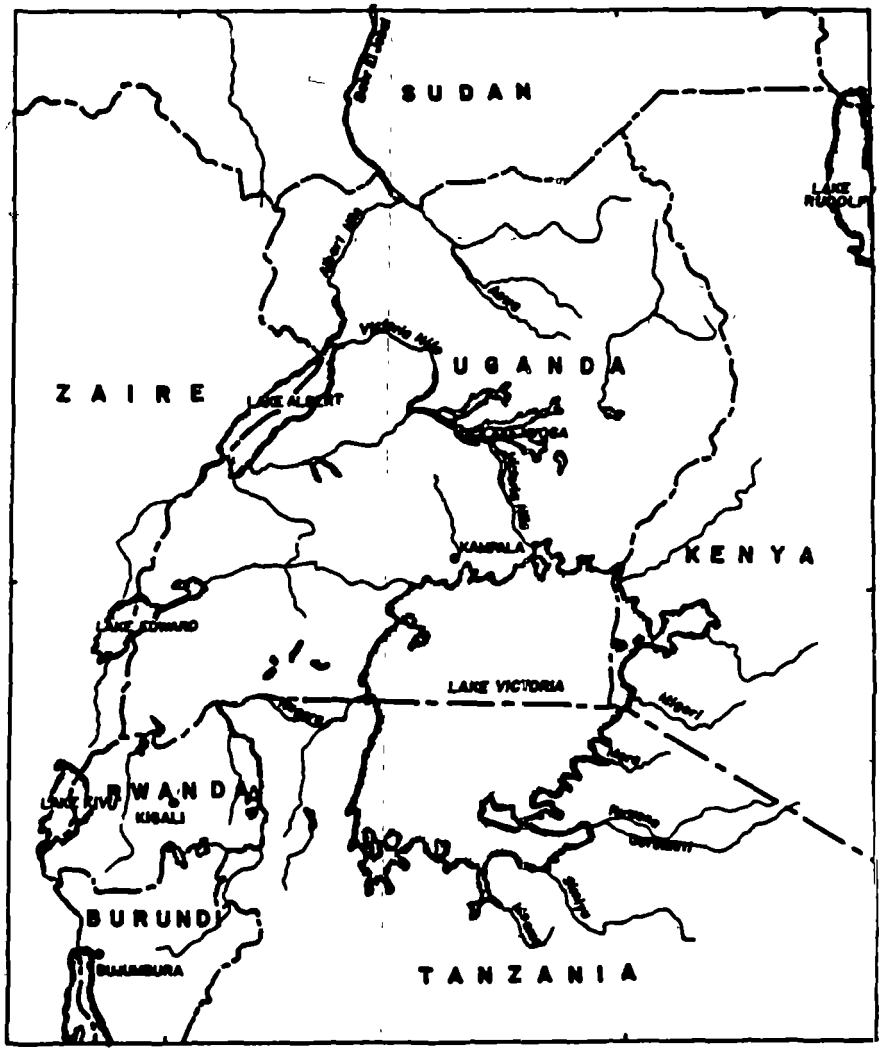


INTERNATIONAL ASPECTS

If there were to be a marked reduction in the flow of the Nile, then the international consequences would be inevitably significant. There would be immediate impacts on the lower riparians, Egypt and Sudan - both of whom have strong interests in continuing to receive the same volume of water as would be provided without any major abstractions by the upper riparian countries. Similarly, pollution of the lakes and rivers of the Nile Basin can have an impact of significane to five countries: Egypt, Kenya, Sudan, Tanzania and Uganda.

Uganda's Water Action Plan examines the present legal obligations and the current forums for cooperation - with a view to possibilities of ensuring equitable sharing arrangements.

The map shows Uganda's position in the Upper Nile Basin.

