

WATER RESOURCES IN EAST AFRICA

ENTEebbe REPORT

East African Water Resources Seminar
May 24-27, 1993

Follow-up upon

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ENTEBBE REPORT

EAST AFRICAN WATER RESOURCES SEMINAR

24-27 May 1993

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0. EXECUTIVE SUMMARY

The *East African Water Resources Seminar* in Entebbe, Uganda, in May 1993, was attended by 60 professionals from relevant sectors of water resources development and management, mainly from the East African countries.

The Seminar participants found that the development and management of water resources in the East African region should be based on the general principles and guidelines emerging from the preparatory process of the UN Conference on Environment and Development (UNCED) held in Rio de Janeiro, Brazil, in June 1992. These principles are spelled out in the *Copenhagen Report* and the *Dublin Report*, and confirmed in the Agenda 21 document from UNCED.

These guiding principles recognize water as a finite and vulnerable resource to be managed in an integrated manner. They stress the importance of managing water and related land resources at the lowest appropriate levels, following a participatory and demand-driven approach, and recognizing water as a social and economic good with an economic value in all its competing uses. They also stress the vital role of women in water resources management.

The Seminar discussed the status, problems and opportunities of water resources development and management in the East African region, based i.a. on *Country Reports* prepared by Kenya, Tanzania and Uganda for this purpose.

In analysing the water resources situation of the region, four primary problem areas were identified:

Water resources variability

Rainfall, surface water and groundwater in the region are characterized by significant variations in time and space, resulting in difficult access to and local and seasonal shortages of adequate water resources.

Water quality degradation

Deterioration of the water quality in rivers and lakes is an increasing problem in the region, resulting in water sources becoming unfit for human consumption and other purposes. Discharges from towns, industries and agricultural areas are the main causes of water quality degradation.

Impact of human activities

The rapid population growth in the region, combined with economic development, results in increasing water demands, affecting the general availability of water resources and the state of the aquatic ecosystems in the region. Land

management problems result in increasing land degradation, soil erosion and siltation problems.

Competing water demands

Competition for locally scarce water resources is an increasing problem at all levels throughout the region, from the small communities to the large river basins. Conflicts have started to occur between sectors, between upstream and downstream users, and between urban and rural areas.

The Seminar identified six broad areas within which recommendations for action were proposed. The areas and main recommendations were the following:

Roles and functions of different management levels

National water resources policies, including appropriate standards, need to be adopted in line with the general decentralization policies.

Guidelines on roles, functions and decision-making processes at different levels need to be formulated - from users to the national level, and in the administrative as well as the hydrological (river basin) system.

A participatory approach shall be adopted at all levels, and the participation of the private sector shall be promoted.

Cross-sectoral integration mechanisms and guidelines

Mechanisms for cross-sectoral coordination need to be strengthened and developed at all levels, such as cross-sectoral committees and task forces.

Guidelines for cross-sectoral water resources impact assessments should be developed to support these mechanisms.

Economic analysis, pricing and charging

Practical guidelines for the estimation and application of direct, opportunity and environmental costs of water need to be prepared.

Demand-driven cost recovery approaches should ensure that charges reflect service levels and cover at least operation and maintenance costs.

Guidelines for charging should be developed, based on the full economic value of water, but with allowance for cross-subsidization.

Legal and planning framework

A flexible legal framework for water resources management need to be established and enacted at the national level, with appropriate bye-laws at lower levels.

Through decentralization it should be ensured that laws are enforced at the lowest appropriate levels.

Dynamic water action plans should be established which include mechanisms for ongoing water resources assessment, outline of the institutional and management frameworks, and overall sector programming guidelines and priorities.

Water resources assessment, monitoring and information management

A well functioning and coordinated information base is a precondition for proper water resources management at all levels. Increased attention - and financing - needs to be provided to and within the East African governments to maintain adequate water resources monitoring and information systems.

Capacity building at all levels

Requirements in terms of staff, training, facilities, incentives etc. - dictated by the institutional and management framework for water resources - need to be assessed, and appropriate capacity building plans formulated accordingly. Capacity building efforts should include not only institutions, but also local communities and users.

1. INTRODUCTION

Global water resources issues were high on the international agenda in the process of the Rio conference in June 1992 (UN Conference on Environment and Development - UNCED). In preparation for Rio the first world water resources conference in 15 years was held in Dublin in January 1992 (International Conference on Water and the Environment), and preparations for this conference at the country and international levels were substantial.

In recognition of the importance of freshwater and environmental protection, and because of the high priority of water development in the Nordic development assistance programmes, the Nordic countries (Denmark, Finland, Norway and Sweden) launched the so-called '*Nordic Freshwater Initiative*' as part of the Dublin-Rio process. In collaboration with a number of developing countries, Nordic and international water professionals analysed the problems and opportunities of water resources development and management in developing countries. The initiative resulted in the '*Copenhagen Informal Consultation on Water Resources Development and Management*' in Copenhagen in November 1991. This Consultation produced the *Copenhagen Statement and Report*, which in turn had a major influence on the outcome of the Dublin Conference (the *Dublin Statement and Report*) and UNCED (Chapter 18 of *Agenda 21*)

Throughout the discussions in Copenhagen and Dublin the representatives from the East African countries were very active, and also very interested in the concepts and recommendations emerging from the process, not least because of the current decentralisation process in these countries.

As a consequence, the East African countries requested the assistance and cooperation of the Nordic countries in arranging an East African Water resources Seminar to discuss the Copenhagen-Dublin principles in an East African context. The Nordic countries responded favourably to this request, and the *East African Water Resources Seminar* was held in Entebbe, Uganda, in the period 24-27 May 1993.

The objectives of the Seminar were to

- analyse the principles and guidelines resulting from the Copenhagen-Dublin-Rio process in an East African context, and
- discuss and make recommendations for how to translate these principles into action in the East African countries

The Seminar addressed water resources management at the *national level and below*. International issues (such as Lake Victoria and the Nile Basin) were addressed as part of national level management but not discussed as a separate issue.

The Seminar was attended by some 60 professionals from relevant sectors of water resources development and management, mainly from the East African countries Kenya, Tanzania and Uganda, but also by observers and resource persons from Zambia and Zimbabwe, international organisations and the Nordic countries. A list of participants (including the Secretariat) is contained in *Appendix A*.

The discussions at the Seminar considered development and management of *water resources* in the broad sense, including linkages to land management, and emphasized cross-sectoral aspects of water resources management. The stage was set in plenary sessions by addressing the Copenhagen-Dublin-Rio principles, followed by presentations of East African water resources problems as described in Country Reports by Kenya, Tanzania and Uganda, and case studies from each of the three countries.

The three *Country Reports* were prepared as contributions to the Seminar. These reports address the status, opportunities and constraints of water resources development in the three countries, and describe and discuss the institutional and management frameworks. They contain a wealth of relevant information about the water resources situation in the region, and they are consequently appended as an integral part of the present report (*Appendix G*).

The main thrust of the Seminar were detailed discussions and hard work in three *Working Groups* in which the conclusions and recommendations of the seminar were generated, and used for the final summing up in the last plenary session. The programme of the seminar is included as *Appendix B*.

The present *Entebbe Report* summarizes the conclusions and recommendations of the East African Water Resources Seminar. The report is based entirely on the outcome of the Working Group discussions as presented in *Appendix C*, supported by relevant examples from the three country reports. The report provides a summary of the *basis for action* at two levels: the general concepts and guidelines for water resources management from the Copenhagen-Dublin-Rio process in Chapter 2, and the actual water resources problems of East Africa in Chapter 3. The *recommendations for action* - "how to" improve water resources management in East Africa - follow in Chapter 4.

The report is structured around the ten key messages emanating from the Working Group discussions: the four main water resources problems in East Africa, and the six broad areas within which recommendations for actions were formulated. These messages are summarized in Chapter 0.

2. BASIS FOR ACTION: CONCEPTS AND GUIDELINES

The East African Water Resources Seminar focused on how to translate the key messages emerging from Copenhagen (the Nordic Freshwater Initiative), Dublin and Rio (UNCED) to action in an East African context.

For easy reference the Copenhagen and Dublin Statements, and an outline of the Freshwater Chapter of Agenda 21, are attached as *Appendices D, E and F*.

2.1 The Copenhagen Statement

The Copenhagen Statement and Report produced by representatives from 27 countries in Copenhagen in November 1991 address "Implementation Mechanisms for Integrated Water Resources Development and Management".

Recognizing freshwater as a finite and vulnerable resource - vital for the sustenance of life, for all development activity, health and environmental maintenance - two key principles emerged as prime components for sustainable development and management of water resources:

Principle 1: Water and land resources should be managed at the lowest appropriate levels

Centralized and sectoral (top down) approaches to water resources development and management have often proved insufficient to address local water management problems. While recognizing the need for a central mechanism capable of protecting national economic and social interests, the role of governments needs to change, to enable users, local institutions and the formal and informal private sector to play a more direct part. The levels at which effective management decisions can be taken and problems can be solved will vary widely from country to country and from situation to situation. The fundamental principle remains however that, in any given situation, water resources should be managed at the lowest appropriate level, taking into account the need for integrating their management with land use management.

The most appropriate level of water resources management may range from the household level to the level of international river basin committees, depending on the nature of the problem related to the specific water resource. The important point is that decisions or actions concerning water resources management should be taken as close to the root of the problem as possible, i.e. at the lowest appropriate level, and that higher levels primarily should act in such a way as to enable lower levels to carry out decentralized and integrated management.

Principle 2: Water should be considered as an economic good, with a value reflecting its most valuable potential use

Access to enough water of adequate quality for basic subsistence is a fundamental human need. However, efficient allocation and use of water resources can only come from a full recognition of the costs and benefits associated with various alternative uses taking into account future needs. In other words, water is an economic good. Failure to recognize this key principle has contributed substantially to wasteful and environmentally damaging uses of water. Whether or not different categories of users are charged the full economic cost of providing their water supplies, that cost must be apparent and accounted for in resource management strategies.

Operationalization of this concept includes diverting attention from supply to demand management principles when dealing with land and water resources. In addition to the economic efficiency dimension, water must in several contexts be considered as a social good - in order to ensure the satisfaction of basic needs for increasingly large poor segments of the populations of the developing world. Once the value of the resource is recognized and estimated, the ways of charging for water must be carefully designed to reflect local conditions and requirements, which may vary substantially from place to place.

2.2 The Dublin Statement

More than 500 participants from over 100 countries attended the International Conference on Water and the Environment (ICWE) in Dublin in January 1992 which produced the Dublin Statement and Report. As in Copenhagen, the Dublin Conference managed to set priorities and identify a few key principles for water resources development and management.

The four 'guiding principles' from Dublin are listed below. The conference was prepared in collaboration with the Nordic Freshwater Initiative. As it appears, the Dublin guiding principles bear resemblance to the two Copenhagen principles. Hence, the reports from the two conferences are mutually supportive and strongly complementary.

Principle No. 1 - Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment

Since water sustains life, effective management of water resources demands a holistic approach, linking social and economic development with protection of natural ecosystems. Effective management links land and water uses across the whole of a catchment area or groundwater aquifer.

Principle No. 2 - Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels

The participatory approach involves raising awareness of the importance of water among policy-makers and the general public. It means that decisions are taken at the lowest appropriate level, with full public consultation and involvement of users in the planning and implementation of water projects.

Principle No. 3 - Women play a central part in the provision, management and safeguarding of water

This pivotal role of women as providers and users of water and guardians of the living environment has seldom been reflected in institutional arrangements for the development and management of water resources. Acceptance and implementation of this principle require positive policies to address women's specific needs and to equip and empower women to participate at all levels in water resources programmes, including decision-making and implementation, in ways defined by them.

Principle No. 4 - Water has an economic value in all its competing uses and should be recognized as an economic good

Within this principle, it is vital to recognize first the basic right of all human beings to have access to clean water and sanitation at an affordable price. Past failure to recognize the economic value of water has led to wasteful and environmentally damaging uses of the resource. Managing water as an economic good is an important way of achieving efficient and equitable use, and of encouraging conservation and protection of water resources.

2.3 Agenda 21: The Freshwater Chapter

The recommendations from Copenhagen and Dublin were strongly advocated in the preparatory process of the Rio conference (UNCED), and considered in the Freshwater Chapter (Chapter 18) of Agenda 21. However, formulated in a full intergovernmental negotiation process, the Agenda 21 document emerged as a comprehensive, diplomatic and all-embracing document. It does not - as the Copenhagen and Dublin Statements - convey clear priorities and guiding principles. It does, however, include and consider the Copenhagen and Dublin principles, and contains no significant contradictions to them.

Hence, while the Copenhagen and Dublin Reports can be applied in practice to provide new directions for water resources development and management, the Agenda 21 document provides the international 'blue-stamp' of these new directions. At the same time it provides a comprehensive catalogue of issues and proposed activities for water resources development and management.

The Freshwater Chapter of Agenda 21 addresses the following seven programme areas:

- integrated water resources development and management
- water resources assessment
- protection of water resources, water quality and aquatic ecosystems
- drinking water supply and sanitation
- water and sustainable urban development
- water for sustainable food production and rural development
- impacts of climate change on water resources

A more detailed outline of the chapter is included in *Appendix F*.

These three background documents set the scene and formed the framework for assessing the water resources situation in East Africa, and for defining possible problems related to the water resources.

3. BASIS FOR ACTION: WATER RESOURCES IN EAST AFRICA

The status, problems and opportunities of water resources development and management in the East African region have been described in the three Country Papers from Kenya, Tanzania and Uganda (*Appendix G*). As one of their most important purposes, these papers address the problems related to the availability of water resources, their utilization and the possible conflicts of interests.

These problems were addressed in the initial Working Group discussions. The conclusions of the Working Groups on these issues are summarized in the tables "Water resources availability" and "Water resources utilization and conflicts of interest" in *Appendix C*.

Four main water resources problems in the East African region were identified

- the seasonal and spatial variability of water resources
- the degradation of water quality caused by natural and human factors
- the impact of human activities on the availability and conservation of water

- competing demands for water resources, by different sectors, and between upstream and downstream users

3.1 Water resources variability

East Africa is characterized by significant variability in space and time of available water resources: rainfall, surface water and groundwater. Access within a reasonable distance to adequate water resources (both surface water and groundwater) is consequently a severe problem in many parts of the region.

While certain parts of Kenya and Tanzania are well known to suffer from inadequate water resources, even Uganda which is generally well endowed with water resources experiences local water scarcity problems and limits to sustainable groundwater extraction.

Seasonal variations are related not only to differences in water availability between distinct wet and dry seasons, but also to considerable variation from year to year in timing of seasons and amounts of rainfall and streamflow.

Both lead to uncertainty and drought risk, and often increasingly so in the areas of low mean annual rainfall.

The vulnerability and scarcity of water resources in the region and their variation in space and time call for increased focus on and development of appropriate technologies (with least environmental impact) for water conservation, harvesting of rainwater and water storage.

3.2 Water quality degradation

Deterioration of the water quality in rivers and lakes is a serious problem in the region, resulting in water resources becoming unfit for human consumption and other purposes.

The water quality deterioration is caused primarily by human activity such as discharge of untreated wastewater from towns, industries and mines; discharge of nutrients and excess agrochemicals from agricultural areas, pollution caused by livestock, and increased sediment loads due to deforestation and inappropriate cultivation practices.

Industrial water pollution has been a recognized problem in western Kenya for some time, but in Uganda (Jinja, Kampala) and Tanzania the problem is increasing. Similarly, other water quality problems (such as pollution with agro-chemicals) may not be widespread at this time, but future problems are expected and must be anticipated.

The rapidly deteriorating water quality and ecology of Lake Victoria illustrates the importance of increased attention to water quality management in the region.

A particularly important aspect of water quality control is sanitation and public health control. Water supply from polluted rivers, lakes and shallow wells have public health implications which need to be considered as part of the development and management of water resources.

Sources of lower water quality may need to be accepted, at least temporarily, as the only economically realistic alternative in many cases. This is the case in areas of naturally occurring low quality groundwater, as well as in areas of increased demands for limited water resources. Hence, flexible water quality standards may be decided at the intermediate level (as e.g. the Region Water Office or River Basin Water Office), on the basis of a general framework for water quality standards recommended at the national level.

3.3 Impact of human activities

The most significant human aspect of water resources development and management is the population growth which, combined with economic development, results in ever increasing demands for a finite resource. Hence, the water availability per capita is steadily decreasing, and the human impact on the resource is increasing.

Human activities impact not only the water quality as discussed above, but also the general availability of water resources and the state of aquatic ecosystems in the region.

The increased population pressure in large parts of the region lead to deforestation and increased cultivation of the land. Changes in vegetation and in cultivation practices affect the hydrology and water balance, and may lead to increased flood and drought problems, as well as to land degradation, soil erosion and siltation problems. Such problems are most common in the densely populated highlands of Kenya and Tanzania (e.g. reported soil erosion problems in Kenya and reservoir siltation in Tanzania)

Afforestation may, however, lead to increased evapotranspiration losses and hence reduced water availability for downstream users (as may e.g. be the case in the Ruaha Basin in Tanzania)

One of the most acute environmental problems related to water resources development in Uganda is the use and protection of wetlands. Wetlands serve an important function as storage reservoirs and natural regulators of streamflow, while at the same time having a potential for agricultural development (e.g. rice cultivation). The effect of development of these wetlands need to be assessed in an environmental context, and sustainable use patterns established.

3.4 Competing water demands

Competition for scarce water resources occur at all levels in the East African region.

At the local level conflicts occur between small farmers, cattle owners and village water supplies competing for water in short supply. This may include problems between nomadic groups and settled water users. Such problems occur throughout the region but vary considerably in their extent and duration.

Particularly in Kenya and Tanzania demands for irrigation water are expected to increase as more land is put under irrigation. Hence, conflicts between agricultural and other uses can be expected to demand much more attention in the future.

Conflicts are also reported between industrial water users and other users, both urban and rural.

At the basin level conflicts occur between upstream irrigation and downstream hydropower interests, as e.g. in the Pangani and Ruaha Basins in Tanzania.

Problems at this level also include conflicts between water resources for rural and urban use. In Kenya interbasin transfers in favour of urban water supplies affect rural communities adversely.

At the highest level potential conflicts are associated with the use of internationally shared waters such as Lake Victoria, as well as potential interbasin water transfers. As mentioned above such problems were not specifically discussed at the Seminar.

4. RECOMMENDATIONS FOR ACTION

Having discussed the types of water resources problems to be addressed in East Africa (Chapter 3), the Seminar considered the institutional and management actions required for their solution.

The results of the Working Group discussions on these issues are summarized in the tables in *Appendix C*.

The tables "Institutional aspects" and "Management instruments" summarize the initial diagnostic discussions on institutional and management issues. This discussion resulted in the identification of six broad areas within which more detailed recommendations for action would be identified. These areas were the following:

- roles and functions of different management levels
- cross-sectoral integration mechanisms and guidelines

- economic analysis, pricing and charging
- legal and planning framework
- water resources assessment, monitoring and information management
- capacity building at all levels

The four tables "Roles and functions at different management levels", "Cross-sectoral integration mechanisms and guidelines", "Economic analysis, pricing and charging" and "Legal and planning framework" summarize the recommendations for action proposed by the three Working Groups within the first four of these six areas. It was agreed that the two last areas ("Water resources assessment" and "Capacity building") generally were better described in the Dublin process, and no specific tables of recommendations were therefore prepared for these.

Recommendations within the six areas are described below. This description includes the recommendations made during the initial, more diagnostic group discussion as summarized in the tables "Institutional aspects" and "Management instruments".

4.1 Roles and functions of different management levels

4.1.1 National policy formulation

Decentralization policies need to be developed and adopted, including a framework of standards.

Tanzania has developed a coherent national water policy, and an implementation strategy (since 1991), but although they include effective utilization and protection of scarce resources, they are biased towards the water supply sector.