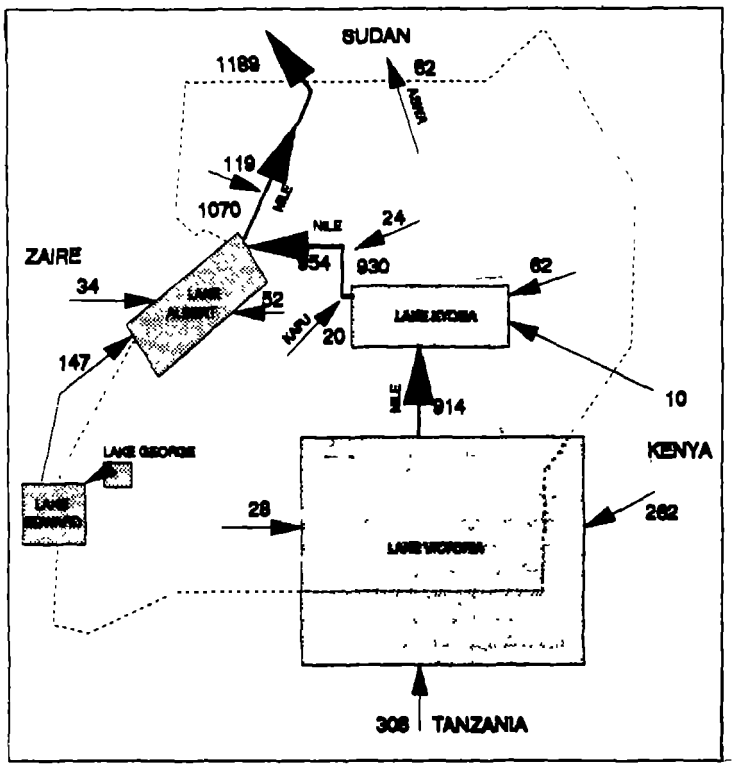


The existing treaties are reviewed: the Nile Waters Agreement of 1929 and the Owen Falls Dam Agreement of 1949 - as well as the three agreements with Nile Basin states entered into by Uganda after independence. These old and more recent agreements are assessed in the light of current, and generally accepted, doctrines of "equitable utilization of shared water resources" - and they are set against environmental declarations of the United Nations.

An important international aspect to be examined is the question of pollution. Water quality and pollution loads in the region are not being monitored sufficiently well to make accurate assessments - or specify cause/effect relationships - but it is apparent that there has been a serious deterioration of the ecology and water quality of Lake Victoria during the last two decades - and this, in turn, affects the water quality of the Nile. With the increasing population in the catchment area and the reduced buffer capacities of the ecosystem, there could be a dramatic reduction of the fish stocks, a build-up of algae blooms along lake shores adjacent to towns, and further contamination causing major health hazards. International action is urgently required.

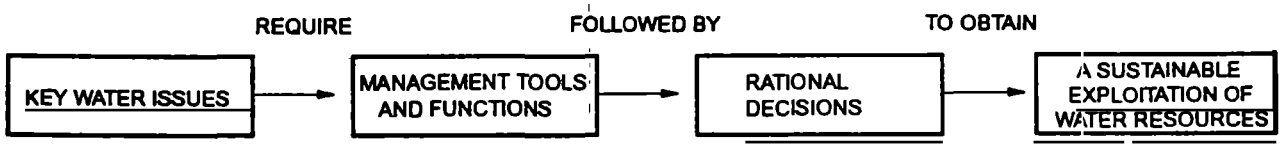
Uganda, alongside the other riparian nations, has particular reasons to regard water as both an economic and environmental good - and a strong interest in participating in any multi-national basin-wide organization concerned with the management of the water resources. The Water Policy Committee will have a clear mandate in helping to formulate Uganda's priorities and policies.

The figure below illustrates schematically the major components and average flows of the Nile system within the Ugandan territory. (Figures are 1948-70 averages in m^3/s, source: HYDROMET).