Kenya has different sector policies for different water uses, but no comprehensive water resources policy. With respect to water supply it is noted that water quantities and user convenience aspects are catered for in a first step, whereas water quality aspects and standards are postponed to a later second step of policy development.

In Uganda a national water resources policy is under formulation as part of the national Water Action Plan.

4.1.2 How to define roles and functions

The existing status with respect to responsibilities, performance and skills available need to be reviewed, considering all sectors involved in water resources management.

Guidelines for roles and functions at different levels (from users to national) need to be formulated. Such guidelines should clearly demarcate responsibilities and avoid duplication. This may include:

- policy, regulation and technical guidelines at national level; and design, implementation, and operation and maintenance at district and user levels
- definition of different types of water resources problems with thresholds for when the main impact is at local, regional, district, basin and national levels. Appropriate functions should be designed accordingly (including definition of when permits are required and when they are not)
- establishment of water resources management committees and task forces with specific mandates and legal backing
- preparation of land and water plans at district level

Examples of *possible* levels for decisions, actions and instruments, inputs and cross-sectoral integration mechanisms for Tanzania and Uganda are shown in Tables 1 and 2 below.

	Socio-political structure			Intermediate Level (River Basin Water Office)
	Local Level	Intermediate Level	National Level	
Decisions	Management/Dev. of water resources Integrated management of forest/ land/water Water allocation and water rights Effluent permits	Criteria for water allocation, water rights and effluent permits Regional development plans Water Quality Standards	National water development policy and plans Recommended water quality standards	Criteria for water allocation, water rights and effluent permits Allocation of water rights and effluent permits to major users Principles of catchment protection and integrated management of forest/land/water Water quality standards
Action and Instruments	Integration of user group interests Implement development projects Organize operation and maintenance Settle disputes Water resources monitoring	By-laws Solution of conflicts Technical extension and training Water resources monitoring Large development projects	Legislation delegating management and development of water resources to lower levels Allocation of funds Water resources monitoring	Sectoral integration and conflict solution By-laws and regulations Price mechanisms Water resources assessment and environmental impact assessment Catchment development plans
Inputs	Technical extension and training By-laws Information	National plans Water resources assessment and environmental impact assessment Planning proposals and requests	Regional plans	National plans Legislation authorizing catchment authority Water resources data
Cross Sectoral	Village Council Community Development Committee	Regional Water Board	Central Water Board	Basin Water Board

Table 1: Possible water resources management levels
(From Tanzania Country Report)

	Local Level RC.1 - RC.3	District Level RC.5	National Level
Decisions	<ul style="list-style-type: none"> - Allocation permits - Settle disputes 	<ul style="list-style-type: none"> - Criteria for water allocation - Allocation permits - Effluent permits - District plans and priorities - Settle disputes 	<ul style="list-style-type: none"> - National policies, plans, priorities - Criteria for water allocation and effluent points - Allocation and effluent permits for major uses - WQ standards - Settle dispute
Actions & Instruments	<ul style="list-style-type: none"> - O&M of water supply - Monitoring of water & land use practices - Organisation & support of user demands - Mobilisation of user groups 	<ul style="list-style-type: none"> - Process user demands and include in plans - By laws - Implement projects - Monitoring and regulation of land & water use practices - Water Resource Assessments 	<ul style="list-style-type: none"> - Legislation, Regulation, Water Action Plan revisions. - Sectoral coordination - Data and information management - Water Resources Assessment and Environmental Impact Assessments
Inputs	<ul style="list-style-type: none"> - Information - Development funds - By-laws - Technical extension & training - Management training - District plans 	<ul style="list-style-type: none"> - National plans, policies, priorities - User demands and proposals - Local monitoring data - Management training 	<ul style="list-style-type: none"> - Local and district monitoring data. - District plans
Cross-sectoral integration	<ul style="list-style-type: none"> - Village Water and Sanitation Committees - RC's 	<ul style="list-style-type: none"> - District Water Committee 	<ul style="list-style-type: none"> - Water Policy Committee

Table 2: Possible water resources management levels
(From Uganda Country Report)

It is noted that in Tanzania there is a certain decentralization of water resources management functions to the regional level (Regional Water Engineer), and District Water Offices have been established under the Local Government System. In Kenya District Water Boards have recently been created in order to decentralize the decision-making process and change the traditional top-bottom approach. These Boards have the responsibility of coordinating all the Government's efforts in developing and managing water resources throughout the country. In Uganda all districts will have water offices, and county water offices are also envisaged. National and district water resources committees for cross-sectoral coordination are proposed in the Ugandan Water Action Plan.

Coordination at the catchment or river/lake basin level should be ensured in response to the demand for such mechanisms. In Kenya Catchment Boards have an advisory role to the central Water Apportionment Board. River Basin Water Offices are being created, where required, in Tanzania in order to ensure a more equitable distribution of the water resources, and hence reduce potential conflicts (as e.g. for Pangani River basin). In Uganda no such structures appear required for the time being.

Within overall national policies, new and effective mechanisms are required for the planning and coordination of the activities of bilateral and multilateral donor agencies and NGO's (Non-Governmental Organizations) working within water resources development.

4.1.3 Participation of the involved parties

A participatory approach to management of land/water resources at all levels should be adopted, and users sensitized for effective participation through workshops, seminars and the media.

The participatory approach needs to penetrate to the community level and involve not only local institutions, but also the individuals concerned. This would include drawing on locally available knowledge, awareness raising about the need and requirements for proper water resources management, relevant information about the state of these resources, as well as information about the opportunities for active involvement in the decision-making process.

In Tanzania the National Water Policy clearly states that drinking water supply schemes belong to the communities who must be accountable and responsible for their operation and maintenance.

Involved parties in water resources management include not only users, but also those who impact on water, institutions related to water development, and those with a water related environmental interest.

Particular emphasis needs to be given to the active involvement of women in water resources management. Women have the main responsibility for the collection and handling of water, and hence for the family's behaviour with respect to sanitation and general health prevention. Women also represent the main agricultural work force and have an important stake in the allocation of water resources at the local level for various uses. The important role of women in the daily management of water at the local level needs to be associated with influence at the higher levels (e.g. water related committees at village and district level) at which important decisions are made.

Special emphasis also needs to be given to the often neglected role of youth and children in water resources programmes.

4.1.4 Role of the private sector

The trends towards decentralization, combined with the ongoing structural adjustment programmes, promote increased involvement of the private sector.

Participation of the local private sector in water resource studies and operation of water projects should be promoted, including user associations and NGO's working in the sector. Privatization and establishment of self-contained corporations for water supplies are already under way in the region, as is community ownership of water supply installations.

Capacity building efforts and technology transfer should also promote private sector involvement through increased involvement of local enterprises and consultants in water development programmes.

4.2 Cross-sectoral integration mechanisms

4.2.1 Cross-sectoral committees and task forces

In order to manage water resources in a holistic and integrated manner, including linkages to land management, cross-sectoral integration is required at all levels, and among all stakeholders, be they politicians, technicians, administrators or private individuals.

Cross-sectoral mechanisms, for instance committees and task forces for water resources management at all levels, need to be strengthened or established, involving government, NGO's and the private sector. This includes:

- formation of a cross-sectoral water policy and regulatory committee (high level committee to i.a. formulate guidelines for work of task force at working level) at the national level. In Tanzania a coordinating National Action Committee (NAC) was formed during the International Drinking Water Supply and Sanitation Decade.

An Interministerial Committee has been formed in Uganda as part of the Water Action Plan preparation.

- setting-up intersectoral task forces (to become permanent if the need arises), and holding inter-sectoral meetings on water resources planning and management issues. The members should be chosen on the basis of their competence in the field concerned, rather than their bureaucratic position
- setting-up and/or strengthening district development committees (DDC), including all sectors and NGO's
- formation of village water committees, including executive roles for all major water users

In Kenya and Tanzania, the recently established Boards, at district level in Kenya and at basin level in Tanzania, appear to have broader cross-sectoral roles than previous structures. In Uganda a cross-sectoral interministerial committee and a task force at working level have been initiated as part of the preparation of the national Water Action Plan.

4.2.2 Guidelines for impact assessment

For all major water related programmes, water allocations and effluent discharge permits, cross-sectoral water resources impact assessments are required. Such assessments should include their impact on the resource, other users, and the environment, as well as an evaluation of their cost effectiveness and user response.

Operational guidelines for making water resources impact assessments and dealing with them in cross-sectoral task forces and committees need to be worked out.

4.3 Economic analysis, pricing and charging

4.3.1 Economic cost analysis

Guidelines for estimation of direct, opportunity and environmental costs need to be prepared. Such estimations should be required for all major water related programmes, water allocation and discharge permits. Opportunity and environmental costs are not presently used in economic calculations in East Africa.

In particular the opportunity concept needs to be operationalized as a tool for water resources impact assessments (see above) in cases of competing demands for scarce water resources.

4.3.2 Demand-driven cost recovery

Except for some major undertakings, users should participate in choosing service and cost levels, own their facilities and determine the system for cost recovery and management.

Charges should reflect the service levels and cover at least the operation and maintenance costs either in kind or in cash.

Therefore, as part of project planning, a social analysis including ability and willingness to pay should be undertaken; and education programmes targeted at the household level on the benefits of potable water and related costs (especially operation and maintenance) should be organized.

The East African countries have all introduced cost recovery or community responsibility for operation and maintenance of drinking water supplies, and are considering using charges to reduce waste and pollution. Demand-driven cost recovery mechanisms in other sectors of water resources development, such as irrigation, are generally less developed.

4.3.3 Guidelines for charging

Formulation of pricing and charging mechanisms for different water users should be based on the full economic value of water - but allowance should be made for cross-subsidization (vulnerable groups) and differential charges to:

- guarantee access to minimum drinking water requirements
- promote efficient use of water resources
- promote proper disposal of waste
- protect the environment.

In an effort to minimize the waste and degradation of water resources through discharges from either domestic, industrial or agricultural sources, introduction and application of 'the polluter pays' principle is needed.

4.4 Legal and planning framework

4.4.1 National legislation

An appropriate legal framework is a precondition for the proper functioning of water resources management mechanisms at all levels. The legal framework should enable implementation of the national water resources policy by ensuring that the various levels are empowered to fulfil their proper roles and functions.

Legislation and bye-laws concerned with proper utilization, protection and management of water resources (all laws dealing with or impacting water) at all management levels need to be reviewed, updated, rationalized, enacted and enforced as appropriate, allowing flexibility needed over time and space.

The need to revise current water legislation has been recognized by all the three countries. However, only Uganda presently appears to be working towards a comprehensive Water Resources Act which cater for cross-sectoral integration, decentralization, involvement of stakeholders and use of full economic costs calculations.

The capacity of existing institutions for enforcement of legal framework should be assessed, and strengthening embarked upon where weaknesses exist by, e.g.:

- ensuring wide dissemination of revised and new laws (in order to create awareness)
- decentralizing to ensure that the laws are enforced at the lowest appropriate level
- formulation and enforcement of local bye-laws

4.4.2 National water action plans

Dynamic national water action plans should be prepared, based on the national water resources policies. Such plans should include assessment of the national water resources; outline the required institutional framework, including roles, functions and management instruments at different levels; and include overall sector programming guidelines and priorities.

Hence, water action plans are required to identify and clarify the rules of the game, rather than prescribing solutions far into the future. While, obviously, broad national development scenarios for future water resources development need to be identified, based on water resources assessments, details of such developments should be guided by local demands. The national action plans should clarify the process by which this takes place, and on a rolling basis address short term development priorities within the long term scenarios.

The planning exercise should involve users and draw on experiences learnt from previous projects with a view to replicate 'successful' strategies.

The role of existing traditional water master plans in the development of dynamic water action plans need to be reviewed.

Kenya has recently finalized a National Water Master Plan, and district water development plans are being prepared. Tanzania has Regional Water Master Plans which need revisions and coordination in a national framework. Simultaneously a water policy and implementation strategy have been approved, and a

water sector review is being prepared which with a few additions may be shaped into a water action plan. Uganda has finalized the first phase of the national Water Action Plan and expect to complete the plan within a year.

4.5 Water resources assessment and information

A proper information base is a precondition for planning, development and management of water resources. Adequate and reliable data for rainfall, surface water and groundwater (quantity and quality) need to be available at all levels to enable decision-making from the local level (local competition for scarce water resources) to the national and international level (negotiations within the Nile Basin).

Plenty of information has been obtained in the course of preparation of regional and national water master plans and from operation and maintenance activities. However, this information has not been fully utilized, and associated monitoring systems have not been fully developed.

In order to avoid unnecessary duplication, the information base for water resources needs to be coordinated between the many sectors involved in data collection and analysis.

Water resources information needs to be collected and processed at the planning level (whether in the form of rapid water resources assessments or more comprehensive water resources investigations). It is, however, equally important that the information base be maintained through regular monitoring at a sustainable level. Information management is an indispensable part of the 'enabling environment' for water resources management, i.e. flow of relevant information between the concerned levels.

A proper information system is also a precondition for public awareness and intelligent involvement of people in the management process.

Increased attention - and financing - needs to be provided to and within the East African governments to maintain adequate monitoring and information systems for water resources management.

4.6 Capacity building for water resources management

Properly trained, motivated and equipped people at all levels are a precondition for any institutional framework to function.

The requirements in terms of staff, training, facilities, incentives etc. dictated by the institutional and management framework for water resources management need to be assessed, and appropriate capacity building plans formulated accordingly.

It is noted that new institutions and additional staff require-

ments may not be the solution in the East African context. With the present economic situation, including the required structural adjustment measures, the institutional framework needs to be based as much as possible on existing institutions and people. However, adjustments in their mode of operation, and training and other support programmes to enable this, will be required.

Capacity building is not limited to improving institutions. It extends all the way to the communities and individual users - i.a. through agricultural extension, information to local committees and user groups, training of operators and caretakers and general education and awareness raising programmes.

APPENDIX A:

List of Participants

EAST AFRICAN WATER RESOURCES SEMINAR(24TH - 27TH MAY 1993)

PARTICIPANTS

COUNTRY	NAME	ORGANISATION/DEPARTMENT	DESIGNATION/POSITION	POSTAL ADDRESS/TEL/FAX
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EAST AFRICAN WATER RESOURCES SEMINAR(24TH - 27TH MAY 1993)

PARTICIPANTS

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EAST AFRICAN WATER RESOURCES SEMINAR(24TH - 27TH MAY 1993)

PARTICIPANTS

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EAST AFRICAN WATER RESOURCES SEMINAR(24TH - 27TH MAY 1993)

PARTICIPANTS

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EAST AFRICAN WATER RESOURCES SEMINAR (24TH-27TH MAY 1993)

PARTICIPANTS

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EAST AFRICAN WATER RESOURCES SEMINAR (24TH-27TH MAY 1993)

PARTICIPANTS

COUNTRY	NAME	ORGANISATION/DEPARTMENT	DESIGNATION/POSITION	POSTAL ADDRESS/TEL/FAX
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APPENDIX B:
Seminar Programme

East African Water Resources Seminar
Entebbe, 24-27 May 1993

PROGRAMME

DAY 1	morning	<p>Welcome, opening</p> <p>Permanent Secretary, Mr. B.Z. Dramadri, Uganda</p> <p>Ms. B. Storgaard, Denmark</p> <p>Hon. Minister, Mr. Henry Muganwa Kajura, Uganda</p> <p>Keynote addresses:</p> <p>Nordic Initiative & CIC Dublin Conference</p> <p>UNCED, Agenda 21 (fresh-water)</p>	<p>Dr. T. Jønch-Clausen, Denmark</p> <p>Dr. A. Askew, WMO</p> <p>Dr. J. Lundquist, Sweden</p>
	afternoon	<p>Water resources in East Africa:</p> <p>Kenya</p> <p>Tanzania</p> <p>Uganda</p>	<p>Mr. P.K. Weru, Kenya</p> <p>Mr. S.S. Mambali, Tanzania</p> <p>Mr. P.O. Kahangire, Uganda</p>
	evening	Reception	
DAY 2	morning	<p>Case study presentations:</p> <p>Ismania, Tanzania</p> <p>Western Kenya Water Programme</p> <p>Uganda Water Action Plan</p>	<p>Prof. M. Mujwahuzi, Tanzania</p> <p>Mr. R.F.K. Munene, Kenya</p> <p>Mr. E. Dribidu, Uganda</p>
	afternoon	WORKING GROUP SESSION	
DAY 3	morning	<p>WORKING GROUP SESSION</p> <p>Brief presentation from working groups</p>	Working group chairmen
	afternoon	WORKING GROUP SESSION	
DAY 4	morning	<p>Results of working group sessions:</p> <p>Presentation</p> <p>Discussion</p>	Working group chairmen
	afternoon	<p>Final discussion:</p> <p>Draft summary by chairman</p> <p>Discussion</p> <p>Summary by chairman</p> <p>Closing session</p>	<p>Ms. B. Storgaard, Denmark</p> <p>Ms. B. Storgaard, Denmark</p> <p>Permanent Secretary, Mr. B.Z. Dramadri, Uganda</p>
	evening	Dinner	
DAY 5	morning	Excursion	

APPENDIX C:

Summaries of Working Group Discussions

WATER RESOURCES AVAILABILITY

GROUP I	GROUP II	GROUP III
<p>Climatic factors (Spatial, seasonal variations, aridity etc.)</p>	<p>Poor distribution of water resources in time and space</p>	<p>Variability in space and time of water resources and its impact on socio-economic activities</p>
<p>Water quality (natural)</p>	<p>Deterioration of water quality due to changes in land use, poor sanitation practices and effluent disposal</p>	<p>Inadequate quality of water for human consumption and other purposes resulting from natural factors and pollution</p>
<p>Geological characteristics of certain areas (groundwater)</p>		
<p>Impact of human activities - land use practices - deforestation etc.</p>	<p>Decline in water quantity availability due to changes in land use and decline in per capita availability due to population increase</p>	<p>Catchment land use practices and development of wetlands and their influence on water resources</p>
	<p>Lack of proper water resources monitoring and assessment regarding quality and quantity</p>	<p>Need for efficient and effective collection, monitoring, analysis and publishing of data on quality and quantity of surface and groundwater</p>
	<p>Lack of integrated development plans/planning (process)</p>	<p>Need for conservation and harvesting of rainwater and development of appropriate technologies for these</p>

WATER RESOURCES UTILIZATION AND CONFLICTS OF INTEREST

GROUP I	GROUP II	GROUP III
<p>Inadequate information/data on water resources available (drought preparedness)</p> <p>Inadequate community awareness (in relation to management of the resource at the lowest appropriate level)</p> <p>Inappropriate technology (efficiency, sustainability, options)</p> <p>Inadequate integrated planning, policy (legislation, regulations) and coordinating mechanisms (optimize use, and minimize conflicts)</p> <p>Inadequate coordination for use of shared transboundary water resources</p> <p>Inadequate human and financial resources</p>	<p>Lack of awareness of water as a finite and vulnerable resource among users and decision-makers</p> <p>Assessment of demands (based on realistic projections) and basic human needs</p> <p>Competing demands for scarce water resources, e.g. urban-rural; irrigation-other demands; livestock-other uses; wetlands: conservation-use</p> <p>Lack of allocation priority criteria at all levels from grassroots to national levels</p> <p>Low coverage of domestic water supply for both rural areas and urban centers</p> <p>Problems of nomadic groups and settled water users</p>	<p>Potential for and conflicts associated with interbasin transfer of water resources</p> <p>Inadequate capacity to develop and maintain water resources</p> <p>Problem of allocation of scarce water resources among various users (including multipurpose uses) and the need to resolve conflicts, taking into account socio-cultural, economic and environmental factors</p> <p>Efficient distribution and use (including reuse) of water for all purposes</p> <p>Establishment and enforcement of water quality standards</p> <p>Maximization of use of freshwater lakes</p>

MANAGEMENT INSTRUMENTS

GROUP I	GROUP II	GROUP III
<p>Tariff strategy that promotes conservation, avoids abuse, and generates sufficient funds for sustainable operation and maintenance</p> <p>A legal framework that reflects sector objectives and policies (participatory decision making at local level, resolution of conflicts, setting of standards, revenue collection, priority setting)</p> <p>Improved inter-sectoral coordination mechanisms</p> <p>Monitoring and evaluation systems</p> <p>Increased funding for water resources management through various means (cost sharing/recovery, private sector investment, retention of revenue by water undertakers etc)</p>	<p>Appropriate pricing policy to optimize water allocation, water use and to sustain water resources information systems</p> <p>Need to enact review, enforce and harmonize water legislation in various acts/sectors</p> <p>Guidelines for cross-sectoral assessment of water projects with due regard to appropriate technology, land/water, environmental and social aspects</p> <p>Decentralized and dynamic planning process including integration of institutional aspects and review of the role of existing WRMP; involvement of water users in implementation and operation</p> <p>Policy dialogue between formal bodies, NGO's and the public at various levels</p> <p>Incorporation of local consultants in donor funded projects</p>	<p>Comprehensive economic as well as financial analysis as a basis for investments in and pricing of all water conservation and utilization</p> <p>Enact and enforce enabling water legislation with provision for regulations and schedules to be revised as conditions demand, involving private sector, donors and NGO's</p> <p>Integration in water resources planning and allocation of cross-sectoral issues and economic, social and environmental criteria</p> <p>Monitoring, processing and dissemination of information needed for management at all levels, and associated training</p> <p>Need for clear understanding of issues concerning the delegation of responsibility to end-users and others</p>

ROLES AND FUNCTIONS AT DIFFERENT MANAGEMENT LEVELS

GROUP I	GROUP II (<u>indication of level</u>)	GROUP III
<p>Adopt decentralization and devolution policy</p> <p>Review of existing status with respect to responsibilities, performance and skills available</p> <p>Identify activities and responsibilities at different levels</p> <p>Sensitize and adopt a participatory approach at all levels for all those concerned, through workshops, seminars and media</p> <p>Sanction the roles and responsibilities through a legal instrument</p>	<p>Setting national policy standards (<u>national</u>)</p> <p>Definition of thresholds for water allocation in terms of permits/no permits (<u>national</u>)</p> <p>Users participation in management with due regard to land/water resources (e.g. environmental protection of land/water resources) (<u>local</u>)</p> <p>Preparation of district land/water use plans (<u>intermediate</u>)</p> <p>Coordination of sectoral activities within river basins when the need exists (<u>intermediate</u>)</p>	<p>Review/formulate guidelines on roles and functions at different levels (from users to national) that clearly demarcate responsibilities and avoid duplication through:</p> <ul style="list-style-type: none"> - policy, regulation and technical guidelines at national level, and design, implementation and O&M at district and user levels - defining types of WR problems with thresholds for when the main impact is at local, regional, district, basin and national levels, and design functions accordingly - establishment of water resources management committees with specific TOR and legal backing <p>Focus on efficiency and effectiveness of user participation through human resources development methodology</p> <p>Bureaucracy should be avoided at all levels</p> <p>Methods of comprehensive economic and gender analysis should be taught at all levels</p>

CROSS-SECTORAL INTEGRATION MECHANISMS AND GUIDELINES

GROUP I	GROUP II (indication of level)	GROUP III
<p>Establish or strengthen water resources policy and regulatory committee</p> <p>Hold inter-sectoral meetings on water resources planning and management issues</p> <p>Create awareness to enable all those concerned to consult and follow guidelines in decision making</p> <p>Review the roles and mandates of existing institutions dealing with water resources with a view to avoid overlaps</p> <p>Evolve guidelines and screening mechanisms for water resources utilization activities and their impact</p>	<p>Formation of cross-sectoral water policy committee (high level committee to i.a. formulate guidelines for work of Task Force at working level) (<u>national</u>)</p> <p>Setting-up intersectoral Task Force (to become permanent if the need arises) (<u>national</u>)</p> <p>Set-up and/or strengthen district development committee (DDC), including all sectors and NGO's (<u>intermediate</u>)</p> <p>Formation of village water committees, including executive roles for all water uses (<u>local</u>)</p> <p>Creation of intersectoral project task force (<u>local</u>)</p>	<p>Establishment/strengthening of existing cross-sectoral committees for water resources management at all levels involving</p> <ul style="list-style-type: none"> - government - NGO's - private sector <p>For all major water related programmes, water allocations and effluent discharge permits, cross-sectoral water resources impact assessment is required (assessing their impact on the resource, other users, and environment), as well as assessment of their cost effectiveness and user response</p> <p>Roles of cross-sectoral integration should be clearly spelled out, namely</p> <ul style="list-style-type: none"> - national level . coordination - lower levels implementation <p>Persons involved in cross-sectoral integration should be designated on the basis of their competence in the field concerned, rather than their bureaucratic positions</p> <p>Promotion of effective data dissemination among involved sectors</p>

ECONOMIC ANALYSIS, PRICING AND CHARGING

GROUP I	GROUP II (indication of level)	GROUP III
<p>Undertake economic and financial analyses to establish the costs of <u>optional</u> water provision</p> <p>Undertake a social analysis including ability and willingness to pay</p> <p>Establish social, financial and economic criteria for charging</p> <p>Establish tariff structures which promote proper utilization of water and disposal of waste</p>	<p>Prepare guidelines for estimation of opportunity and environmental costs (<u>national</u>)</p> <p>Set-up modalities for tariff charges and prices (<u>national</u>)</p> <p>Impose fees/cost recovery/incentives (in accordance with socio-economic abilities) at all levels (<u>national</u>)</p> <p>Set-up prices and collect fees to cover at least the O&M either in kind or in cash: the charges should reflect the service levels (<u>local</u>)</p> <p>Organize education programmes targetted at the household level on the benefits of potable water and related costs (especially O&M) (<u>local</u>)</p> <p>Promote entrepreneurs in rural areas and autonomous water entities to operate water projects (e.g. in urban centers) (<u>national</u>)</p>	<p>Analyses are required for direct, opportunity and environmental costs for all major water related programmes, water allocation and discharges</p> <p>Except for some major undertakings, users should participate in choosing service and cost levels, their own facilities and system for cost recovery and management</p> <p>Formulation of pricing and charging mechanisms for different water users should be based on the economic value of water - but allowance should be made for cross-subsidization (vulnerable groups) and differential charges to guarantee access to minimum drinking water requirements and promotion of efficient use</p> <p>Emphasis should be on affordable, manageable and sustainable technologies</p> <p>Promotion of deployment of local consultancies in water resources studies.</p>

LEGAL AND PLANNING FRAMEWORK

GROUP I	GROUP II (indication of level)	GROUP III
<p>Review, amend and enact laws for proper utilization, protection and management of water resources (All laws dealing with or impacting water)</p> <p>Evolve or strengthen legislation to ensure protection, conservation and apportionment of water at all management levels</p> <p>Ensure wide dissemination of revised and new laws (in order to create awareness)</p> <p>Establish water action plans to facilitate water resource management</p> <p>Decentralize to ensure that the laws are enforced at the lowest appropriate level</p>	<p>Review, enact and enforce relevant legislation in relation to water resources management (<u>national</u>)</p> <p>Formulate and enforce bye-laws (<u>local</u>)</p> <p>Coordinate the legal framework for management of shared water resources (<u>national</u>)</p> <p>Prepare dynamic water action plans (covering water resources assessment, required institutions, management instruments etc.), based on water resources policies (<u>national</u>)</p> <p>Ensure that planning draws on experiences learnt from previous projects with a view to replicate 'successful' strategies (<u>intermediate</u>)</p>	<p>Review, update, rationalize and enforce legislation and bye-laws concerned with water, allowing flexibility needed over time and space</p> <p>Assess the capacity of existing institutions for enforcement of legal and planning framework, and embark on the process of strengthening where weaknesses exist</p> <p>Ensure user participation by encouraging a demand-driven approach</p> <p>Involve users and water enterprises in the formulation and implementation of water resources management tools</p> <p>Environmental impact assessment studies should be made during the planning stages of water resources development</p>

APPENDIX D:
Copenhagen Statement

COPENHAGEN STATEMENT

Freshwater is a finite and vulnerable resource, which is vital for the sustenance of life, for all development activity, health and environmental maintenance. Rapid population growth, coupled with the pace of economic development, is putting increasing strain on available water and land resources. Depletion and degradation of available resources are causing the costs of new water supplies to escalate and threatening sustainability.

The past sectoral and top-down approach to water and land management has proved ineffective and insufficient in ensuring the sustainability of water resources. Specialists are agreed that a coordination and integration of sectoral approaches is vital, to tackle the escalating problems.

Participants in the Copenhagen Informal Consultation on Integrated Water Resources Development and Management prepared and supported by the Nordic Countries and held on 11-14 November 1991 consider that two key principles should be prime components of future strategies for sustainable development and management of water resources for rural communities.

1. Water and land resources should be managed at the lowest appropriate levels
2. Water should be considered as an economic good, with a value reflecting its most valuable potential use.

The Copenhagen Informal Consultation focused on integrated water resources management in rural communities (including small towns) in developing countries. Affected water users therefore include domestic users, agricultural users, and rural industrial users. These recommendations are not intended to cover water management problems of large urban areas, or transboundary issues. These topics are recognized as vitally important but they are addressed through other fora.

Governments are urged to adopt the two key principles in their national policies and action plans and to couple them with a strong recommendation that land resources management should be fully integrated with water resources development and management. In support of these recommendations, the 45 participants (including water resources specialists from 15 developing countries and 12 developed countries) have provided guidance on practical ways to implement integrated water resources development and management from local to national level in developing countries. Implementation mechanisms are described in the report of the Copenhagen Informal Consultation. The main elements are outlined in this Copenhagen Statement.

BACKGROUND

At the UN Conference on Environment and Development (UNCED), in Rio de Janeiro, Brazil, "Agenda 21" is the World's agenda for environmentally sustainable development in the next century. Within this agenda, the freshwater chapter says "Effectively integrated management of water resources is important to all socio-economic sectors relying on water". In preparation for Rio, the freshwater issue will be discussed at the International Conference on Water and the Environment (ICWE) in Dublin in January 1992.

The Copenhagen Informal Consultation, the recommendations from which will be input to ICWE, represents an important consensus on the approaches needed to implement effective integration of water and land resources management, in a multisectoral approach which extends to all levels of society.

THE KEY PRINCIPLES

1. Centralized and sectoral (top down) approaches to water resources development and management have often proved insufficient to address local water management problems. Recognizing the need for a central mechanism capable of ensuring the national economic and social interests, the role of governments needs to change, to enable users, local institutions and the formal and informal private sector to play a more direct part. The levels at which effective management decisions can be taken and problems can be solved will vary widely from country to country and from situation to situation. The fundamental principle remains however that, in any given situation, water resources should be managed at the lowest appropriate levels, taking into account the need for integration with land use management.
2. Access to enough water of adequate quality for basic subsistence is a fundamental human need. However, efficient allocation of water resources can only come from a full recognition of the costs and benefits associated with various alternative uses taking into account future needs. In other words, water is an economic good. Failure to recognize this key principle has contributed substantially to wasteful and environmentally damaging uses of water. Whether or not different categories of users are charged the full economic cost of providing their water supplies, that cost must be apparent and accounted for in resource management strategies.

MANAGEMENT AT THE LOWEST APPROPRIATE LEVELS

Objectives

Implementation of water and land resources development and management at the lowest appropriate level has these basic objectives:

- * to ensure sustainable development and management of water resources
- * to achieve a high degree of awareness and concern among water users, while increasing their involvement and responsibility for satisfying their needs
- * to develop and promote a shared vision of water resources management, through a broad consultative approach involving governments, NGOs and the public
- * to recognize local interests, make local information available and ensure its optimum use
- * to mobilize local financial, physical and human resources
- * through decentralization, to enable central government agencies to concentrate on essential national functions
- * to recognize the important role of the private sector in cost effective water resources management.

Demand-driven water resources development and management

To prepare the ground for their active involvement, people must have choices and a sense of ownership and responsibility. All categories of water users should be given an opportunity to:

- * participate in setting priorities for use of economic and human resources for development of different water-use sectors, based on proper information about the practicality, costs and environmental impact of different options
- * choose technology and service levels, with due consideration to their willingness to pay for the service chosen, and the sustainability of the resource
- * have a choice between different implementing agencies, including both the public and private sector, competing on an equal basis.

These choices will only be valid when management decisions on water development and allocation are governed by an awareness of the full cost of providing the water (including the "opportunity cost" of other potential uses). They should also be based on recovery of actual costs, though this does not preclude political decisions to transfer revenue (i.e. subsidies) to help satisfy communities' basic needs.

Demand-driven institutional responsibility

Changes to existing institutional arrangements and legislative frameworks should not be made for their own sake, but in response to an expressed need. To avoid waste of effort, while ensuring improvements in management efficiency where necessary:

- * Institutional capacity for water management should be developed when there is a clear demand. Institutional response will therefore vary from time to time and place to place. A need for a river basin authority to regulate water use in one part of a country does not imply that all river basins in that country need the same type of institution. Existing administrative structures will often be quite capable of achieving local water resources management. In other situations, the need may arise for new institutions based, for instance, on catchment areas. Integration too should be demand driven. Organizations are most efficient when they have specific, well-defined and measurable objectives, and special authority.
- * Water use regulations, including local bylaws should generally only be introduced when there is an expressed demand for regulation from affected people, organizations or institutions. Sometimes, this demand may be stimulated through awareness raising, but without it, there is little likelihood that regulation imposed for external reasons will be effectively enforced.
- * Management and regulation of water and land use should generally be performed at the social and physical level appropriate to a need. Only when a new demand arises or a conflict needs resolving should management be transferred to a higher hierarchical level. Even then, there should not necessarily be a transfer of command and control. The higher management level should create the enabling environment for problem solving to be returned to the lower level.

The enabling environment and the role of government

In creating the enabling environment for management at the lowest appropriate level, the roles of the government include:

- * Mobilizing resources for and formulating national action plans for water resources development and management. Such plans should include a definition of the roles of central

and local government, the formal and informal private sector, and communities.

- * Creating the infrastructure for the optimal national development and management of water resources, including the delegation of authority for implementation to the appropriate levels.
- * Legislation, standard setting and other activities necessary to protect the environment and ensure equity and fairness in availability and access to water resources. Empowerment of local government to introduce and enforce appropriate bylaws. Review and amendment of existing legislation inhibiting decentralized management can be just as important as introduction of new legislation.
- * Monitoring and assessment of the use, development and management of water and land resources, and dissemination of information to all interested parties
- * Promoting awareness of the needs for water and land resources management at all levels of society
- * Creating opportunities for expression of demands for water and land resources development and management
- * Building capacity to undertake water and land resources management when the need for it is agreed upon

International agencies and donors have an important role to play, individually and in cooperation, to support developing countries in creating the enabling environment for integrated development and management of water resources at the lowest appropriate level. This should include mechanisms to channel donor support to local levels in developing countries. Local institutions and NGOs from developed countries may be similarly involved under government coordination.

The management hierarchies

Like any other natural resource or sector, water is managed at several institutional levels in the socio-political system from the lowest (household) to the highest (national/international) level. Water itself, however, does not respect administrative boundaries. Water is contained within natural hydrological boundaries, varying from the lowest sub-catchment (or sub-aquifer in case of groundwater) to the largest international river basins.

While integrated water resources management necessarily must consider the natural boundaries of the resource, it must at the same time take place within the socio-political structures of the country concerned.

Hence, in identifying the most appropriate institutional context for any water resources management decision or action, the socio-political and hydrological management structures must

be reconciled. In particular it must be decided at each level whether land and water management institutions are needed, and if so whether they should be advisory or executive.

Socio-political, hydrological and water management hierarchial structures often correspond in principle as follows:

- * Local level:
Socio-political: Household, community, village
Hydrological: Sub-catchment/aquifer
Water Management: e.g. Local catchment committee
- * Intermediate level:
Socio-political: District, region, province
Hydrological: Catchment/regional aquifer
Water Management: e.g. Coordinating catchment committee/authority
- * National level:
Socio-political: Nation (state/federal)
Hydrological: River basin
Water Management: e.g. National water committee/river basin authority
- * International level:
Socio-political: International (country, region of countries, world community)
Hydrological: Transboundary water body/international river basin
Water Management: e.g. International river basin committee

In addition to these structures, interest groups at local level (as e.g. user groups), and at regional and national level (as e.g. water associations) play a role in pursuing sectoral water interests.

So far these management hierarchies involve mostly institutions in the public domain, and it has yet to include land use management in relation to water resources availability and use. However, it is increasingly evident that the private sector, NGO's, cooperatives, corporations, etc, have an important role to play in water resources management. Users should have the option to use the services of private entities (such as water supply utilities or irrigation water associations), if these can provide cheaper or better services -within the overall framework and guidelines defined in the public domain.

Management decisions and actions

Given various hierarchies, whether existing or potential, the following implementation mechanisms for integrated water resources management should be identified

- * The lowest appropriate levels for management decisions and actions, including roles of public and private sector institutions

- * Management instruments to implement these decisions
- * Required inputs at all levels (higher levels providing the enabling environment for lower levels)
- * Mechanisms at each level to promote cross-sectoral integration

The Copenhagen Report contains some examples of typical implementation mechanisms.

WATER AS AN ECONOMIC GOOD

Access to enough water of adequate quality for basic subsistence is a fundamental human need. A prerequisite for sustainable management of water as a scarce and vulnerable resource is that its full economic cost should be identified and acknowledged. With limited funds available for water and other human development needs and competition between different sectors priorities must be set.

Assessing the economic value of water

Making water available and usable involves costs in the form of capital and labour. Growing demand for water means that satisfying the needs of one user increasingly preempts the use of that water by another user. There is therefore an additional cost - the opportunity cost - reflecting the value of the water in its most valuable alternative use, i.e. the revenue foregone by using the water in the chosen way. For domestic water use in most rural areas this opportunity cost is negligible, but in many settings the opportunity cost is high. These include settlements with high population densities, where the combined demands of many small users exceed the capacity of the water resource, and cases where large users dominate to the extent that other potentially valuable water uses are excluded. Finally, in many cases there are additional significant costs of protecting the environment from adverse impacts of the prevailing water use activities.

Meeting basic needs

Increasingly, communities are becoming aware of the growing scarcity of water and its deteriorating quality, and so recognizing water as an economic good. At the same time, they have a commitment to meet basic needs. Some may solve this dilemma by rationing water. Others may adopt water charging systems which secure a minimum provision that all can afford, while additional demands are charged according to a formula which ensures full or partial recovery of all costs.

Charging Options

There are many, and widely different charging options available for domestic, industrial, and irrigation water. The chosen charging mechanism depends on the local conditions and the development goals. Experience has shown that improvements can only be sustained if the felt need of the users is so strong that they are willing to pay for the services. Charging for water use is thus essential not only for inducing conservation and protection of water resources, but also for creating a sense of ownership and responsibility for the functioning of these water systems.

COPENHAGEN FOLLOW-UP

The participants of the Copenhagen Informal Consultation are convinced that widespread adoption of the two key principles described in this Statement will have a major impact on the implementation of integrated water resources development and management in the coming years. They therefore recommend the following actions:

1. That the Copenhagen Statement and the Copenhagen Report be transmitted to the 1992 Dublin Conference on Water and the Environment, and so as a contribution to the preparation for the 1992 UN Conference on Environment and Development in Rio de Janeiro, with a strong recommendation that they be considered essential components of strategies for integrated water resources development and management for the 1990s and beyond.
2. That the Copenhagen Statement and the Copenhagen Report be widely disseminated so that governments and sector specialists may adopt the guiding principles in formulating and implementing national action plans.

APPENDIX E:

Dublin Statement

THE DUBLIN STATEMENT ON WATER AND SUSTAINABLE DEVELOPMENT

Scarcity and misuse of fresh water pose a serious and growing threat to sustainable development and protection of the environment. Human health and welfare, food security, industrial development and the ecosystems on which they depend, are all at risk, unless water and land resources are managed more effectively in the present decade and beyond than they have been in the past.