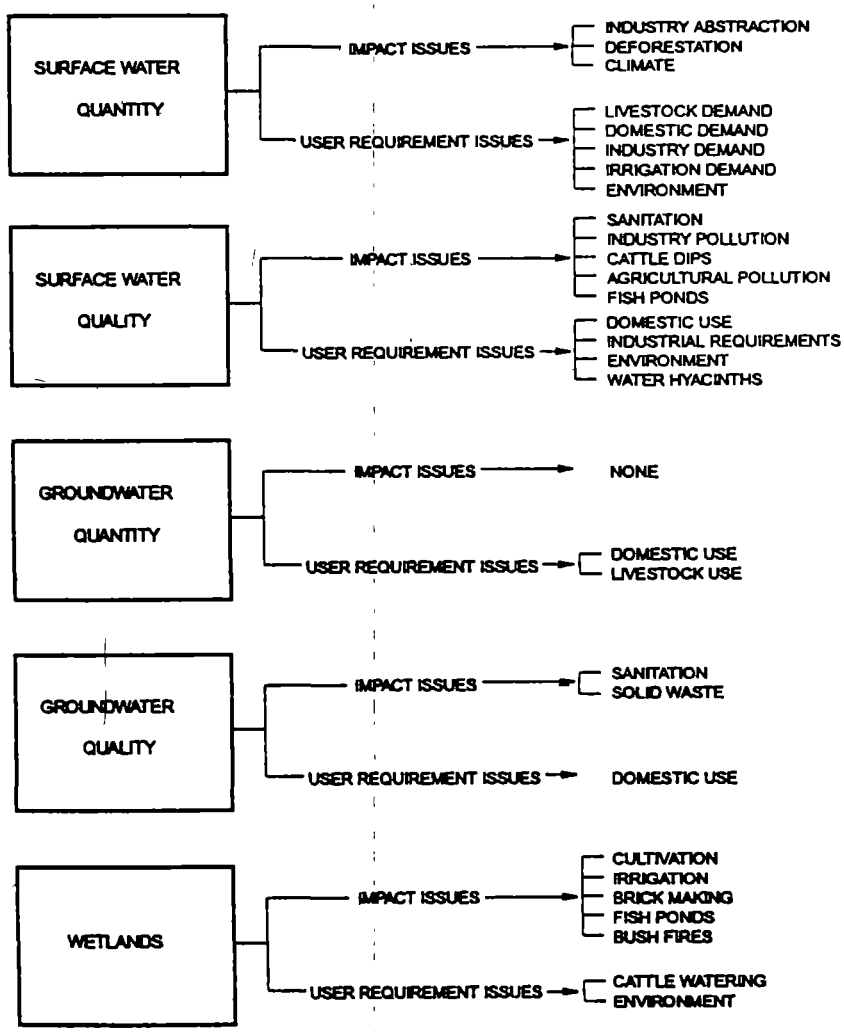


DISTRICT STUDIES

The purpose of the five main district studies was to identify key issues related to water resources management. From these issues, a series of management functions and tools were derived - needed for the kinds of rational intervention that would lead to a beneficial and sustainable use of the resource:



The following diagram presents an overview of the main issues found; an impact issue relates to an activity which has a negative effect on either water quantity or quality, and a user requirement issue relates to the inadequate matching of needs and available resources.



EXAMPLES FROM MBARARA

Some of the issues that were identified - and the required responses:

SURFACE WATER QUALITY		
RATIONALE	**MANAGEMENT TOOLS & FUNCTIONS**	**MANAGEMENT RESPONSIBILITIES**
IMPACT ISSUE: POLLUTION		
An abattoir discharges waste water into River Ruizi in Mbarara town; a milk station, a soap factory, a meat processing industry and a tannery all discharge to low-lying swamp land at Kakoba. Organic and chemical wastes are polluting both the swamp and a river, which is also used for domestic supply. Several companies are applying for registration (including Pepsi Cola) and Mbarara Town Council plans to develop an industrial area along the river.	Industrial effluent standards and regulations - based on trade-offs between treatment costs, capacity of the municipal treatment plant, and environmental benefits. Industrial environmental awareness building. Legal means of intervention when violations occur. Economic incentives.	**National:** Drafting of policies, standards, guidelines for EIAs, regulations. Establishing means of intervention. Providing economic incentives. **District:** Making EIAs. Monitoring & controlling effluents. Environmental awareness building. **Community:** Raising awareness of pollution. Reporting cases
IMPACT ISSUE: DEFORESTATION		
The intensive use of hill slopes for cattle pasture is claimed to have increased the erosion, which has caused severe silting of the rivers.	Regulatory control of land use. Incentives for adopting alternative farming practices. Declaration of forest reserves. Legal means of intervention.	**National:** Establishing framework for control of biomass use. Designation of forest reserves. **District:** Making by-laws. Promoting incentives for use of hill slopes. **Community:** Through Rcs, raising awareness, passing by-laws ad exercising community self-control.
USER REQUIREMENT ISSUE: DOMESTIC USE		
Owing to the scarcity of developed groundwater sources in many parts of Mbarara District, a substantial number of households depend on surface water for consumption (mostly rivers and valley dams). There is no direct monitoring of the surface water quality, but it is obvious that this water is not suitable for drinking. Often the same source is also used for washing, wastes, and watering cattle The high silt content also hampers the intake of water for domestic supplies.	Coordination of upstream/downstream use. Enforcing regulations for effluents. Managing a system of discharge permits, based on EIAs. Activating legal means of intervention.	**National:** Setting effluent standards and wastewater regulations. Establishing legal means of enforcement. Producing guidelines on construction and use of valley tanks and dams. **District:** Planning water intake and wastewater discharge locations. Supervising use of valley tanks and dams. Monitoring. **Community:** Maintaining quality of sources.
USER REQUIREMENT ISSUE: ENVIRONMENT		
Kagera River has become infested with the non-native water hyacinth - adding another dimension to the eutrophication phenomenon, since nutrient loadings (nitrogen and phosphorus) are rapidly converted into biomass. Navigation is impeded; oxygen depletion affects fish stocks.	Agreements have not been reached on most appropriate control measures.	**National:** Determine eradication strategy. Coordinate policies and controls with upstream countries. **District and Community:** Support and implement nationally determined actions