Five hundred participants, including government-designated experts from a hundred countries and representatives of eighty international, intergovernmental and non-governmental organizations attended the International Conference on Water and the Environment (ICWE) in Dublin, Ireland, on 26–31 January 1992. The experts saw the emerging global water resources picture as critical. At its closing session, the Conference adopted this Dublin Statement and the Conference Report. The problems highlighted are not speculative in nature; nor are they likely to affect our planet only in the distant future. They are here and they affect humanity now. The future survival of many millions of people demands immediate and effective action.

The Conference participants call for fundamental new approaches to the assessment, development and management of freshwater resources, which can only be brought about through political commitment and involvement from the highest levels of government to the smallest communities. Commitment will need to be backed by substantial and immediate investments, public awareness campaigns, legislative and institutional changes, technology development, and capacity building programmes. Underlying all these must be a greater recognition of the interdependence of all peoples, and of their place in the natural world.

In commending this Dublin Statement to the world leaders assembled at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in June 1992, the Conference participants urge all governments to study carefully the specific activities and means of implementation recommended in the Conference Report, and to translate those recommendations into urgent action programmes for

WATER AND SUSTAINABLE DEVELOPMENT.

International conference on water and the environment

GUIDING PRINCIPLES

Concerted action is needed to reverse the present trends of overconsumption, pollution, and rising threats from drought and floods. The Conference Report sets out recommendations for action at local, national and international levels, based on four guiding principles.

Principle No. 1 – Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment

Since water sustains life, effective management of water resources demands a holistic approach, linking social and economic development with protection of natural ecosystems. Effective management links land and water uses across the whole of a catchment area or groundwater aquifer.

Principle No. 2 – Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels

The participatory approach involves raising awareness of the importance of water among policy-makers and the general public. It means that decisions are taken at the lowest appropriate level, with full public consultation and involvement of users in the planning and implementation of water projects.

Principle No. 3 – Women play a central part in the provision, management and safeguarding of water

This pivotal role of women as providers and users of water and guardians of the living environment has seldom been reflected in institutional arrangements for the development and management of water resources. Acceptance and implementation of this principle requires positive policies to address women's specific needs and to equip and empower women to participate at all levels in water resources programmes, including decision-making and implementation, in ways defined by them.

Principle No. 4 – Water has an economic value in all its competing uses and should be recognized as an economic good

Within this principle, it is vital to recognize first the basic right of all human beings to have access to clean water and sanitation at an affordable price. Past failure to recognize the economic value of water has led to wasteful and environmentally damaging uses of the resource. Managing water as an economic good is an important way of achieving efficient and equitable use, and of encouraging conservation and protection of water resources.

THE ACTION AGENDA

Based on these four guiding principles, the Conference participants developed recommendations which enable countries to tackle their water resources problems on a wide range of fronts. The major benefits to come from implementation of the Dublin recommendations will be:

Alleviation of poverty and disease

At the start of the 1990s, more than a quarter of the world's population still lack the basic human needs of enough food to eat, a clean water supply and hygienic means of sanitation. The Conference recommends that priority be given in water resources development and management to the accelerated provision of food, water and sanitation to these unserved millions.

Protection against natural disasters

Lack of preparedness, often aggravated by lack of data, means that droughts and floods take a huge toll in deaths, misery and economic loss. Economic losses from natural disasters, including floods and droughts, increased three-fold between the 1960s and the 1980s. Development is being set back for years in some developing countries, because investments have not been made in basic data collection and disaster preparedness. Projected climate change and rising sea-levels will intensify the risk for some, while also threatening the apparent security of existing water resources.

Damages and loss of life from floods and droughts can be drastically reduced by the disaster preparedness actions recommended in the Dublin Conference Report.

Water conservation and reuse

Current patterns of water use involve excessive waste. There is great scope for water savings in agriculture, in industry and in domestic water supplies.

Irrigated agriculture accounts for about 80% of water withdrawals in the world. In many irrigation schemes, up to 60% of this water is lost on its way from the source to the plant. More efficient irrigation practices will lead to substantial freshwater savings.

Recycling could reduce the consumption of many industrial consumers by 50% or more, with the additional benefit of reduced pollution. Application of the 'polluter pays' principle and realistic water pricing will encourage conservation and reuse. On average, 36% of the water produced by urban water utilities in developing countries is 'unaccounted for'. Better management could reduce these costly losses.

Combined savings in agriculture, industry and domestic water supplies could significantly defer investment in costly new water-resource development and have enormous impact on the sustainability of future supplies. More savings will come from multiple use of water. Compliance with effective discharge standards, based on new water protection objectives, will enable successive downstream consumers to reuse water which presently is too contaminated after the first use.

International conference on water and the environment

Sustainable urban development

The sustainability of urban growth is threatened by curtailment of the copious supplies of cheap water, as a result of the depletion and degradation caused by past profligacy. After a generation or more of excessive water use and reckless discharge of municipal and industrial wastes, the situation in the majority of the world's major cities is appalling and getting worse. As water scarcity and pollution force development of ever more distant sources, marginal costs of meeting fresh demands are growing rapidly. Future guaranteed supplies must be based on appropriate water charges and discharge controls. Residual contamination of land and water can no longer be seen as a reasonable trade-off for the jobs and prosperity brought by industrial growth.

Agricultural production and rural water supply

Achieving food security is a high priority in many countries, and agriculture must not only provide food for rising populations, but also save water for other uses. The challenge is to develop and apply water-saving technology and management methods, and, through capacity building, enable communities to introduce institutions and incentives for the rural population to adopt new approaches, for both rainfed and irrigated agriculture. The rural population must also have better access to a potable water supply and to sanitation services. It is an immense task, but not an impossible one, provided appropriate policies and programmes are adopted at all levels—local, national and international.

Protecting aquatic ecosystems

Water is a vital part of the environment and a home for many forms of life on which the well-being of humans ultimately depends. Disruption of flows has reduced the productivity of many such ecosystems, devastated fisheries, agriculture and grazing, and marginalized the rural communities which rely on these. Various kinds of pollution, including transboundary pollution, exacerbate these problems, degrade water supplies, require more expensive water treatment, destroy aquatic fauna, and deny recreation opportunities.

Integrated management of river basins provides the opportunity to safeguard aquatic ecosystems, and make their benefits available to society on a sustainable basis.

Resolving water conflicts

The most appropriate geographical entity for the planning and management of water resources is the river basin, including surface and groundwater. Ideally, the effective integrated planning and development of transboundary river or lake basins has similar institutional requirements to a basin entirely within one country. The essential function of existing international basin organizations is one of reconciling and harmonizing the interests of riparian countries, monitoring water quantity and quality, development of concerted action programmes, exchange of information, and enforcing agreements.

In the coming decades, management of international watersheds will greatly increase in importance. A high priority should therefore be given to the preparation and implementation of integrated management plans, endorsed by all affected governments and backed by international agreements.

The enabling environment

Implementation of action programmes for water and sustainable development will require a substantial investment, not only in the capital projects concerned, but, crucially, in building the capacity of people and institutions to plan and implement those projects.

The knowledge base

Measurement of components of the water cycle, in quantity and quality, and of other characteristics of the environment affecting water are an essential basis for undertaking effective water management. Research and analysis techniques, applied on an interdisciplinary basis, permit the understanding of these data and their application to many uses.

With the threat of global warming due to increasing greenhouse gas concentrations in the atmosphere, the need for measurements and data exchange on the hydrological cycle on a global scale is evident. The data are required to understand both the world's climate system and the potential impacts on water resources of climate change and sea level rise. All countries must participate and, where necessary, be assisted to take part in the global monitoring, the study of the effects and the development of appropriate response strategies.

Capacity building

All actions identified in the Dublin Conference Report require well-trained and qualified personnel. Countries should identify, as part of national development plans, training needs for water-resources assessment and management, and take steps internally and, if necessary with technical co-operation agencies, to provide the required training, and working conditions which help to retain the trained personnel.

Governments must also assess their capacity to equip their water and other specialists to implement the full range of activities for integrated water-resources management. This requires provision of an enabling environment in terms of institutional and legal arrangements, including those for effective water-demand management.

Awareness raising is a vital part of a participatory approach to water resources management. Information, education and communication support programmes must be an integral part of the development process.

Follow-up

Experience has shown that progress towards implementing the actions and achieving the goals of water programmes requires follow-up mechanisms for periodic assessments at national and international levels.

In the framework of the follow-up procedures developed by UNCED for Agenda 21, all Governments should initiate periodic assessments of progress. At the international level, United Nations institutions concerned with water should be strengthened to undertake the assessment and follow-up process. In addition, to involve private institutions, regional and non-governmental organizations along with all interested

International conference on water and the environment

governments in the assessment and follow-up, the Conference proposes, for consideration by UNCED, a world water forum or council to which all such groups could adhere.

It is proposed that the first full assessment on implementation of the recommended programme should be undertaken by the year 2000.

UNCED is urged to consider the financial requirements for water-related programmes, in accordance with the above principles, in the funding for implementation of Agenda 21. Such considerations must include realistic targets for the timeframe for implementation of the programmes, the internal and external resources needed, and the means of mobilizing these.

The International Conference on Water and the Environment began with a Water Ceremony in which children from all parts of the world made a moving plea to the assembled experts to play their part in preserving precious water resources for future generations. In transmitting this Dublin Statement to a world audience, the Conference participants urge all those involved in the development and management of our water resources to allow the message of those children to direct their future actions.

APPENDIX F:

Agenda 21: Structure of Chapter on Freshwater

Agenda 21: Structure of chapter on freshwater

In Agenda 21, the outcome of the UNCED conference held in Rio de Janeiro, in June 1992, the freshwater issues are discussed in chapter 18. The full introduction of chapter 18 and the structure of the other sections are given here:

Chapter 18

PROTECTION OF THE QUALITY AND SUPPLY OF FRESHWATER RESOURCES: APPLICATION OF INTEGRATED APPROACHES TO THE DEVELOPMENT, MANAGEMENT AND USE OF WATER RESOURCES

INTRODUCTION

18.1. *Freshwater resources are an essential component of the Earth's hydrosphere and an indispensable part of all terrestrial ecosystems. The freshwater environment is characterized by the hydrological cycle, including floods and droughts, which in some regions have become more extreme and dramatic in their consequences. Global climate change and atmospheric pollution could also have an impact on freshwater resources and their availability and, through sea-level rise, threaten low-lying coastal areas and small island ecosystems.*

18.2. *Water is needed in all aspects of life. The general objective is to make certain that adequate supplies of water of good quality are maintained for the entire population of this planet, while preserving the hydrological, biological and chemical functions of ecosystems, adapting human activities within the capacity limits of nature and combating vectors of water-related diseases. Innovative technologies, including the improvement of indigenous technologies, are needed to fully utilize limited water resources and to safeguard those resources against pollution.*

18.3. *The widespread scarcity, gradual destruction and aggravated pollution of freshwater resources in many world regions, along with the progressive encroachment of incompatible activities, demand integrated water resources planning and management. Such integration must cover all types of interrelated freshwater bodies, including both surface water and groundwater, and duly consider water quantity and quality aspects. The multisectoral nature of water resources development in the context of socio-economic development must be recognized, as well as the multi-interest utilization of water resources for water supply and sanitation, agriculture, industry, urban development, hydropower generation, inland fisheries, transportation, recreation, low and flat lands management and other activities. Rational water utilization schemes for the development of surface and underground water-supply sources and other potential sources have to be supported by concurrent water conservation and wastage minimization measures. Priority, however, must be accorded to flood prevention and control measures, as well as sedimentation control, where required.*

18.4. *Transboundary water resources and their use are of great importance to riparian States. In this connection, cooperation among those States may be desirable in conformity with existing agreements and /or other relevant arrangements, taking into account the interests of all riparian States concerned.*

18.5. The following programme areas are proposed for the fresh-water sector:

- (a) *Integrated water resources development and management;*
- (b) *Water resources assessment;*
- (c) *Protection of water resources, water quality and aquatic ecosystems;*
- (d) *Drinking-water supply and sanitation;*
- (e) *Water and sustainable food production and rural development;*
- (f) *Water for sustainable urban development;*
- (g) *Impacts of climate change on water resources.*

The remainder of the chapter is devoted to an elaboration of the above mentioned issues. Each of the proposed programme areas is discussed according to the following schedule:

Basis for action

Objectives

Activities

Means of implementation:

- (a) *Financing and cost evaluation*
- (b) *Scientific and technological means*
- (c) *Human resources development*
- (d) *Capacity-building*

APPENDIX G:

Country Reports: Kenya, Tanzania, Uganda

APPENDIX G-1:

Country Report: Kenya

**WATER RESOURCES DEVELOPMENT MANAGEMENT
IN KENYA**

by

**WATER DEVELOPMENT DEPARTMENT
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**A Paper Contribution to the East African Water Resources Seminar
on Integrated Water Resources Development and Management**

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INTRODUCTION

The Republic of Kenya is located approximately between latitudes 4° 21'N and between longitudes 34° and 42°E. It is almost bisected by the Equator and by longitude 38°E.

The land area is approximately 582, 646 km² of which 11.230 km² are inland waters. The country is about 800 km wide and 940 km from north to south. To the east the coastline extends 536 km from Somalia to Tanzania.

Kenya is characterized by enormous physical and ecological diversity. The country is divided longitudinally by the Central Rift Valley which is over 60 km wide and upto 330 metres deep. To the east of the Rift Valley, the highlands rise to over 2000 metres and the region is dominated by Mt. Kenya (5199 m and Aberdares (4000 m.)

The general relief of Kenya is dominated by a gentle dome shaped asymmetrical shield which divides the country into two distinct physical regions viz: uplands over 900 m attitude and lowlands. The highland area which is centered around Mt. Kenya extends westward to the Lake Victoria basin and north to Mt. Elgon. This area comprises mainly of volcanic rock, has fertile soils and good rainfall. The population is high and development is considerable.

The lowland area with the exception of Lake Victoria basin and coastal plain has less favourable climate mainly due to low rainfall and poor soils and is consequently thinly populated and less well developed.

Kenya's population which stood at about 21 million as of 1989 census, is increasing rapidly, and perhaps at an unbearable rate. This critical burden creates increasing demands on all natural resources, water being no exception. In this regard, therefore, optimisation of use and rational allocations between the conflicting water demands for domestic, industrial, hydropower, fisheries, recreation, navigation, livestock and agricultural users should be the primary objective of water resources development and management in Kenya. Supply of water of sufficient quantity and quality and in close proximity to dwelling units, results in considerable benefits that may be categorized as health, economic and social. The development of waste-water disposal and pollution control systems should go hand in hand with the development of water supply systems.

1. WATER RESOURCES

1.1 GENERAL

Kenya has a wide range of climatic conditions extending from a warm

coastal climate along the Indian Ocean, through a hot arid climate on the interior lowland plains, to a cool humid climate in the highlands. These climatic conditions are largely influenced by its equatorial location and the monsoon systems of the Indian Ocean. Main winds and their circulation are controlled by the large-scale pressure systems of the Western Indian Ocean and the adjoining continents. Kenya's seasonal weather results from changes in global circulation patterns extending over a wide band of latitude.

1.2 RAINFALL

Rainfall is the climatic factor which has the greatest significance on the water resources. A high proportion of rainfall in Kenya is from convective storms rather than from general frontal storms. Consequently, storms concentrate in cells which deposit rains in bursts of varying intensity, duration and relative small area.

A large number of these local storms occur during the rainy season with a random scattering over similar terrain. The mean annual rainfall ranges from less than 250mm in arid Northern and Eastern areas to more than 2,000mm near high mountain ranges. However, two-thirds of Kenya is arid and semi-arid, receiving on the average less than 850mm in annual rainfall. Annual rainfall normally follows a seasonal pattern and the length of rainy seasons varies with geographical region. Seasonal variations are more pronounced in dry lowlands of the North and East while less pronounced in humid highlands of Central and Rift Valley areas and even lesser in the Lake Victoria region. Despite the concentration of rainfall in brief seasons that are normally predictable, occasional shortfalls from the usual pattern result in periodic droughts that seriously affect crops and livestock production patterns. Along the coast, January to March is generally dry with the heavy rains occurring between March and May. Rainfall decreases from June to August with some occasional rains occurring in October and November. Rainfall decreases rapidly from December and the minimum is realized during January and February period.

In Eastern, North-Eastern, South-Eastern and Central areas, there are two distinct rainy seasons from March to May and October to December, while June to September is dry. April is generally the wettest month although heaviest downpours have been recorded during October and November.

The Lake Victoria area has no absolute dry seasons. Rainfall is prevalent most of the time of the year, and is generally heaviest in April. April and May tend to experience heavier rainfall in areas away from the highlands. Most highland areas west of the Rift Valley experience one long rainy season from March to September.

1.3 SURFACE WATER

Kenya receives an average of 289,500 million cubic metres of rain water annually based on an estimated national annual mean precipitation of 510mm. Most of this water escapes through evapo-transpiration and part of it infiltrate into the ground. The major portion of the remainder is drained by rivers and streams to the lakes and Indian Ocean. It is, therefore, obvious that with proper development and management of surface water resources, Kenya can meet its water needs for many years to come.

The greatest stream density is concentrated in the Central highlands as well as in Western Kenya while in the rest of the country dry valleys or seasonal streams are common. There are only two major rivers, the Tana and Athi which traverse the dry area in a south easterly direction and discharge their flow to the Indian Ocean. As such the major problem of surface water development is therefore that of distribution and not of water availability.

Kenya is divided into five catchment basins, namely Lake Victoria, Rift Valley, Athi River, Tana River and Ewaso Ng'iro. If all the basins were to be fully developed, only Lake Victoria and Tana River basins which would have surplus surface water balances. However, these two basins in addition to Athi River basin also happen to be the most densely populated. (fig. M 9.1)

1.4 GROUNDWATER

Groundwater resources in Kenya are also quantitatively and qualitatively unevenly distributed. In most of the high rainfall areas there are many fresh water aquifers with the high yields while in most of the drier areas aquifers are of low yield and have water of poor quality. More than 6,000 boreholes have been drilled countrywide during the past fifty years. Although this indicates that groundwater has contributed appreciably to the water supply in Kenya, results to-date show that the geological formations we have in the country are unfavourable for substantial groundwater production. The average yield of the 6,000 Kenyan boreholes for which measurements are available is only 117 litres per minute and half of the boreholes drilled to-date have produced less than 80 litres per minute. In some areas groundwater is not readily available, in others potential aquifers lie at considerable depths and would only be reached through expensive drilling operations while in other areas the available water is unsuitable for human consumption on account of high salinity, fluoride and other mineral salt concentrations. It is, therefore, necessary that an extensive exploratory programme be launched to map out the areas suitable for future water development and recommend suitable methods for such development.

2.0 DEVELOPMENT OF WATER RESOURCES

It is estimated that presently 75% of our urban and 25% of our rural population is adequately provided with water for domestic use.

Development activities in the water sector can partly be classified on the basis of water supply for rural needs or water supply for urban requirements. The general objective of development of water resources is to free the nation from water constraints, and thereby to contribute to national economic development, regional development, improvement of the environment and social well-being.

2.1 RURAL WATER SUPPLIES

The set target under this programme is the provision of access to safe and sustainable water sources towards the year 2000 with the ultimate aim of providing piped water supply system towards the year 2010. The Government is fully geared towards fulfilling this commitment. In the present District Focus for Rural Development Policy, the selection of rural water supplies schemes is done by the District Development Committees in consultation with the local community.

The provision of water supplies through community participation is continuing to be fully integrated into the overall Government effort to improve water supplies throughout the rural areas. In this regard, therefore, District Water Boards were recently set up with the responsibility of co-ordinating all the Government's efforts in developing and managing water resources throughout the country.

2.2 URBAN WATER SUPPLIES

Relatively rapid growth of the major towns in Kenya has led to the need for provision and expansions of water and sanitation services. In this regard, therefore, it is aimed to provide piped water supply to all urban areas by the year 2000.

The achievement of sustainable development by any nation is a challenge which calls for prudence in resources planning and management. The implications of this are far-reaching particularly on cultural, social, political and economic aspects of resources utilization for the betterment of human living standards. Critical aspect under this consideration, would be to ensure food security for the society. In a developing country where population is doubling every 18 years, planning for proper and optimum land and water resources utilization, to promote high agricultural yields is imperative. Cognizant of this requirement,

and in a bid to ease land pressure on high potential areas, the government of Kenya has established several irrigation schemes in ASAL areas. The objectives of planning irrigation schemes are within the National Food Policy in order to:

- (a) to produce sufficient food to feed the country's population and,
- (b) to produce surplus food for export to earn the much needed foreign exchange while at the same time supplementing community income at household level.

From national water demand point-of-view, agricultural water use will continue to command the highest demand. It is for instance, projected that the National Water demand will progressively increase from 5.68 million cubic metres per day in the year 1990, to 15.937 million cubic metres per day by the year 2010. Of this, 73% will be agricultural water demand, 4% livestock development, 22% domestic and industry and 1% for inland fisheries and wildlife. Demand for irrigation water will continue to increase as more land is put under irrigation and as rainfed agriculture continues to be unreliable due to atmospheric factors.

However, even with the burden of ensuring surplus food production, the government has recognized the need to integrate this with environmental protection and has promoted various measures to ensure sustainable agriculture. Such measures include intercropping of food crops with trees under the agroforestry programme, soil and water conservation measures and proper utilization of agrochemicals to minimise their adverse environmental effects. Other measures will include, a shift from agrochemical dependence to organic farming with less environmental costs.

In a move to reduce environmental damage associated with flood irrigation projects, Environment Impact Assessment reports have been a pre-condition for the starting of many irrigation projects in Kenya.

The water supply needs for a rural person are estimated at 50 lpd while that for the urban dweller is put at 100 lpd. According to estimates the total rural water supply demand based on the above figure will be 749.3×10^3 /day by the year 2000, while the water demand for urban needs has been estimated at 1168.3×10^3 /day. Livestock needs have been assessed at $426.5 \times 10^3 \text{m}^3$ /day and that for industry at $377.5 \times 10^3 \text{m}^3$ /day. The water demand for wildlife has also been estimated at 21.000m^3 of fresh water per day on the basis of wildlife species and distribution in the country. Water for fish farming needs based on a fish production capacity of 2.5t/ha. has also been assessed to be 28.6mcm or 0.96m^3 /sec.

Conflict in the management of water has been witnessed and is envisaged in the following areas:

- (a) In rural and urban water supply, conflicts arise where preference has been given to urban water supply and no serious attention has been paid towards the needs of rural people while carrying out inter-basin transfer of such waters through canals and pipes to towns remotely placed from the source.
- (b) In the process of endeavouring to meet the industrial and domestic water needs in urban areas, it has been established that the unplanned-for development of industrial projects will impose a high demand on existing water supplies thus leaving basic needs of water for urban dwellers not provided for. This in many instances does compel urban dwellers to go for alternative sources which at times are of unacceptable standards in quality and quantity.
- (c) There is conflict between industrial operations and other users in agriculture, fisheries, recreation, livestock, wildlife supply, in that most industrial waste water discharges are rarely controlled in terms of quality thus impairing the quality for other intended purposes as a result of pollution.

It is therefore envisaged that with the planned increase of industrialization taking place in the developing countries there will be more degradation of the environment and particularly the destruction of water resources unless adequate measures are instituted in order to foster good practices in industrial development and harmonizing the same with environmental protection and conservation.

The major environmental issues related to water resources management include:

- (i) Destruction of the land and soil vegetation cover through over-grazing or unplanned land-use. This practice in turn renders the soil unstable and is easily carried away by rainfall thus accelerating the erosion of soil. Soil erosion and sediment in transport has the adverse environmental effects of silting dams, damaging of turbines as well as destruction of fish spawning grounds.
- (ii) The environmental issues related to water resources management in wetlands involves reclamation of wetlands which in turn destroys the inherent purification capacity of such wetlands in the removal of organic and inorganic loads in waste water discharges. There is also the added disadvantage of dislocation of stable ecosystems through pollution of wetlands, destruction of flora and fauna including the interference with conservation and preservation of biodiversity.

- (iii) A major environmental hazard related to the management of water resources is pollution arising from the discharge of partially treated domestic sewage. Such organic wastes may constitute the source of water-borne diseases such as cholera, typhoid, dysentery etc. Malaria and schistosomiasis can also arise through improper management of water resources. Inorganic pollutants such as pesticide residues and heavy metals may persist in water systems or in aquatic life thus ending up in our piped water distribution system and ultimately in our body systems. Agricultural fertilizers carried back through irrigation return waters may also greatly affect the utilization of surface waters by causing eutrophication. Eutrophication will render such water bodies unsuitable for boating, transportation, swimming etc.

Whereas natural water systems are the universally accepted ways of disposal of liquid wastes due to their natural ability to assimilate, detoxify and degrade such wastes into natural harmless substances, the only means of conserving the water bodies is through adequate treatment of such wastes before discharge. This is essential if we are to safeguard the future socio-economic uses of such water bodies. The adequate treatment of industrial wastes is therefore essential although it tends to negate the industry's profit making motive.

This also applies to development of urban sewage systems which although expensive must be viewed as part and parcel of water supply development if the health of the communities served is to be protected and their production increased. Environmental protection and conservation will as such come into conflict with socioeconomic development unless both aspects are viewed and accommodated during project planning and implementation. This is realised fully if environmental impact assessment is incorporated in all projects.

2.3 INSTITUTIONS

At the national level the country's water resources are under the development and management of the Ministry of Land Reclamation, Regional and Water Development. The Ministry operations are under the legal backing of the Water Act Chapter 372 of the Laws of Kenya. The Custodian of the Act is the Water Apportionment Board which is entrusted by the Catchment Protection, Water Supply Development, Water apportionment, and Protection of the country's Water Resources from pollution.

The Ministry has the overall responsibility of evolving the policy and legislation including the overall planning of water development matters countrywide. There are other institutions which also play other roles which are rather subordinated to that played by the Ministry. These include Ministry

of Agriculture, Livestock Development and Marketing, Ministry of Local Government, Ministry of Health and Ministry of Lands and Settlement.

At regional level the management of water resources is entrusted to the Basin Catchment Board and the Provincial Water Engineers. The role of the regional Catchment Board is to scrutinize applications relating to water abstraction permits and recommend allocations to the Central Water Apportionment Board. This is done with the advise of the Provincial Water Engineers and other provincial departmental heads. At District level, the District Water Boards have been created and are operational. The role of these boards is to direct streamline and co-ordinate the resources at the district level. The boards address themselves to water allocations for various uses, approves, cancels, or withdraws water permits and directs on measures relating to the protection of water resources within the entire district. The District Water Board is under the technical advice of the District Water Engineer who also acts as a secretary to the Board. For the purposes of ensuring equitable distribution of water resources as well as the optimal protection of the same, the District Water Board is constituted mostly of the district heads of department who have interests in the management of water at district level.

Apart from the Ministry of land Reclamation, Regional and Water Development, there are other water undertakers who have been appointed by the Minister and empowered to take responsibility of water supply within certain limited areas.

These water undertakers include the National Water Conservation and Pipeline Corporation, Municipal Councils, County Councils, Schools and Prisons, the Kenya Railways Corporation, Religious Organizations, Self-Help Water Associations as well as private individuals.

There are approximately 500 water undertakers who have so far been gazetted in the entire country.

The Operational water supply systems country wide are well over 1,000 and in a recent socio-economic survey the management of water in 1570 centres was found to be distributed as follows:

(i)	Ministry of Land Reclamation, Regional and Water Development	- 579
(ii)	National Water Conservation and Pipeline Corporation systems	- 188
(iii)	Community systems	- 339
(iv)	Self-Help systems	- 243
(v)	Local Authority systems	- 164
(vi)	NGO systems	- 53
(vii)	Donor systems	- 4

This distribution indicates the broad variation in the institutions involved in water resources development in Kenya. In view of this and due to the possible conflict which is likely to arise therefrom, the need to co-ordinate the activities of such diverse bodies who are involved in water development activities in the country has been established. This role is currently being played by the District Water Board at the district level while at the national level, the overall planning, co-ordination and direction is vested in the Water Apportionment Board under the advice of the Director of Water Development Department.

Over and above the existing development and management scenario, the Government of Kenya is also investigating the feasibility of privatisation of some of the water related activities. To this end, the Government has formed the National Water Conservation and Pipeline Corporation to handle some of the major water supply projects. The government through the Water Apportionment Board is also encouraging rural communities to initiate and run their water supply schemes, with technical support from the Ministry of Land Reclamation, Regional and Water Development. It is intended that communities will set up their own priorities on water affairs, and channel their decisions through the District Water Board for implementation and guidance.

3:0 CAPACITIES

3:1 FINANCIAL RESOURCES

It has been estimated that a total of Kf16,188 million for Domestic and Industrial Water Supply, Kf1,022 million for sewerage development, Kf1,184 million for irrigation development, Kf1,017 for livestock water development, Kf1,407 million for hydropwer development, Kf1,482 million for river and flood works, making a total of Kf22,300 million, will be required for Water Development Sector in the next twenty years (upto 2010). The implications of achieving the targets, therefore, entails massive resources inflows to the water sector and in case of inadequate resources the targets have to be shifted, and hence the necessity for good planning.

Finance for both Development and Recurrent programmes is a major constraint in the Ministry's endeavour to fulfill the targets mentioned above. Most financial constraints focus on the short supply of funds available for development of the water and sanitation sector, as well as for maintenance of existing services. More donors should be attracted to assist in the development of our water resources.

3.2 HUMAN RESOURCES

Manpower requirements in order to attain Decade targets are of various levels, namely professional, sub-professional and supporting staff. Apart

from the Ministry which has well trained personnel, the other actors in the water sector lack the required personnel and, therefore, there is need for massive human resources build-up. This has already taken root through community training as well as setting up, of a water training institute. Recruitment and training needs for achieving the human resource needs have been estimated on a year-by-year basis for each numerically significant position.

The manpower projections and surveys already carried out have established beyond doubts that the highest training needs are within the sub-professional and technical cadres.

The training at professional level is presently catered for at University of Nairobi. However, the turnover is low and the Ministry's requirements have been supplemented by sending staff Overseas for undergraduate and post-graduate training.

The need for research and training facilities in the field of water and waste water should correspond with the development activities in this area in the country. At the moment research facilities in this field are mainly located at the University of Nairobi and to a very limited extent in the Ministry.

The two bodies also recognize the need to train manpower in the field of water and waste water engineering especially at post-graduate level in order to provide specialised skills to those manning the Ministry. The Research facilities proposed can be used for research as well as training purposes.

3.3 INSTITUTIONAL RESOURCES

A considerable number of agencies are involved in various fields of water resources development in Kenya. However, these institutions are not well co-ordinated and tend to duplicate efforts and sometimes conflict on the exploitation of water resources. It is in this direction that there has been necessity of setting out District Water Boards for co-ordination.

3.4 WATER APPORTIONMENT BOARD.

The Water Apportionment Board is in charge of all abstractions of Water in Kenya. It issues, varies and revokes awards of Water Permits. The Ministry provides the board with Technical advice, manpower for the Board's Secretariat, and Water Bailiffs who are Board's field officers. Lack of adequate and qualified field personnel has made the Board's work difficult in overseeing illegal abstraction of water and pollution of water sources. Integration of water resources development, utilization and protection requirements, will be necessary in the overall national development planning. This integration will primarily redress the critical problems associated inter alia with:

- (a) Fragmented sector policies,
- (b) Co-ordination among sector agencies in water development,
- (c) Skilled manpower requirements,
- (d) Operation and maintenance and rehabilitation needs of water projects,
- (e) Resource mobilisation and utilisation including cost recovery.

This integration is also expected to harmonise planning of water resources development with that of agricultural, industrial, and fisheries development among others. Use of other planning measures for sustainable development is also envisaged. Those measures will include use of National Environment Action Plans (NEAP) and the Environmental Impact Assessment on all major projects.

4.0 LEGISLATION

The Water Act Cap. 372 of the Laws of Kenya constitutes the legal document for the management of water resources in Kenya. Its objective is to make better the provision for the conservation, control, apportionment and use of the water resources of Kenya and for other purposes incidental to and connected with the management of the same.

The Water Act was first enacted in 1962 and revised in 1972. The Custodian of the Water Act is the Water Apportionment Board which ensures the implementation of water management requirements as stipulated within the Act. The Board is under the technical advice of Water Development Department and its powers stem from those of the Minister in-charge of water development matters. The Minister appoints the Board as per the Act. The ownership of water in Kenya is vested in the Government and the Minister empowered to discharge those powers arising out of the Act, delegates such powers to the Board.

Under the technical advice of the Director of Water Development, the Board is mandated to make further regulations for the better management of the country's water resources. It is also empowered to issue permits or licences pertaining to water usage and cancel or withdraw any water rights issued to the user subject to such action being in-line with the requirements of the Water Act. The water Apportionment Board is also empowered to direct the better protection and conservation of the country's water resources and catchment areas.

The current state of the Water Act has been identified to fall short of closely facilitating the management of the country's water resources particularly from pollution. In this regard the Act has been revised and it is envisaged that the revised edition which will allow the management of water resources in conformity to day-to-day technological and legal requirements will be enacted and released.

5.0 POLICY

The rural water development and supply policy as articulated in the 1989-1993 five year national Development Plan has the objective of ensuring the availability of potable water to within four (4) kilometres of every household by the year 2000 and it also emphasizes on the provision of safe and reliable water for all the population by the year 2010.

In rural areas, the conceptual development sequence is in two steps. During the first step, provision of water will be within walking distance i.e. within 1 km in the high potential areas and 4 km in the arid and semi-arid areas. In the second step, provision of piped water supply systems which is fully treated and complying fully to national and international water quality standards is envisaged. In rural areas, the pricing policy is based more on ability to pay than on demand and supply.

In urban areas, the government's water policy is based on increasing the water supply to adequate supplies for both industrial and domestic uses. There is also increased efforts to institute a proper pricing tariff in order to ensure proper water demand management in urban areas.

Sewage development programmes have also been proposed and will be implemented at the same time as water supply programmes.

The policy governing the water supply for livestock is basically similar to that for rural domestic water supply with slight differences such as livestock being left to cover longer distances and being dependent on surface water rather than piped supplies.

The national policy relating to irrigation water supply emphasizes on low cost approach in the implementation while increasing the acreage under irrigation. Small scale irrigation projects and utilization of gravity flow are mainly given preference.

The water conservation and protection policy in water resources management in Kenya emphasizes on satisfactory treatment of both domestic and industrial wastes before they return to water course. Good agricultural practices to minimize agrochemicals reaching rivers from farms and construction of multi-purpose reservoirs for water conservation.

6.0 FINANCIAL MANAGEMENT IN THE WATER SECTOR

It is the Kenya Government Policy to recover the full cost of urban water supply schemes and the O & M cost of the rural water supply through the collection of user's water tariff. This government policy is targeted to be fully realised by the year 2000. By then the urban water supply schemes will finance their operations through adequate arrangements on long term credit.

To facilitate the collection of users water tariff, water meters which were in the past not available in the rural areas are being installed.

In an effort to minimize wasteful use of treated water an ascending tariff structure and the phasing out of the flat rate system is being looked into.

Pollution charges are non-existent in rural areas but are to some extent practised in urban areas where industries and commercial enterprises are charged for effluent discharged into sewers on the basis of water consumption. The charges for unit consumption of water are much higher than for those for effluent discharges. However, it is envisaged that in the near future the charges for water abstraction and pollution discharges will be brought into play in order to ensure water conservation and its protection from pollution. Charges for irrigation water are also non-existent. However, a fee is paid for anew permit or during the periodical renewal of such permits.

7.0 PLANNING

The government of Kenya with the assistance of the Japanese Government, has recently concluded a National Water Master Plan. Once officially launched, the Master Plan will form the blueprint for National Water resources planning, development and management in the present decade and towards the year 2010. Drawing up of the Water Master Plan is an important move necessary in the overall National Planning in order to ensure integration of sustainable development and management of water resources in a complex inter-relationship between people. District water development plans are also being prepared.

8.0 DECISION-MAKING STRUCTURE

As discussed earlier in this paper, the affairs of water development and management at national level have hitherto been bestowed by the Government of Kenya, upon the Ministry of Land Reclamation, Regional and Water Development. To assist the Minister of Water Development in the administration of water affairs countrywide, there is within the Ministry, a Water Apportionment Board whose Chief Technical Adviser, is the Director of Water Development. It is this Act that forms the legal framework within which water affairs are managed.

At the basin level, are Catchment Boards that are subordinate to the Water Apportionment Board for all purposes of apportionment and use of water resources. In the recent past and in response to the district focus for rural development, District Water Boards have been formed in order to decentralise the decision-making process and change the traditional top-bottom approach.

The objective of these changes is to allow participation at the lowest level possible in the decision-making process. It is also intended that development and management of water resources will in future be on the basis of community demand. This change in management approach, has facilitated non-governmental organizations (NGOs) particularly women water associations, to initiate and fully participate in many water projects.

APPENDIX G-2:

Country Report: Tanzania

EAST AFRICAN WATER RESOURCES SEMINAR

Entebbe, Uganda, 24th - 27th May, 1993

TANZANIA COUNTRY REPORT

EAST AFRICAN WATER RESOURCES SEMINAR

ENTRANCE, UGANDA, 24th - 27th MAY 1993.

1.0 GENERAL BACKGROUND

1.1 Physiology

Tanzania, covering an area of 937062sq.km., lies 1.5 deg. south of the equator. It has common borders with Kenya, Uganda, Rwanda and Burundi in the north, Zaire in the west and Zambia, Malawi and Mozambique in the south. The country is characterised by a narrow coastal plain occupying the eastern seaboard. Most of the country, however, lies on the Great African Plateaux with altitudes between 1000m and 2000m.

The interior of Mainland Tanzania is interspersed with highland areas. The areas in the north east are characterized by the shatter-belt of block mountain topography namely the Pare-Usambara mountains, and also by the highlands associated with the volcanic districts of Mts. Kilimanjaro and Meru. Most of the other highland masses are associated with the Rift Valley. In the central northern area, there is the geologically ancient landform of Shinyanga region, the Serengeti plains and the highlands of Singida region. In the south, the highlands extend southeast of Lake Tanganyika through north and north east of Lake Nyasa, forming the Livingstone, Udzungwa and Kipengere mountain range. The volcanic Rungwe mountain lies to the north of L. Nyasa.

Substantial portions of the three East African Lakes (Victoria, Tanganyika and Nyasa) lie within its borders.

1.2 Climate

For a country close to the equator Tanzania is rather dry. More than half of the country receives, on the average, less than 800mm of rain per year. Rainfall is the most dominant climatic factor; it depends upon air circulation patterns and the movement of convergence zones in the region. Due to the north bound migration of what is called the intertropical convergence zone (ITCZ) from December to April, most parts of the country receives rains and this is the rainy or wet season. The dry season in the months of June to October reflects the subsequent retreat of the ITCZ. Mean annual rainfall over the country is dependent to some extent, upon relief.

Generally, it varies from 200mm to 1,000mm over most of the country. Higher falls of 1,000-3,000mm are recorded in the north-east Lake Victoria basin and in the southern highlands.

There are small seasonal temperature variations, this is because of the country's proximity to the equator. Mean temperatures range from 26 degree C on the coast, to 17 degree C in the southern highlands. Figure 1 shows the distribution of rainfall in the country.