MANAGEMENT PROCEDURES

The Need for Regulation

The conservation, equitable use and protection of Uganda's water resources can be achieved only by putting in place appropriate regulatory machinery - and making sure that there is capacity to operate that machinery. Among the many matters on which control can properly be exercised, there are two main activities for which regulatory mechanisms are urgently needed: extraction of both surface and groundwater - and wastewater discharge. These are the two areas for which the Water Action Plan presents the case for a permit system, proposes outline regulations, and identifies the required administrative procedures.

Proposed Administration

A small unit will be established within the Directorate of Water Development for processing applications and issuing permits for water extraction and wastewater discharge. Through established institutional channels the unit will also have responsibility for enforcing wastewater standards and regulations. And at the district level, in cases where monitoring reveals that permits, by-laws or regulations are not being followed, the district authorities will need to apply sanctions, either administratively or through the RC and Magistrates Courts.

But the drafting and implementation of regulations, permits, by-laws and procedures should all be in harmony with the principles that underlie the Water Action Plan: devised in a participatory manner and managed at the lowest appropriate level. Also, recognizing capacity constraints, the regulatory system should apply only to activities where the negative impact on the water resources are on a significant scale.

Regulating Water Extraction

A core element of water resources management is the rational prioritization and sustainable allocation of water supplies among different users. Of course, the more scarce the resources, the more necessary and difficult this management becomes. But always, as a basis for making these judgements, it is vital to have adequate information about what resources are available -and what are the present and likely future demands on those resources. Such information can be obtained only if extractors report on their extractions to those who have the responsibility for managing the resource. Hence the first need for the regulation of water extraction.

However, it is argued that there is no case for regulating small scale water extractions if they do not adversely affect the possible use of the resource by others. Therefore, although there will be an obligation to report on all groundwater drilling, only large scale extractors will need to apply for permits - and be subjected to the consequent monitoring.

Two levels for regulation of groundwater extraction and three for surface water extraction are envisaged. As shown in the following table, the determining factor is the degree of anticipated impact on the resource. Note that, in the case of irrigation schemes and fish ponds, the recommended threshold values have not been specified - these will be

determined by the Directorate of Water Development, in consultation with the Ministry of Agriculture, Animal Husbandry and Fisheries.

Criteria for levels of water extraction regulation:

DEGREE OF CONTROL	GROUNDWATER	SURFACE WATER
No regulation	Domestic use as defined in Water Resources Statute Extraction by manual means	Domestic use as defined in Water Resources Statute Extraction by manual means
Registration required		Extraction of water by motorized pump or by gravity diversion with a capacity < 5 l/s Non-subsistence irrigation schemes < .. ha Non-subsistence fish ponds < .. ha
Permit required	Extraction by motorized pump, except for domestic use as defined in Water Resources Act	Extraction of water by motorized pump or by gravity diversion with a capacity > 5 l/s Irrigation schemes > .. ha Fish ponds > .. ha

Charges

The recommended charges in connection with water extraction permits comprise two elements:

- a flat rate, one-time charge, to cover the costs of the administration associated with handling the permits
- an annual charge for water extraction

The annual charge could be designed to reflect any scarcity in particular areas. The revenue should be an income for administering the permit system; it would be used to cover, among other things, the costs of monitoring compliance with the given permits and impacts on water resources. DWD would design the structure and WPC decide on the size of the charges.