Hydrologic and moisture conditions of the country are wholly influenced by the rainfall pattern and amounts. Rivers and Lake levels rise during the wet season and recedes during the dry season. The central and northern parts of the country, including areas immediately south of L. Victoria, are dry for an average of seven consecutive months in a year. River flows in these areas are intermittent. In the southern, western and northern highlands however which receive more than 1,000 mm/year of rain, the rivers are perennial. Some of these areas experience frequent floods, which inconvenience people in varying degrees.

Hydrologically, Tanzania is divided into five major drainage basins. These are the Indian Ocean drainage system, the Internal Drainage to Lake Eyasi, Lake Natron and Bubu depression complex, the internal drainage to Lake Rukwa, the Atlantic Ocean drainage and the Mediterranean Sea Drainage basins. Each of these basins comprises a network of rivers and lakes of various sizes. Figure 2 shows these major drainage basins.

1.3 The Economy

Tanzania is classified as a Least Developed Country (LDC) with a per capita income of US\$ 180. The economy is characterised by a large traditional rural sector and an intensive modern urbanised sector. Small scale farmers contribute 83% of the agricultural production.

Agriculture contributes about 50% of GDP and some 80% of export. Principal export crops are coffee, cotton, cloves, cashew nuts, tea, sisal and tobacco which together account for more than 70% of the total foreign exchange earnings. However, world commodity prices for most of Tanzania's exports have either declined or remained stagnant.

The manufacturing sector is concerned with the production of consumer goods such as food, beverages, tobacco, textiles, garments and shoes, which account for about 70% of industrial value added. Tourism has been rapidly growing and its contribution to the national economy has been increasing over the years.

Figure 1
Mean Annual Rainfall

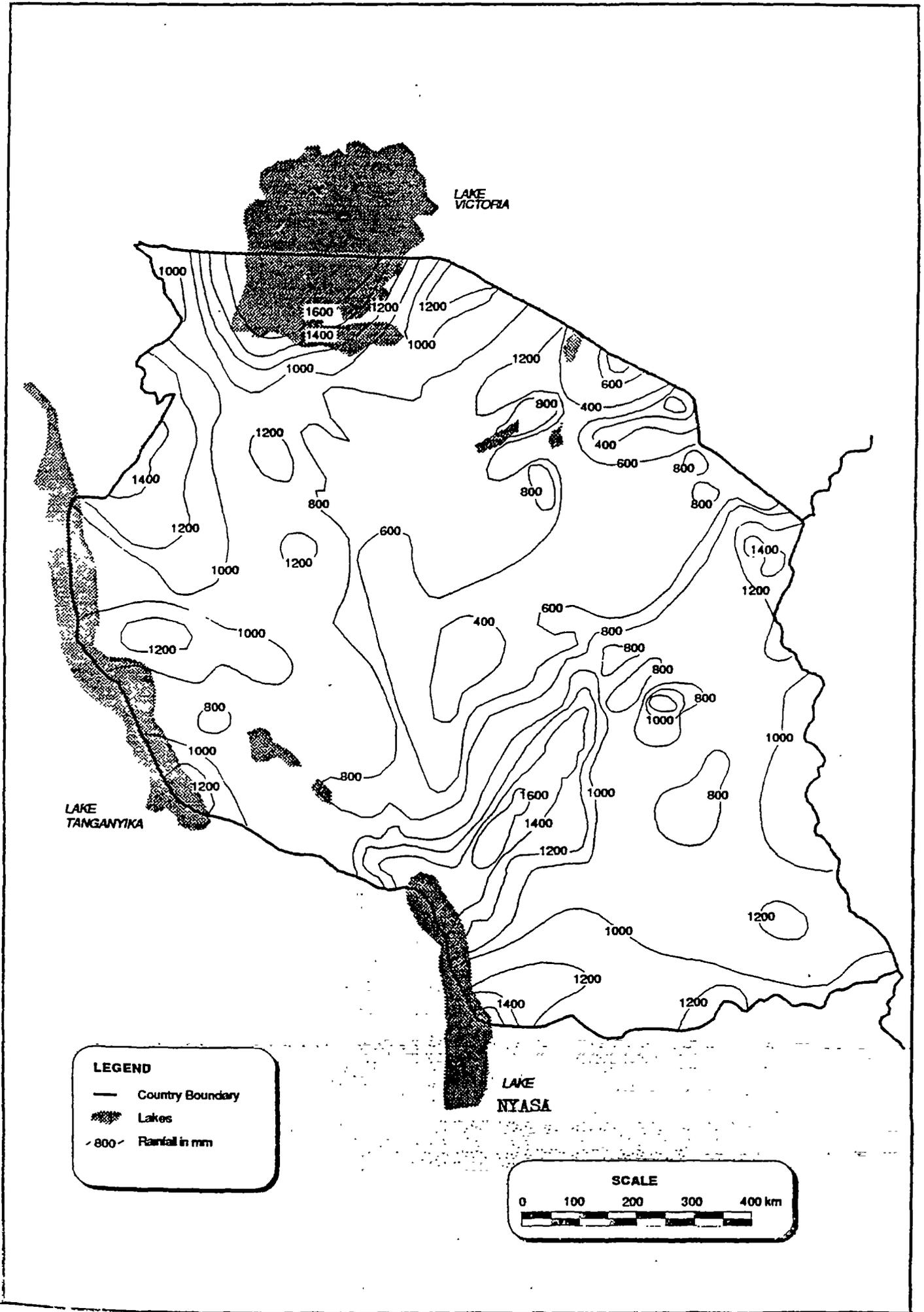
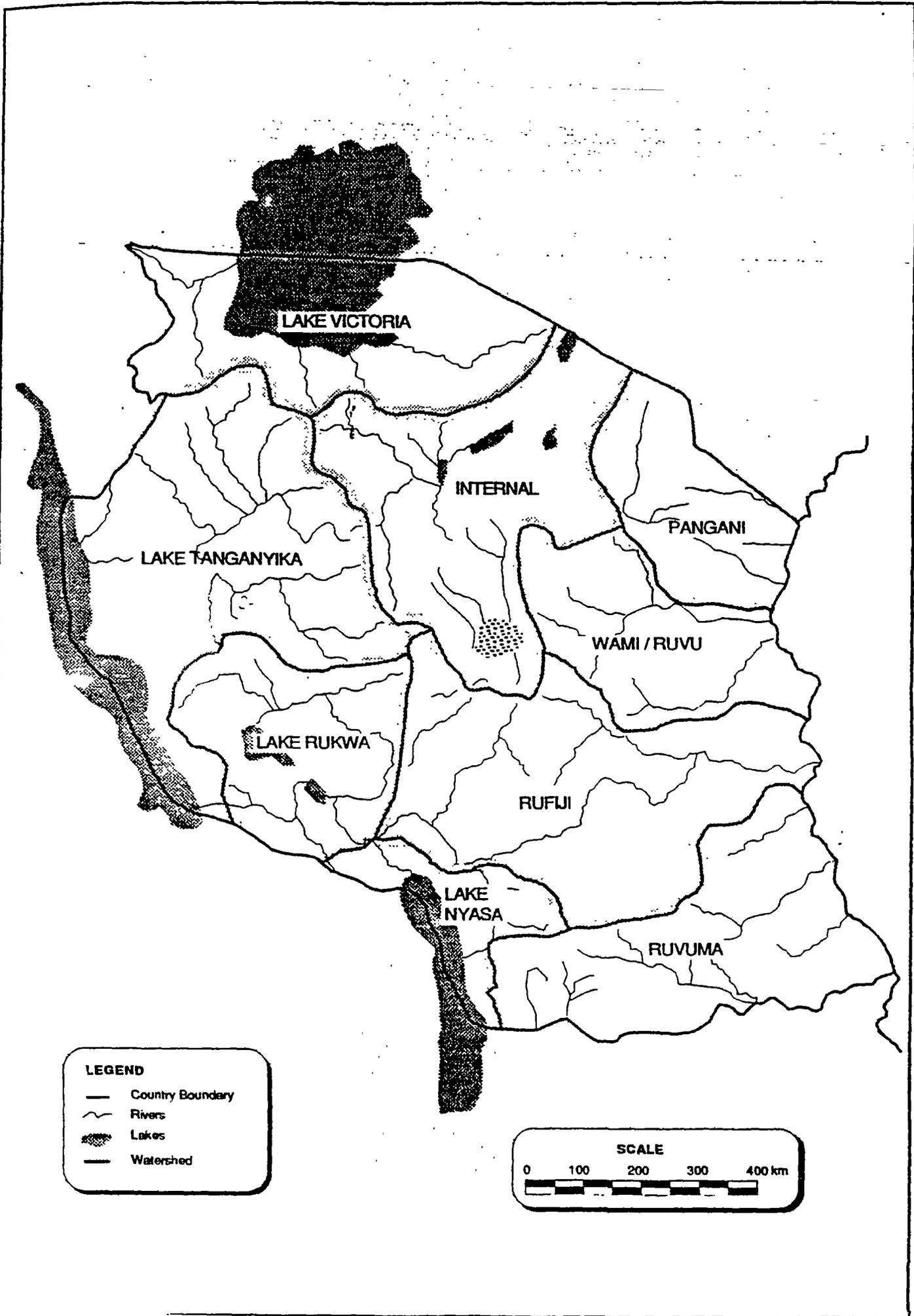


Figure 2
Major Drainage Basins of Tanzania



2.0 WATER RESOURCES

2.1 Availability

2.1.1 Surface Water Resources

About 50% of the surface runoff in the country flows directly into the Indian ocean from the major river systems of Pangani, Wami, Ruvu, Rufiji, Ruvuma, Mbwemkuru and Matandu. The remaining 50% is divided into surface water draining northward into L. Victoria, Westward into L. Tanganyika, southward into L. Nyasa and the Zambezi and then into the Indian Ocean. In addition some of the runoff flows into a number of drainage basins which have no outlet to the sea.

The following are some of the major river systems, which constitute the principal surface water resources of the country with the mean annual runoff in million cubic meters in brackets at the gauging site indicated.

-	Rufiji at Stieglers Gorge	(22,250)
-	Kilombero at Swero	(14,627)
-	Kagera at Kyaka	(7,064)
-	Ruhuhu at Kikonge	(5,600)
-	Malagarasi at Taragi Ferry	(5,060)
-	Wami at Mandera	(3,280)
-	Mara at Mara Mines	(1,970)
-	Kiwira at Kyeka	(1,900)
-	Ruvu at Moro Bridge	(1,370)
-	Pangani at Hale	(627)

Considerable water resources exist in the country's lakes, namely L. Victoria, Lake Tanganyika, L. Nyasa, L. Rukwa, L. Eyasi and L. Natron. Except for L. Victoria, the usefulness of lake water for water supply, irrigation and the like is limited, because most of these lakes are situated in the rift valleys.

The chemical quality of most of the surface water resources is generally good, Small streams in Tanga, Kilimanjaro and Arusha region regions have been polluted by mainly municipal and industrial effluents. Lake Victoria water at Mwanza receive untreated municipal sewerage at a place not far from the municipal water intake. High concentration of livestock in some of the northern areas of the country have caused severe gully erosion and the streams therefore carry large sediment loads. The effect of this is that reservoirs in these areas have a short lifetime due to sedimentation.

2.1.2 Ground Water Resources

Groundwater is one of the major sources of water in the country particularly in the central regions of Shinyanga, Dodoma, Singida and Arusha.

The quality of groundwater in Tanzania is generally good, and acceptable for most uses. The main problems are salinity and high fluoride concentrations. High salinities occur along the coast due to the presence of brackish or saline connate waters and/or saline intrusion exacerbated by overpumping, and in some inland lacustrine and terrestrial deposits, such as those west of Morogoro and in the depression near Lake Rukwa, where salts have become concentrated by evaporation.

High fluoride concentrations are a serious problem in some areas and may exceed 14 ppm (the temporary Tanzania standard is 8 ppm) particularly within the Precambrian volcanics and metamorphics in the north (Arusha and Kilimanjaro regions), and in the vicinity of the Rift Valley system to the south and east (Singida and Shinyanga regions).

The total number of boreholes in Tanzania exceeds 4,000. The domestic water supply for the majority of towns is provided from boreholes. The largest number of boreholes is located in Dodoma region; Singida and Rukwa regions also have almost 500 boreholes. In contrast, Ruvuma, Mbeya and Kigoma region have less than 100 boreholes.

A recent study, financed by Japan has shown that changes have occurred in the borehole fields over the period of record. However, the only regular groundwater level monitoring at present carried out in Tanzania is in the Makutupora basin in Dodoma region. Water quality monitoring and analysis have not been regularly undertaken since water master plans activities.

2.2 Utilization of Water Resources

Irrigation, power production, industrial and domestic water supplies are areas which have a high demand and use of water resources in the country. On a smaller scale water resources are also utilized for fisheries, transport and livestock.

2.2.1 Irrigation

Most crop production in Tanzania is rainfed; irrigation may therefore be seen in many areas as a protection against drought and as a means for stable crop production. In some areas however irrigation is used for dry season farming mainly for the production of vegetables. The government policy on agriculture attaches great importance to the development of the nation's considerable potential for irrigated agriculture. At present about 145,000 hectares of irrigated agriculture have been developed, of which 25,000 ha comprise of centrally managed schemes. The major crops irrigated are sugar cane rice and tea.

The national surveyed irrigation potential is about one million ha, of which about 60% (615,000 ha.) is in the Rufiji Basin, and of this acreage, two thirds can be used for double cropping.

The Rufiji basin comprise of three major basins, the Great Ruaha, the Kilombero and the Luwegu.

About 60% of the Irrigation potential in the Rufiji basin is in the Kilombero and Lower Rufiji, while 40% lies in the dry Usangu and Pawaga Plains in the Great Ruaha Basin. However most of developed irrigated agriculture is in the Pangani basin and the Great Ruaha. Irrigation potential is estimated on the availability and easy exploitation of water.

2.2.2 Hydropower

Most of the country's hydropower potential is in the Rufiji river system. Other rivers with hydropower potential are Kagera, Ruhuhu, Wami and Rufirio. Most of the hydropower potential for Pangani and Gt. Ruaha has been developed. Of the existing power generation facilities, 86.5% are hydropower units, and of the total available hydropower generation capacity, more than 99% is in the Great Ruaha and the Pangani.

2.2.3 Domestic and Industrial Water Supplies and Sanitation

Much of the domestic and industrial water supply sources are from surface water. Ground water sources, though potable in most cases, are not used to a great extent. This is due to the fact that ground water recovery needs a higher or expensive technology than surface water extraction.

(a) Rural Water Supply

The installed capacity for rural water supply schemes as of June 1992 serve 9,404,000 out of 20,540,000 people, an average of 46.9%. However, reliability of the data is questionable, as it can be illustrated that the actual supply is not as shown because over 35% of the schemes are not in operation. Many of the pumping units are worn out, non operational and need replacement. It is at this point that the questions of sustainability and affordability come in.

(b) Urban Water Supply

Urban water supply by June 1992 covered 3,203,000 people out of 4,757,000, which is 67%. This coverage does not take into account the quality of water supplied as sometimes due to non functioning of treatment plants and non availability of water treatment chemicals, water is supplied either partially treated or untreated. The operational costs are normally higher than the revenue collected. This is so because the water tariffs do not meet running costs and, the billing and revenue collection systems are not sufficiently streamlined.

(c) Sanitation

(i) Urban Sanitation

The average national sanitation coverage in 1990 in urban areas was estimated at 79 % .

Sanitation facilities commonly used include central sewerage systems, septic tanks with soakage pits, traditional pit latrines and, to a small extent, the newly introduced Ventilated Improved Pit (VIP) latrines. Sanitation services in urban areas throughout the country are poor and inadequate. Cesspit emptier are inadequate and expensive to hire.

Out of more than 52 urban centres, only seven, namely, Dar es Salaam, Mwanza, Moshi, Arusha, Dodoma, Tabora and Tanga are partially served by central sewerage systems, which are already ancient and urgently needing rehabilitation. Sewerage systems for Mbeya and Morogoro towns are at various stages of construction. The septic tanks, in all urban centres are usually in poor shape.

Overflows of hazardous untreated sewage are a common sight in the streets of most towns in the country. The freely-flowing raw sewage from residential, commercial, industrial and institutional establishments in urban areas, is a major source of pollution to water sources and other receiving bodies.

(ii) Rural Sanitation

The widely used traditional pit latrines seldom meet the minimum required health standards. Whereas VIP latrines are still not readily affordable by the majority of the rural people, there are at least 12,000 VIPs in the country.

2.3 Community participation

Implementation of rural water supply programmes did not go hand in hand with the development of beneficiaries' attitudes towards ownership of the schemes. Many people thought that the schemes belonged to the Government and not for them. This left many installations not cared for and open to vandalism. The National Water Policy clearly states that schemes belong to the communities and they must be accountable and responsible for operation, maintenance and vigilance against theft and the like. Many villages have now formed both Village Water Committees and Village Water Funds.

2.4 Present conflicts in water utilization

At a small scale, conflicts occur among farmers fighting for irrigation water from small rivers. This has been so in Arusha and Kilimanjaro regions.

In many cases these conflicts are resolved among the parties involved by apportioning time for irrigation for each farmer or a group of farmers and by limiting the area under irrigation for each farmer.

At a large scale the conflicts are between the sectors of agriculture and hydropower production. The nature of configuration of major irrigation projects and hydropowerplants as it is in the Pangani and Great Ruaha Rivers, is such that irrigation takes place upstream of the hydropower plants.

In the Pangani, hydropower is produced at Pangani falls which is close to the Indian Ocean while the upstream parts of the basin are fertile and therefore densely populated and this is where irrigation takes place. The electric power company (TANESCO) feels threatened by increased farming activities upstream in this area.

In the Great Ruaha, hydroelectric power is produced at Kidatu and a regulation reservoir is situated upstream at Mtera. The Usangu and Pawaga plains upstream have been under irrigation for a long time. In these areas agricultural potential is limited by availability of water for irrigation and not land. More land has therefore been put under irrigation in recent years. Today, TANESCO ascribes the water shortage at Mtera Dam to irrigation practices in the upstream plains, even though the shortage may be due to a normal drought spell or improper operation of the reservoir. TANESCO is demanding that all irrigation projects upstream of the dam be closed down in order to promote power production.

Due to the low level of development in Tanzania there are generally few areas of conflict in the use of available water resources. But the above are examples of real conflicts between food production and power production. They indicate that more conflicts may arise as more water is needed for development in the various sectors.

2.5 Environmentally friendly land use

There is a big campaign going on in Tanzania on Environmental issues, especially focusing on the land-soil-vegetation-water environmental conservation.

The rising human population has meant an increased demand for land, agriculture, water and fuelwood. Similarly, the large livestock population needs extra demand for pasture and water. This human and livestock population pressure has caused growing incidence of over-grazing and deforestation leading to soil erosion and other serious environmental consequences which, if not checked, will result in declining agricultural yields and human welfare.

Specific environmental issues to be examined include:-

- The impact of landuse practices on the physical environment (ie. animal husbandry and cultivation of cash and export crops)
- The use and misuse of chemical fertilizers and pesticides, and incidence of land and water pollution
- Occupational health hazards associated with agro-processing
- Impact of increased commercial farming on nutritional status
- Natural water management

3. INSTITUTIONS

3.1 Institutional set-up

The Ministry of Water, Energy and Minerals (MWEM) is a three sector Ministry. The water sector (MAJI) is responsible for all Water Supply and Urban Sanitation activities in the country.

Regarding certain tasks such as rural sanitation, health education, and community mobilisation, MAJI also closely coordinates its activities with the Ministries of Health; Community Development, Women Affairs and Children and with the Prime Ministers Office (Local Government and Regional Administration). The sector is also responsible for water research, assessment and management.

3.1.1 Sector Responsibilities

The roles and responsibilities of MAJI at the National level are as follows:

- Supervision of the implementation of the National Water policy;
- Rural and urban water supply development;
- Construction of drainage works and safe disposal of waste water in urban areas;
- Maintaining environmental hygiene and sanitation;
- Development of river basins;
- Supervision of Parastatals under its jurisdiction;
- Provision of consultancy services on water supplies and waste water disposal.

The sector under the Commissioner for Water Affairs is divided into four sections or departments headed by Assistant Commissioners. These are Water Research; Operation, Maintenance and Water Laboratories; Sewerage and Drainage and Design, Construction and Materials Testing Laboratory. There is also a unit for Water Law under the Principal Water officer.

At the regional level, activities of the Water Sector are headed by a Regional Water Engineer (RWE) who is administratively responsible to the Regional Development Director (RDD) and technically responsible to the Ministry of Water, Energy and Minerals (MWEM). In addition MWEM is responsible for manpower development, backstopping and material supply.

The District Water Office is under the Local Government System. Administratively, the District Water Engineer (DWE) is answerable to the District Executive Director (DED).

DWE reports to RWE on technical matters only. The districts are further sub-divided into divisions, wards, and villages.

The lowest administrative structure at the district level for the management of the Water Sector is the Village Water Committee within the Village government.

3.2 Capacities

3.2.1 Human Resources Development

Human resource is perhaps the most important component of any programme. It is said, "you can have all the resources needed for your programme but if you do not have the people, such resources become useless". Competent plans mobilizes and evaluates all types of resources. Human resources needed in managing of water resources include professionals of various disciplines such as planners, scientists, administrators, social-economists, engineers, surveyors, technicians, craftsmen and project operators.

On the average, in the early seventies, the Ministry of Water, Energy and Minerals had been receiving 2-3 engineers, geologists and chemists annually. However, it was felt that a number of professionals had to be trained annually if the sectoral demand was to be met. The most important programme was the training of about 234 undergraduate engineers under a manpower crash programme conducted in India between 1976 and 86, with SIDA assistance. This effort enabled the sector to allocate, on the average, four engineers to each region by 1986. Post graduate training has also been conducted in various countries abroad, mainly in Europe.

Training has also been done through seminars and workshops within the country and abroad.

Training of technicians has mainly been conducted at the Ministry's Rwegarulila Water Resources Institute, established in 1974. The annual training capacity is about 70 technicians for the disciplines of hydrology, hydrogeology, water works and laboratory technology.

Most craftsmen are trained under Regional Training Programmes allowing each regional office to train a maximum of 20 Primary and Secondary school leavers in any of the water related trades. After a year of training, the candidates are tested and certified by the Rwegarulila Water Resources Institute in close collaboration with the National Vocational Training Department of the Ministry of Labour and Social Welfare.

Villagers are expected to run their own water schemes. Therefore, each village appoints one or two villagers who are provided with basic technical skills necessary to operate, maintain, protect and safeguard the quality of their water schemes successfully.

In view of the shortage of staff, numerous expatriate staff mainly in engineering and consultancy services have been recruited from various parts of the world to strengthen the sector capability. Most of these take two year contracts.

In 1990 it was felt that the Ministry of Water, Energy and Minerals needed strengthening in order to institutionally achieve the water sector objectives. This strategy had the following main objectives:-

- (a) Rationalise organizational structure, functions and responsibilities at national, regional and district levels of water supply and sanitation institutions covering MAJI, the National Urban Water Authority, (NUWA) in relation to Ministry of Health, Regional and District Executive Directors' Offices, Urban Councils, and Village governments so that sector activities are well coordinated and guided.
- (b) Establish efficient and well functioning technical, financial and administrative systems in the sections of Design and Construction, Operations and Maintenance, Drainage and Sewerage, Water Research, Manpower Development and Administration and Planning Unit of MAJI and NUWA.
- (c) Develop a 5-year investment program for rural and urban water supply and sanitation services including priority project packages for external financing to lead to the achievement of IDWSSD objectives. Institutionalise the preparation of the investment programme and project packages in MAJI.

- (d) Train at least 10 MAJI and NUWA personnel on the job during the establishment of the technical, financial and administrative operational systems in water supply and sanitation services. Train other MWEM staff based on the training programme to be prepared by the Organisation and Human Resources Development Expert.

MAJI's self strengthening Project URT/89/003 was evaluated in October 1992 and the evaluation came out with two main recommendations. That the project in its current form be terminated in March 1993 and that a new project document based on MAJI's Project and Divisional Work plan be reformulated and submitted to the authorities for further consideration.

3.2.2 Technological

Appropriate technology is essential in supplying water to the people. Some of the technologies applied were such that operation and maintenance of completed projects and schemes proved difficult as they required importation of spare parts from abroad, against a poor foreign exchange situation of the country. Sustainability of completed projects was therefore frustrated.

3.2.3 Financial

Funding has been one of the hindering factors in the sector development. The financial resources allocated to the water sector are not commensurate with the sector needs and do not accord the sector the priority it deserves. It was estimated, at the beginning of 1981, that a total of Tsh.15.6 billion would be required to supply the backlog of the population by the year 1990. However, only Tsh 7,515,676.000/= was made available. This has made it impossible to achieve sector objectives and plans.

3.3 Sector Coordination - Intra and Inter

Intra and Inter sector co-ordination is poor and not fully established, especially in project appraisal and implementation from the districts through the regions to National level, among ESAs, NGOs and the private sector. It was only during the Decade when the National Action Committee (NAC) was formed to coordinate sectors involved in the implementation of the Decade objectives. The committee was composed of members from Ministries responsible for Water Supply, Health, Planning, Finance, Industries, Agriculture as well as the University of Dar es Salaam and the Speakers office.

The responsibilities of NAC were:-

- advising the government on the implementation and achievement of the decade objectives,
- monitoring of sector performance and constraints and advising on the best way to overcome them and
- specifying and rendering guidelines of government sector policy etc.

4. WATER RESOURCES MANAGEMENT

4.1 Policy and Legislation

4.1.1 Water Policy

The government charged the Ministry of Water in 1987 to formulate a National Water Policy. Prior to this, there was no well defined policy to guide the development of the sector. The National Water Policy was formally launched in November 1991. The following aspects are emphasised in the Water Policy:-

- Effective utilization of available water resources
- Formulation and implementation of water projects
- Rehabilitation of water supply schemes
- Integration of water, sewerage and sanitation projects
- Cost recovery and cost sharing
- Pollution and environmental pollution control
- Protection of water sources
- Operation and Maintenance
- Flood control
- ESA involvement
- Human Resources Development
- National Urban Water Authority (NUWA)
- Involvement of the women in the sector development.

Upon formulation of the policy, MWEM also developed strategies for its implementation.

The overall strategy objectives are:-

- (a) To provide clean and safe drinking water within easy reach as a first priority and then satisfy other needs for other uses;
- (b) To optimize use of the limited water resources;
- (c) To give equal priority to both urban and rural water supplies and;
- (d) To improve all urban water supplies and establish efficient customer services.

4.1.2 Water Legislation

The Water Utilization (Control and Regulation) Act, No.42 of 1974, as amended in 1981, together with the Water Utilization (General Regulations) 1975, are the main pieces of water resources legislation. Under the Act, all water is vested in the Republic and, if the public interest so requires, any source of water may be declared a national water supply, wherein the use of water can be regulated. In addition, any area of land may be declared a water basin in relation to any river.

The Act provides for the establishment of a Central Water Board and Basin Water Boards in respect of each declared water basin. The functions of the Boards are to advise on the apportionment of national water supplies; on the granting, diminution or termination of water rights; on the measures to be taken in case of drought, and on the priorities to be given for the different water uses.

The Water Boards also have power to control and regulate water pollution. In this connection, they are to carry out research and investigation into the causes and methods of prevention and control of water pollution, and to formulate comprehensive plans for the regulation of the discharge of effluents by water users. The discharge of effluents into the receiving waters is prohibited without the consent of a Water Officer. Furthermore, the owner of a water right granted for mining, forestry or industrial purposes or for the generation of power must install adequate equipment for the treatment of effluents. The standards to be complied with in this regard are set out in Schedules to the Act. Polluting water to such an extent as to be likely to cause injury to public health, livestock, fish, crops, etc. is an offence punishable by fine and/or imprisonment.

4.1.3 Formation of River Basin Water Boards

Under the Water Utilization (Control and Regulation) Act, the Minister responsible for Water can declare any river basin national and thus establish a River Basin Water Office for purposes of proper management of the resource.

This is expected to be the tool for Water Management in the Basin. Under this office equitable distribution of the resource and thereby avoiding conflicting demands on agriculture, fisheries, irrigation, livestock, industry, energy production, natural environment/conservation as well as domestic water supply has to be ensured. The river basin office under an appointed River Basin Water Officer is responsible for the close monitoring of the utilization and control of the waters in the basin.

In 1991, the Pangani River Basin was established and the set up has almost been completed and functioning. This Water office has been created out of necessity due to water utilization conflicts as explained above. The Water Officer for Great Ruaha Basin has been appointed and he will start organizing the office in the near future.

Considering the ever rising water demand and conflicts therein, and the environmental degradation of the existing fresh water sources there is a great need for the following:-

- Revision of the Water Utilization (Control and Regulation) Act to reflect the actual situation and enforcement of the laws, viz. introduction of water users fees, granting of Water Rights for specific periods, responsibility of reservoir operations, etc.
- Establishing more river basins as the need arises, to reinforce water resources management systems.

4.2 Planning

Water Master Plans covering 16 regions have been prepared so far. The purpose of a Regional Water Master Plan is to provide the overall guidelines for water development within the region. The main emphasis of the plan is on water supply for human consumption. However other needs such as livestock water supply, irrigation, hydropower, industrial water consumption, etc. are also included in the plan. These Master Plans are 12 - 19 years old; thus are due for updating. The benefit of the water master plans is realized when actual implementation takes place. The major constraint in implementing of the regional water master plans is lack of adequate resources. Further, the plans have been made from a limited data base. Therefore their implementation may cause serious discrepancies between designed projects and the actual situation. In this regard it is highly desirable to have a systematic review and updating of the existing water master plans and prepare master plans for the remaining two regions of Singida and Morogoro. The Arusha Master Plan is under preparation.

The contents of the Regional Water Master Plan include among other things the following:-

- (i) Inventory of water resources.
- (ii) Inventory of water demand for different purposes i.e.
 - Human consumption
 - Livestock
 - Irrigation
 - Industry
 - Hydropower
- (iii) Assessment on the present situation in the use of water resources.
- (iv) Description of the technology available.
- (v) Stating the design criteria and policy to be followed.
- (vi) Identification of the solution in principle.
- (vii) Guidelines for priority rating in the implementation.
- (viii) Recommendations on water development for different purposes.
- (ix) Recommendations on community participation.

A National Water Mater Plan will be prepared when all regions will have been covered with RWMP'S

4.2.1 Supporting Studies

Depending on the situation, supporting studies may be needed for example:-

- (i) Socio-economical impacts in the RWMP.
- (ii) Sanitation development.
- (iii) Health situation.
- (iv) Livestock development.
- (v) Integration of measures for the protection and conservation of potential sources of fresh water supply, including the inventory of water resources, with land-use planing, forest resource utilization, protection of mountain slopes and river banks and other relevant development and conservation activities.

- A move towards the implementation of activity (v) above has started by establishing river basin water offices for the purpose of proper management of the sources.

The river basin office under an appointed River Basin Officer is responsible for the close monitoring of the utilization and control of the waters in the basin.

(vi) Development of interactive databases.

Much information have been obtained over the last 30 years or so during the implementation of water supply and sanitation activities. There is plenty of information obtained in the course of preparation and implementation of the regional water master plans and from operation and maintenance activities.

Available information has not been fully utilised and it can be observed that:-

- some monitoring systems exist though not fully developed
- some kind of information base exists and
- a quick feedback mechanism and a full utilization of the information collected is needed.

Therefore with the information available a good sector monitoring system followed by appropriate feedback and action can be established.

(vii) Flood and drought management including risk analysis and environmental and social impact assessment.

- The current trend of climatic shift demands close water resources monitoring. To match with the available resources, there is a need to streamline and rehabilitate the hydrometric, climatic network and organise a monitoring system based a river basin or sub-basin as unit.

(viii) Promotion of schemes for national water use through public awareness raising, educational programmes and levying of water tariffs and other economic instruments.

4.2.2 Other Ministries Involved in the Sector

There are other Ministries which are involved in the development of water supply and sanitation sector and these include:-

- (a) Prime Ministers Office (Local Government and Regional Administration) develops rural water supply schemes in their respective areas of administration;
- (b) Ministry of Lands and Urban Development (ARDHI) is responsible for Urban Development Master Plans which are the bases of water supply distribution, sewerage disposal and storm water drainage;

- (c) Ministry of Health (AFYA) caters for rural sanitation and health education and
- (d) Ministry of Community Development, Women Affairs and Children involves itself in rural water supply and sanitation through HESAWA.

4.2.3 Operation and Maintenance Activities

The present organizational set-up for operation and maintenance is as follows:-

- (a) The National Urban Water Authority is responsible for Water Supply in the City of Dar es Salaam and the surrounding towns of Kibaha and Bagamoyo.
- (b) MWEM is responsible for operation and maintenance of Dodoma Capital Water Supply and three other large rural water supply schemes of Handeni Trunk Main in Handeni District, Makonde Plateau Water Supply in Newala District and Wanging'ombe in Njombe District. In addition MWEM is also responsible for regular checking of the quality of water from both rural and urban water supply schemes.
- (c) Regional Water Engineers are responsible for operating regional headquarters water schemes and of recent, some of the district headquarter's water supply schemes.
- (d) District Water Engineers are responsible for rural water supply schemes and some are still running district headquarters water supply schemes.

However, there are now also some few villages in the country which are operating and maintaining their water supply schemes in line with the National Water Policy guidelines.

- (e) The Dar es Salaam Sewerage and Sanitation Department (DSSD) department of the Dar-es-Salaam City Council, is responsible for sewerage and sanitation activities in the City of Dar-es-Salaam.
- (f) Municipal Councils are responsible for sewerage disposal in their respective municipalities.

With the current economic policy changes taking place in the country, there is a good possibility that water and sanitation activities will be privatized in the near future. The National Water Policy also allows for this.

4.3 Decision Making Structure

The table overleaf shows, in tabular form, how decisions are made at different levels in the country.

Progress towards management at the "Lowest appropriate level" as a result of decentralization has been encouraging and smooth. The majority of villages have formed Village Water Committees of which half of the members are women. Through these Committees all decisions pertaining to water resources, at village level, are made.

DECISION - MAKING STRUCTURE

	Socio-political structure			Intermediate level (River Basin Water Office)
	Local level	Intermediate level (Region Water Office)	National level	
Decisions	Management/Dev. of water resources Integrated management of forest/land/water Water allocation and water rights Effluent permits.	Criteria for water allocation, water rights and effluent permits Regional development plans Water quality standards	National water development policy and plans Recommended water quality standards	Criteria for water allocation, Water rights and effluent permits Allocation of water rights and effluent permits to major users Principles of catchment protection and integrated management of forest/land/water Water quality standards
Action and instruments	Integration of user group interests Implement development projects Organize operation and maintenance Settle disputes Water resources monitoring	By - laws Solution of conflicts Technical extension and training Water resources monitoring Large development projects	Legislation delegating management and development of water resources to lower levels Allocation of funds Water resources monitoring	Sectoral integration and conflict solution By - laws and regulations Price mechanisms Water Resources Assessment and Environmental Impact Assessment Catchment development plans
Inputs	Technical extension and training By - laws Information	National plans Water Resources Assessment and Environmental Impact Assessment Planning proposals and requests	Regional plans	National plans Legislation authorizing catchment authority Water resources data
Cross sectoral	Village Council Community development committee	Regional Water Board	Central water Board	Basin Water Board

4.4 Economic and financial management

Present policies and practices regarding charging for water differs for different uses and location. In urban areas water tariffs are used for revenue collection. Water meters are used and the tariffs are updated periodically.

Rural water supply has, traditionally, been provided free but now the beneficiaries of rural water projects have to contribute a small fee for operation and maintenance of their schemes.

With regard to irrigation water, a Water Right has to be obtained for the use of the water from a river, stream or any other water body.

The national Water Law states that any person who pollutes the water in any river, stream or water course or any body of surface water will be liable upon conviction to a fine not exceeding fifty thousand shillings or to imprisonment for a period not exceeding two years or both.

In Tanzania the practice regarding "water as an economic good" has been clearly demonstrated by the government for over two decades, particularly when it was declared that accelerated social and economic development wouldn't be possible without provision of adequate and clean water to every citizen. That is why a 20 - year programme of 'Water for All by 1991' was launched by the government in 1971.

In light of this, planning in many sectors of the economy was based on availability of adequate quantities of water. However, water was provided free to the rural population.

APPENDIX G-3:

Country Report: Uganda

EAST AFRICAN WATER RESOURCES SEMINAR

Country Presentation by Uganda

Entebbe - Uganda

24th to 27th May, 1993

EAST AFRICAN WATER RESOURCES SEMINAR

COUNTRY PRESENTATION BY UGANDA

1. INTRODUCTION

Uganda is well endowed with fresh water resources comprising large lakes, rivers and wetlands, which form the upstream parts of the River Nile Basin. This natural resource is, however, unevenly distributed both in time and space, which in future could be a limiting factor to socio-economic development.

Located in the Upper Nile Basin, Uganda shares her water resources with the nine riparian countries of the Nile Basin. Developments in some of these countries could affect the water resources of Uganda as well as developments in Uganda could affect the situation for the downstream riparians.

The main issues concerning water resources management in Uganda can be listed as follows:

- limited availability of water (locally) due to the uneven distribution of rainfall and water reserves.
- decline in water quality arising from pollution due to e.g. untreated industrial effluent, poor land management, improper sanitation, use of agro-chemicals, and infestation with water hyacinth.
- lack of a comprehensive policy, legislation and institutional arrangements for integrated water resources management.
- absence of effective water resources assessment and monitoring systems.
- lack of community awareness and participation in sustainable water resource management.
- inadequate regional cooperation in the management of the shared water bodies.

It is on this background that the Government of Uganda as a priority activity recently initiated preparation of a National Action Plan for Water Resources Development and Management in short Water Action Plan (WAP). The Water Action Plan will be based on the Copenhagen-Dublin-Rio (UNCED) guiding principles on freshwater resources notably that (1) freshwater is a finite and vulnerable resource, essential for life, development and the environment, (2) water and land resources should be managed at the lowest appropriate levels, and (3) water should be considered as a socio-economic good with a value reflecting its most valuable potential use.

This paper outlines the water resources situation in Uganda, the institutional set-up within which the sector functions, and presents a status regarding water resources management aspects (policy, legislation, planning mechanism and decision-making structure).

2. WATER RESOURCES

2.1 Availability

Uganda has an equatorial climate with small regional variations in annual temperature and humidity. The southern part of the country is generally well watered with two rainfall peaks occurring in March-May and August-November without any pronounced dry season in between, whereas in the North there is a marked dry season from November to March.

(a) Surface Water:

The main hydrological feature of the country is the extensive inter-connected system of the Equatorial Lakes forming the upper part of the White Nile. Lake Victoria, which drains a total area of about 190,000 km² in Rwanda, Burundi, Tanzania, Kenya and the entire southern part of Uganda, has its outlet close to Jinja.

Passing the Owen Falls Dam the water flows through the Victoria Nile into Lake Kyoga and subsequently into the northern end of Lake Albert. The other branch of the lake system, i.e. Lake George and Lake Edward, is connected via the Semliki river which flows into Lake Albert in the southern end. From Lake Albert, the Albert Nile flows north towards the Sudan.

The Ugandan territory is situated entirely within the Nile Basin, and is for operational purposes divided into a total of eighth sub-basins. These sub-basins are relatively small contributors to the Nile flow (as compared to the 800 m³/sec or 70 million m³/day mean outflow from Lake Victoria), but their yields dominate the water resources potential within Uganda. While the Nile and its flow characteristics are important from both an international and national point of view, the Ugandan catchments are important from a regional/district and local point of view.