Decentralization

The long term strategy is that districts will receive from DWD, as the central authority, permission to allocate a specified volume of water from streams or rivers. The permission will be based on existing use, hydrological criteria, and on an assessment of possible environmental impacts. Then the districts will decide how the permitted volume of water will be divided among competing users, including what surface works can be constructed, and they will issue the extraction permits. DWD will carry out assessments to determine the uses of cross-boundary sources, taking into account any international implications.

In the short term, DWD will administer the water extraction permit system, and it is assumed that this will involve licensing only a small number of large-scale users.

Regulating Wastewater Discharge

Surveys and reports on the discharging of effluents suggest that, in the interests of environmental protection, the municipal services and industrial activities which should be regulated are:

- urban wastewater treatment plants
- sugar factories, textile industries and breweries
- tanning, oil and soap industries
- meat, fish and milk processing plants.

It seems that the second category (sugar factories, textile industries and breweries) at present account for 95% of the national industrial discharge of BOD - though the leather tanning industry produces some of the most heavily polluted wastewater in the country.

Because the processing of wastewater discharge applications involves complex technical issues, the proposal is to reduce the scope of the regulations in two ways: by concentrating on only a limited range of polluting activities (those indicated above) and by focusing on the most characteristic pollutant produced by these industries, BOD, which is also simple to both control and treat. Also, in view of the technical complexities - and of the fact that wastewater discharges affect water resources across district and even national boundaries, it is suggested that the processing and issuing of wastewater discharge permits should be a permanent national function.

Charges

It is recommended that a system of charges should be established which provides incentives to reduce the contents of pollutants in wastewater effluents - either by a more efficient use of raw materials or by treating the effluents. The cost should be determined according to the amount of pollutants discharged. This would be a signal that all polluting effluents are to be discouraged - and it meets the principle of "the polluter pays".

The cost of a wastewater discharge permit would be in the form of a fee paid annually, which comprises two elements:

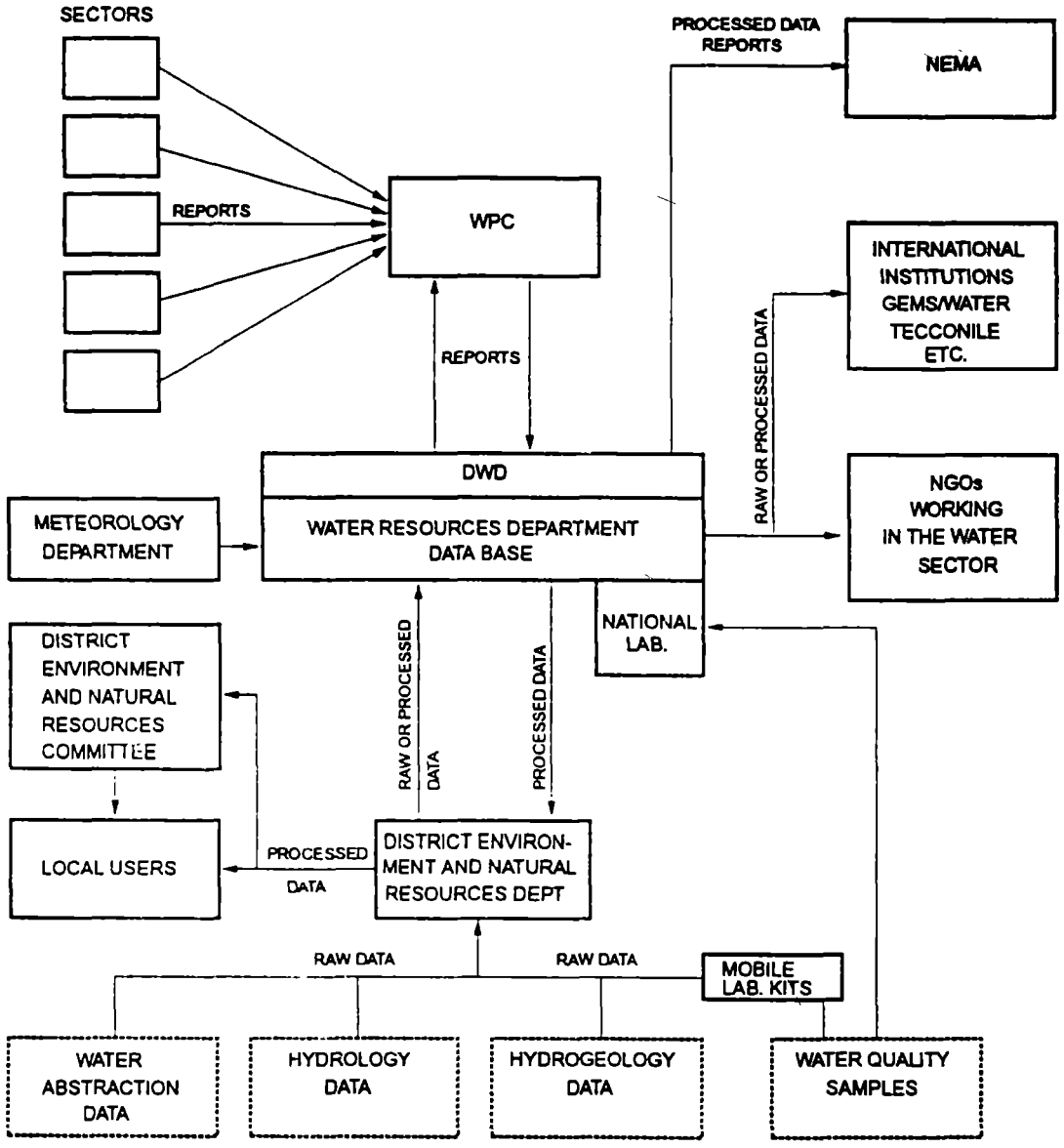
- a flat rate, one-time charge, to cover the costs of the administration associated with handling the permits
- a variable charge related to the type and quality of pollutants being discharged - which would, among other things - cover the costs of monitoring compliance with the permits

The scale of variable charges would be designed to impose a very severe penalty for wastewater discharges with excessive pollution. DWD would design the charges and WPC would decide on the rates

A Data Management System

The Water Action Plan is proposing an integrated data management system that will collect, analyze, store and disseminate information - and assist the wide variety of users in their access to and application of the information that is relevant to their specific management functions:

DATA MANAGEMENT FLOW CHART

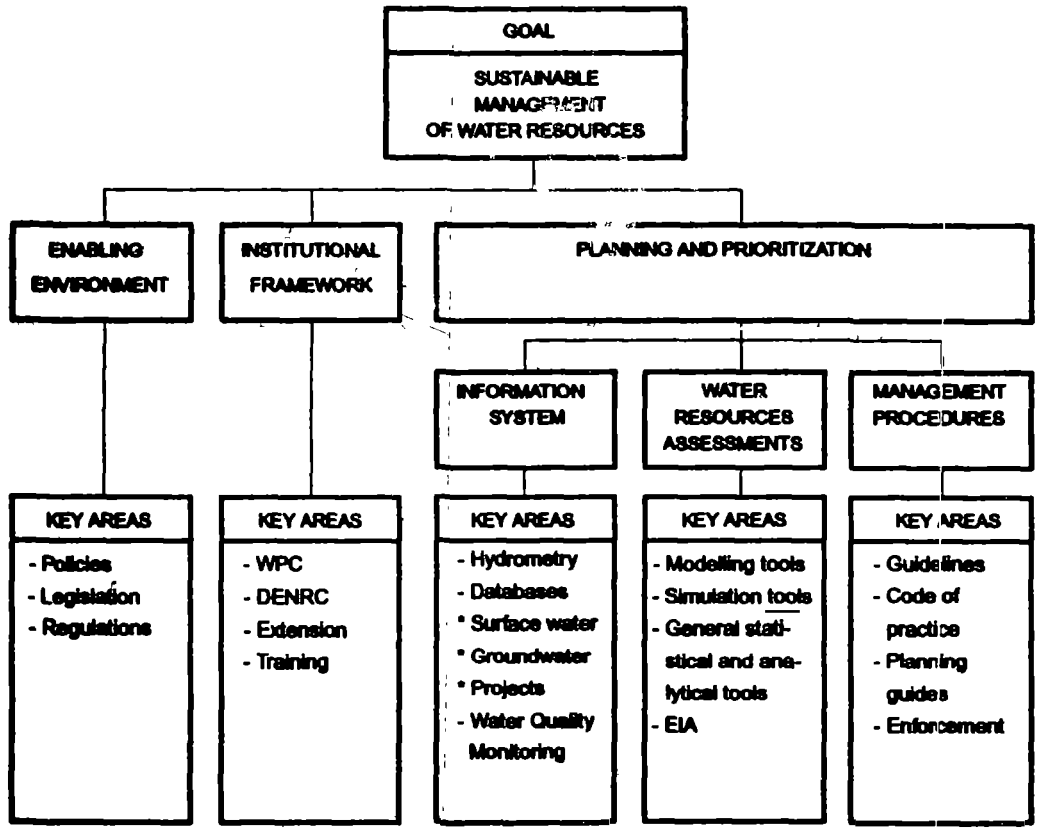


For speed and efficiency in making and implementing decisions, it is important that, whenever possible, relevant information is abstracted, analyzed and used at the district level -instead of waiting for it to come and go out of the central databank. Also, in order to facilitate cross-sectoral management mechanisms, data will need to flow, as illustrated, to sectors related to water resources, such as agriculture, land, fisheries and forestry.

ACTION PROGRAMME

The programme of action that emerges from the analysis of significant issues, and the identification of the responses that are necessary, does not call for a radical restructuring of institutions nor a massive input of resources. The Water Action Plan is a pragmatic one: which fits proposals to existing economic, political and social realities. The structures, functions, procedures and actions that are proposed will need some external assistance - some materials and expertise in support of capacity building - but the action programme is achievable and sustainable because it is moulded within the existing institutional structures and it recognises the general resource constraints.

This final diagram reflects the formulation process of the Water Action Plan and identifies the key areas that will be addressed in its implementation:



DENRC District Environmental and Natural Resources Committee
EIA Environmental Impact Assessment
WPC Water Policy Committee

IMPLEMENTATION

The following tables show the action programme: a three stage strategy in which 39 actions will be undertaken. Stage One is expected to be complete after two years; Stage Two after four; and Stage Three after six years. The criteria used in determining the schedule has been a balancing of considerations such as clustering actions that are best dealt with together, and following the logic of the overall Water Action Plan: first creating the enabling environment, then building the institutional structures, and, finally, producing and using the needed management procedures and tools.

1st STAGE ACTION PROGRAMME
POLICY DEVELOPMENT
- Finalize water supply and sanitation policy
REGULATIONS AND MANAGEMENT PROCEDURES
- Prepare final water and wastewater regulations
- Prepare detailed definition of regulation limits and charges
- Establish water resources assessment procedures
- Establish enforcement procedures
NATIONAL AND DISTRICT INSTITUTIONAL STRUCTURE
- Establish Water Policy Committee and Water Action Plan Secretariat
- Provide orientation workshops at national level
- Support the establishment of Environment and Natural Resources Committees
- Prepare guidelines for integrated extension service
- Prepare guidelines for interaction between DWD and district administrations
WATER RESOURCES MONITORING
- Rehabilitate hydrometric network
- Prepare hydrological yearbook
- Implement sediment transport measurements
- Monitor major wastewater discharges
- Monitor water quality trends
- Establish water quality information system
- Train in groundwater quality analyses
GROUNDWATER POTENTIAL
- Investigate recharge
- Monitor groundwater levels
GROUNDWATER DATABASE
- Train in use and further development of groundwater database
- Update groundwater database
- Promote use of groundwater database
PROJECT INFORMATION SYSTEM
- Implement project information system
- Train in use of project database

2nd STAGE ACTION PROGRAMME
POLICY DEVELOPMENT - Prepare international water resources policy - Support to policy development in water resources related sectors
REGULATIONS AND MANAGEMENT PROCEDURES - Develop water resources related regulations - Prepare management procedures for water resources related regulations - Develop Code of Practice - Prepare drilling licence regulations
DISTRICT INSTITUTIONAL STRUCTURE - Conduct orientation training in districts
WATER QUALITY MANAGEMENT TOOLS - Describe major water pollution sources - Establish water quality modelling tools
GROUNDWATER POTENTIAL - Investigate shallow well potential
INSTITUTIONAL STRUCTURE AND CAPACITY BUILDING - Establish DWD permit processing unit - Establish permit database and train staff - Promote permit systems
WATER RESOURCES ASSESSMENTS - Train in use of hydrological assessment tools
WOMENS ROLE - Conduct a study on womens potential role in the management of water resources
HUMAN RESOURCES DEVELOPMENT - Integrate water resources management training within the activities of the human resources support unit (HRDSU) - Integrate water resources manangement topics within the curriculum at training institutions

3rd STAGE ACTION PROGRAMME
WATER RESOURCES ASSESSMENTS - Collect hydrometeorological data from TECCONILE - Investigate water balances - Train in water balance computations - Investigate the hydrology of wetlandS
WATER QUALITY MANAGEMENT TOOLS - Prepare EIA for sector activities
MANAGEMENT PROCEDURES - Prepare guidelines for district water resources planning - Prepare procedure for bulk water allocation to districts - Prepare guidelines for design of dams and valley tanks

WATER ACTION PLAN DOCUMENTS

UGANDA WATER ACTION PLAN (WAP)		
DOCUMENT	**TITLE**	**DATE**
001	WATER ACTION PLAN PHASE I - PROJECT DOCUMENT Description of the background and requirements to the work in WAP Phase I including budget.	Jan 1993
002	REHABILITATION OF WATER RESOURCES MONITORING AND ASSESSMENT SERVICES IN UGANDA - PROJECT IDENTIFICATION REPORT Background and proposal for a water resources monitoring project including budget.	Feb 1994
003	REGIONAL WATER QUALITY MANAGEMENT IN THE UPPER NILE BASIN - PROJECT IDENTIFICATION REPORT Background and proposal for a water quality management project including budget.	Feb 1994
004	WATER ACTION PLAN PHASE II - PROJECT DOCUMENT Description of the background and requirements to the work in WAP Phase II including budget.	Oct 1993
005	WATER ACTION PLAN - MAIN REPORT Synthesis of the key points of the Water Action Plan comprising the water resources management framework, the action programme and guidance for the implementation and monitoring of the plan.	Jul 1994
006	WATER RESOURCES POLICY Policy document defining a water resources policy with associated management strategies. Outline of areas for further policy development and actions. Preliminary discussion draft of a water supply and sanitation policy.	Jul 1994
007	RAPID WATER RESOURCES ASSESSMENT An assessment of the surface water and groundwater resources occurrence in time and place and a tentative estimate of the water requirements and water resources development trends.	Jul 1994
008	INSTITUTIONAL AND MANAGEMENT ASPECTS An assessment of water resources management functions, structures and tools. Proposals for a future management strategy and corresponding capacity building.	Jul 1994
009	INTERNATIONAL ASPECTS An assessment of the international aspects and implications of Uganda's position in the Upper Nile Basin in relation to water resources.	Jul 1994
010	ANNEX REPORT - VOLUME 1 - DISTRICT STUDIES Collation of district studies for Arua, Mbale, Mbarara, Moroto, Mukono and special studies for Hoima, Kabale and Tororo.	Jul 1994
011	ANNEX REPORT - VOLUME 2 - GROUNDWATER DATABASE Groundwater database development description, specification and manual.	Jul 1994
012	ANNEX REPORT - VOLUME 3 - MANAGEMENT ASPECTS Background for preparation of regulations supporting the Water Resource Statute, guidelines for district water resources management and management procedures for issuing of permits.	Jul 1994
013	ANNEX REPORT - VOLUME 4 - PROJECTS AND ACTIONS Description of water resources development plans and projects giving guidelines for prioritization, impact assessments, updating and coordination. Catalogue of water resources related projects and actions.	Jul 1994
014	WATER ACTION PLAN - EXECUTIVE SUMMARY A concise short version of the set of strategies, actions and guidelines constituting the Water Action Plan also giving a key to the documentation.	Jul 1994

REPRINTED BY DEVELOPMENT SYSTEMS LTD P O BOX 5332, KAMPALA, TEL 257574