The flows in the main branches of the Upper Nile are to a great extent determined by the water levels of the lakes. In this respect the lake system provides a significant storage which helps to smoothen out the effects of seasonal as well as inter-annual variations in rainfall and tributary inflows. In general, lake levels and hence outflows vary periodically around fairly stable levels.

While 17% of the total surface is covered by open water and wetlands, this resource, as mentioned above, is unevenly distributed. Adverse climatic conditions have resulted in unreliable rainfall with respect to quantity and distribution especially in the southwest and northeast. This has led to scarcity of water for rain-fed agriculture and animal industry. The resultant search for water has been associated with many social problems including nomadism and encroachment on nature reserves, wetlands etc. With respect to domestic water supply, people in the rural areas often have to walk long distances, especially during the dry seasons, in search of water sources.

(b) Groundwater:

Groundwater represents the main source of domestic water supply for the rural population of Uganda. It is also important for livestock use particularly in the drier regions. Groundwater extraction takes place from springs, boreholes, and to a lesser extent from dug wells.

Surveys have identified some 12,000 springs in Uganda of which more than 4,500 have been protected for safe use. About 9,000 boreholes exist, typically drilled to a depth in the range of 60–90 metres.

The productive aquifers occur mainly in the crystalline basement rock zones underlying more than 90% of Uganda. Aquifers are also present in the Western Rift Valley sediments found in an area around Lake Edward and from Lake Albert towards north. These aquifers are alluvial infills of gravel, sands and clay. In the northern part of the zone these infills are predominantly sandy and provide comparatively good water yields.

Aquifers in volcanic formations are found around Mount Elgon at the eastern border and at Mfumbira in the extreme south-west of the country. The volcanic rocks are thus found in areas of high relief, and the groundwater occurrence is often as springs.

The basement complex does not represent an extensive homogeneous aquifer, and at the same time is highly variable in terms of characteristics and yield. It is however an important source of water for rural communities with as many as 95% of all boreholes sunk in this complex.

Recent groundwater recharge calculations indicate that in certain localized areas the annual recharge rate is extremely low to such an extent that the risk of groundwater depletion can become a real concern even in rural water supply schemes (at least in high population density areas). In parts of Luwero and Moroto districts rapid decline in yields has already been experienced for a large number of boreholes.

2.2 Utilization of Water

Present water utilization quantities are largely unknown, and future water requirements depend to a large extent on progress in the various development efforts envisaged in the National Rehabilitation and Development Plan. It is expected that during preparation of the Water Action Plan mentioned above an assessment of existing water demands and rough projections related to future developments and demands will be worked out. The present situation and preliminary demand estimates for the major user categories can be summarized as follows:

(a) Domestic and Industrial Water Supply:

At present only some 25% of the rural population and 65% of the urban population has access to water from improved sources. With a rural population of 14 million and 2.3 million in the urban centres, major efforts will be required to increase the coverage levels to the set targets of 75% for rural areas and nearly total coverage in urban areas by year 2000.

Traditionally water for domestic purposes has been obtained primarily from natural sources such as springs, lakes and streams. Shallow wells may be constructed where conditions are favourable, but are not used as widely as in many other countries. It is estimated that in addition to the existing 9,000 boreholes about 20,000 new boreholes will be required (in addition to other water supply options) in rural areas to give a basic water supply of an appropriate standard according to the set targets for year 2000.

Urban water supplies are based mainly on river and lake sources. Treatment of the water is usually required to provide a safe potable water.

If it is assumed that the population increases to 20 million by year 2000 and domestic consumptive use in average is 50 l/c/d, the total water use for domestic supply will be about 1.0 million m³/day. For comparison it can be mentioned that this figure is equivalent to only 1-2% of the flow in the Nile. Thus domestic water demand is not a major factor in the water resources planning at the national level. However, at the local level conflicts of interest are likely to appear, particularly in management of groundwater resources.

Industrial water is usually obtained through municipal water supply systems, though there are some private (groundwater) supplies. Industries may find it cheaper to use own sources for cooling and other non-process purposes for which water with a potable quality is not required. This in turn may result in the improper use of valuable high quality groundwater potentials for low grade functions.

(b) Irrigation and Livestock:

The combination of fertile soils and favourable climatic conditions provide good opportunities for agriculture. Some 85% of the land is considered to be arable and about 80% of the economically active population is engaged in agriculture. The sector contributes 70% of the GNP. The small hold farmers are the backbone of the Ugandan economy. The average household possesses about 1.5 ha of farmland plus 1.5 ha for grazing and fallow.

There is no tradition for irrigated agriculture in Uganda, though some irrigation schemes have been developed for sugar and tea estates. The policy is to promote irrigation schemes amongst farmers, and at present some 2,000 ha out of a planned 6,000 ha of pilot plots are under irrigation; mainly in swamp areas in the Kyoga basin. These wetlands are sensitive to environmental damage, and adverse impacts have already been noted.

The present level of irrigation requires some 0.2 million m³/day. A FAO study (1987) estimated the irrigation potential to more than 400,000 ha, corresponding, if fully developed, to a water demand of 11.0 million m³/day or close to 16% of the Nile flow. Whatever development scenario will be realized there is little doubt that consumptive use for irrigation will place a considerable demand on the water resources. Control and management of irrigation abstractions may become one of the major problems for the water sector.

There are an estimated four million cattles in the country. These are mainly spread through the dry belt extending from southwest passing north of Lake Kyoga to Karamoja. The total demand for livestock water (about 0.14 million m³/day) is very small compared to the country's overall resources, but locally supplies are often inadequate in the dry season.

Because many streams are ephemeral in the main livestock regions pastoralists have to be semi-nomadic and go in search of water. Movement of cattle is now being discouraged to control the spread of diseases. To alleviate this situation the construction of small dams and valley tanks has been a common practice in Uganda.

(c) Hydroelectric Power Generation:

The identified potential on the river Nile is estimated at 2700 MW of which 150 MW is already developed at Owen Falls Hydropower Station. A further extension with 60 MW just downstream of the present dam has been contracted and is due to be implemented soon.

Further utilization of the hydropower potential has been studied quite extensively. The main sites identified for major schemes are all located along the Nile downstream of Owen Falls and include Bujagali (180 MW), Ayago (240/300 MW) and Murchison (480/250 MW). In addition, outside the Nile proper, there is a potential for small schemes which may satisfy local needs. Some have been developed, but a further potential exists particularly on the rivers draining Mt. Elgon, in the West Nile region, and rivers draining the Ruwenzoris.

It should be noted that these developments will have impacts on the balance of the flow in different parts of the Nile system and the variation of the levels in the equatorial lake system. The creation of reservoirs can also have adverse effects such as displacement of people, and environmental consequences such as spread of water borne diseases, habitat degradation, erosion etc.

(d) Other Water Users:

Besides the aforementioned sectors, other non-consumptive uses of water in Uganda include fisheries and tourism. These uses require abundant supply of good quality water, though difficult to state in absolute numeric terms. Finally in this category of water uses, but which is often ignored, is the water required to sustain the aquatic ecosystem in the basin. This aspect of water needs has not yet been addressed in Uganda's case.

2.3 Water and Environment

Uganda experiences increasing environmental problems affecting the water systems in lakes, rivers and wetlands. These problems are basically a result of increasing population, industrialization, and livestock pressure on the lands in combination with poor agricultural practices.

The major sources of water pollution in Uganda today can be categorized as follows:

- Siltation from deforested areas, and overstocked and degraded rangelands.
- Chemical and biological contamination from untreated industrial effluents.
- Acidification due to drainage of wetlands.
- Salinity from application of agricultural chemicals and fertilizers.
- Biological pollution from improper management of human and animal wastes.

Land degradation has been identified as one of the major environmental problems. Examples include inappropriate farming systems, bush burning, deforestation and removal of vegetation cover (e.g for fuelwood and timber), overgrazing by livestock, wetlands drainage, etc. All these have the effect of baring the land and enhancing soil erosion by wind and water. They also affect the hydrological regime (evapotranspiration, runoff, infiltration, etc) inducing unfavourable climatic changes (droughts) and desertification trends.

The wetlands constitute a very important natural resource in Uganda. Externally they reduce the effects of both floods and droughts, provide fish resources and support cropping and grazing along their margins. Internally they are centres of high biodiversity and productivity and valuable refuge and sources of food for fish, in particular the young. Furthermore, they are active biological filters in treatment of effluents, but due to this function they are also sensitive for accumulation of pollution.

Finally, it should be mentioned that with support from several donors a National Environment Action Plan is being prepared for Uganda. Eight task forces on environmental policy, human resources, land management, water resources, biodiversity, mining and industry, health, and energy have produced topic papers as an input to define a comprehensive national environmental strategy and policy.

3. INSTITUTIONAL ARRANGEMENT

3.1 General Institutional set-up

The Ministry of Water, Energy, Minerals, and Environment Protection (MWEMEP) shoulders the overall responsibility for the water sector through the following institutions:

Water Development Department(WDD):

This is the primary government agency responsible for a wide range of activities including water resources assessment and management, development of urban and rural water supplies (construction, rehabilitation, operation and maintenance of water supplies schemes). The department is responsible for all rural water supply programmes and for the provision of potable water and sanitation services in all the towns in Uganda except the larger ones operated by NWSC.

Water Development Department runs entirely on Government budget, with no profits realised for any services. WDD is headed by a Commissioner.

National Water and Sewerage Corporation(NWSC):

This is a Government parastatal responsible for the provision of potable water and waste water disposal in only the nine towns of Kampala, Jinja, Entebbe, Masaka, Mbarara, Mbale, Tororo, Lira and Gulu. It operates on economically viable policies and self-sustaining basis (self-financing). The Government policy has been for WDD to develop towns water supply schemes and hand them over to NWSC when operations are profitable. However, this policy is now being reviewed in light of the newly introduced decentralisation process.

Department of Environment Protection:

This Department was incorporated in MWEMEP in 1991 with the principal role of natural resources management, to harmonise the interests of resource users, monitor pollution and draft environmental legislation. It was also mandated to develop a National Environment Action Plan (NEAP) as an overall policy framework to incorporate environmental concerns in the national socio-economic development process.

Meteorology Department:

This Department is responsible primarily for recording and forecasting weather and climatic patterns and changes, and the dissemination of data to the population as well as specialised users such as air transport.

Department of Geological Survey and Mines(GSMD):

This Department is responsible for inventory and evaluation of mineral resources and promotes their exploration and use. Furthermore, it issues water use permits for minerals exploration and development, and has control over the discharge of wastewater from mining operations. It has a common interest with WDD in expanding the geological database.

Uganda Electricity Board (UEB):

The UEB is responsible for the generation and distribution of hydroelectric power as well as the operation of hydroelectric installations. Power generation is a non-consumptive use, although, it influences the pattern of flows in the rivers. New installations involve major civil works, high investments and can result in negative environmental impacts.

The other ministries with close involvement in the water sector are:

Ministry of Local Government:

Under the Public Health Act, the responsibility for ensuring adequate provision of sewerage, sewage treatment, drainage and sanitation is given to local authorities. The role of provision of sewerage and sewage treatment has largely been superseded by NWSC and WDD taking over responsibility in the urban centres.

Ministry of Health:

The Ministry has a general responsibility for ensuring a healthy environment and a consultative role in setting water quality standards for potable water supplies. It provides training and education services in the community to improve rural sanitation facilities, especially at the household level.

Ministry of Agriculture, Animal Industry and Fisheries:

The Ministry is active in the construction of dams and valley tanks for livestock watering. It is also promoting irrigated agriculture by the construction of pilot/demonstration schemes. One of its departments is in charge of fisheries development. There is also a research institution, the Uganda Freshwater Fisheries Research Organisation (UFFRO) with keen interest in the environment of the lakes with respect to fisheries development.

A part from the towns under the jurisdiction of NWSC, the rest of the country is divided into ten water regions headed by Regional Water Engineers (RWE). The RWE is a direct representative of the Commissioner. The regions combine two to five districts following the administrative boundaries. They are not based on river/lake basins or hydrological catchments.

The districts (39) are headed by a District Water Officer, who reports to the RWE. At the lower levels, the present administrative RC structure (RC1, RC2, RC3, RC4) pertains with subparish and village committees maintaining their own water sources.

The international NGOs active in the water sector are mainly CARE, Water Aid, AVSI (Italian) and LWF. Like the international agencies, such as Danida, Unicef and World Bank, these NGOs promote water supply and sanitation facilities that are community based, operated and maintained. Generally, low cost solutions are preferred and the emphasis is on sustainability.

The role of the private sector is more pronounced in the larger industrial towns where individual developers may be granted permit to construct private water supplies. This is similar to large institutions (army, prisons, schools) and large farms.

3.2 Capacities

Several studies have been prepared regarding human resources development and management capacity building aspects all geared towards strengthening WDD. Government policy decision on democratic decentralisation, the World Bank's sector study on district management and the ministerial review and rationalisation study are positive indicators to this regard.

A re-structuring study of the Ministry of Water, Energy, Minerals and Environment Protection has resulted in a proposal to upgrade the status of WDD from a Department to a Directorate. The present six divisions would be transferred into four Departments (each headed by a Commissioner) for Water Resources Management, Rural Water Development, Urban and Institutional Development, and Inspectorate and Support Services. The regional offices would be abolished, all districts would have offices and some county offices would be established.

WDD, being the Government's technical agency charged with management, development and regulation/coordination of the water sector, handles over 65% of the Ministry's total recurrent budget and 80% of the development budget. The services in the WDD towns are poor as revenue collected is not ploughed back into the system (not self-accounting). However, this is now being addressed under the democratic decentralisation policy. The Department is also thin on the ground at district level and below with respect to calibre and number of facilities, and little representation (staff).

The civil service is now being trimmed down to improve efficiency and performance. In general the low level of productivity has been due to the poor national economic performance, and budget cuts across all sectors.

3.3 Integration

WDD was not established by an Act of Parliament and has therefore inherently a broad and unclarified mandate and lacks adequate resources (financial and human). The present legislation on water puts powers in different acts administered by different Ministers, and often for different user groups interests.

In a proposed new legislation, all functions will derive from two fundamental Acts to be planned and coordinated by one Minister, though different agencies of central or local government will be empowered to perform some functions through a pattern of delegation and devolution. There has therefore been closer cross-sectoral coordination in the recent Water Action Plan studies, NEAP and decentralisation studies that will see increased sector efficiency in the resource management and utilisation.

4. MANAGEMENT ASPECTS

4.1 Policy and Legislation

(a) Policy:

Priority and attention has been accorded to the national water sector development policies and strategies. The Government has endorsed and taken aboard the international drinking water supply and sanitation decade with its subsequent principles adopted hitherto, namely:

- New Dehli statement (1990)
 - . Improving the health and thereby the productivity of the population by providing safe drinking water at a reasonable walking distance and providing sanitation services for all.
 - . Increasing the efficiency of the sector investments and financial self-sufficiency of the services.

- Copenhagen - Dublin - Rio principles (1992):
 - . Freshwater is a finite and vulnerable resource, essential for life, development and the environment.
 - . Water and land resources should be managed at the lowest appropriate level.
 - . Water should be considered as socio-economic good with a value reflecting its most valuable potential use.

To achieve the above general objectives, the government has put in place various mechanisms to facilitate implementation as follows:

- Demand driven approach:

Government emphasizes the demand driven approach where beneficiaries have a choice in determining the key elements of their water supply system right from the planning stage (use of simple and appropriate technologies).

- Community-based management of water services and facilities:

Community participation ensures that water management is vested in the hands of the local (user) groups/authorities.

- Decentralisation policy:

Government has already enacted laws to decentralize most utilities and services to district levels and below, with intent towards privatization or liberalisation. The districts will be self sustaining and will shoulder the O&M functions in several aspects.

- Service Coverage Criteria:

Guidelines have been set as to the maximum walking distance to nearest safe water source and the number of users for a given source.

- Other policy measures:

The government has undertaken and adopted several policy measures described by the following study reports;

- . Water Sector Legislation (1992).
- . Water Supply and Sanitation Sector Strategy (1989).
- . Organisation and Management Study of WDD, (1992).
- . Human Resources Development Assessment in the Water and Sanitation Sector(1992).

- . National Planning Strategy, Rural Water Supply Programme, (1991).
- . Policies and Guidelines, Rural Towns Water and Sanitation Programme (1992).

(b) Legislation:

The aspirations of a rising population and need for sustained economic growth, the increasing demand for wholesome water supply, the need to safely dispose of increasing volumes of industrial effluent, the requirement for increased agricultural and hydro power production inevitably exert a lot of pressure both on the water resources and the environment.

In an effort to establish rational utilisation of a continuously diminishing resource, water legislation offers a means to handle the intricate contradictions in maximising sharing out of the resource between the various demand groups, settling emerging conflicts and at the same time safeguarding the environment.

Uganda therefore proposes to adopt and implement a new water legislation which is socially, environmentally and economically sound, but also maintains its intention to promote regional corporation and observing international obligations.

Several statutes, acts and decrees exist in the Ugandan legal system that are relevant to the water sector but have the following general deficiencies:

- Provision dealing with similar subjects are often scattered through a number of different acts and rules administered by different ministries and agents.
- Because provisions have been enacted at different time for different purposes in different laws, many provisions conflict or seem to be inconsistent.
- Many were drafted a long time ago and use old-fashioned, technical words which are difficult to understand.
- Conflicting provisions and old-fashioned drafting often obscure the true meaning of provisions.
- Because provisions are hard to find and difficult to understand, they are often neglected or ignored. Government officials and others may sometimes act illegal, without realising it.
- Many provisions are now out of date. There have been significant changes in administrative arrangements, in the way water is used, and in Ugandan society since they were passed. Often the old laws no longer serve their original purpose. Thus fines and penalties, which would have been significant deterrents thirty years ago, are now inconsequential and irrelevant.

The proposed legislation, therefore, attempts to correct these anomalies by inacting a comprehensive, clear and flexible legislation that will be adoptable and give practical help to administrators.

Two fundamental Acts have been drafted that will ensure the management of the water resource and associated environmental implications at the lowest appropriate level and ensuring the general objectives of devolution:

- **Water Resources Act**

This Act would replace the basic declarations of Government and individual rights contained in section 27 of the Public Lands Act 1969, which provides the present basis for the Water Rights Rules 1967. But it would also be the fundamental code from which all aspects of hydrological investigations, water resources planning and management derive. It would thus have to deal with numerous matters which are presently not specifically covered by legislation.

- **Water Supply and Sewerage Act**

This Act would combine but simplify existing elements of the Public Health Act (Cap 138). It would also confer powers, which presently do not seem to exist, in ways which can be used by the National Water and Sewerage Corporation, the Water Development Department or any Resistance Council or other central, regional or local government body which may be given power over either water supply or sewerage.

With the advent of the new Water Supply and Sewerage Act, it will be necessary to alter the 1972 Decree which instituted the National Water and Sewerage Corporation to allow the Corporation to take advantage of the new powers conferred by the Act. It will also be advisable to amend the Decree to deal with practical operating difficulties identified by the Corporation and to allow its role to change if this should prove desirable as part of the process of devolution.

Appropriate regulations to complement the Acts will be put in place as follows:

- Surface water - provides framework for the future licensing of hydraulic structures and the right to use water.
- Ground water - with similar objectives as above.
- Water supply - to be made under the Water Supply and Sewerage Act to govern the detailed administrative, financial and technical aspects of water supply, and the designated authority to carry out this function.
- Sewerage - the regulation would be similar to the before mentioned but for sewerage.

- Wastes discharge - to govern the granting of licences to deposit wastes into water or those which may infiltrate water bodies.

4.2 Planning

The practice has been for WDD or any sector institution to individually evolve countrywide development utilisation and conservance plans in the water sector for approval by the Ministry of Finance and Economic Planning, under the national Rehabilitation and Development Plan.

There has been little intersectoral coordination for water resources sector development plans say in agriculture, mining or industry. The abundant water resources have created little conflict and little need for conflict resolutions in the past, but the increasing requirements for tighter environmental laws will call for equally stronger management systems.

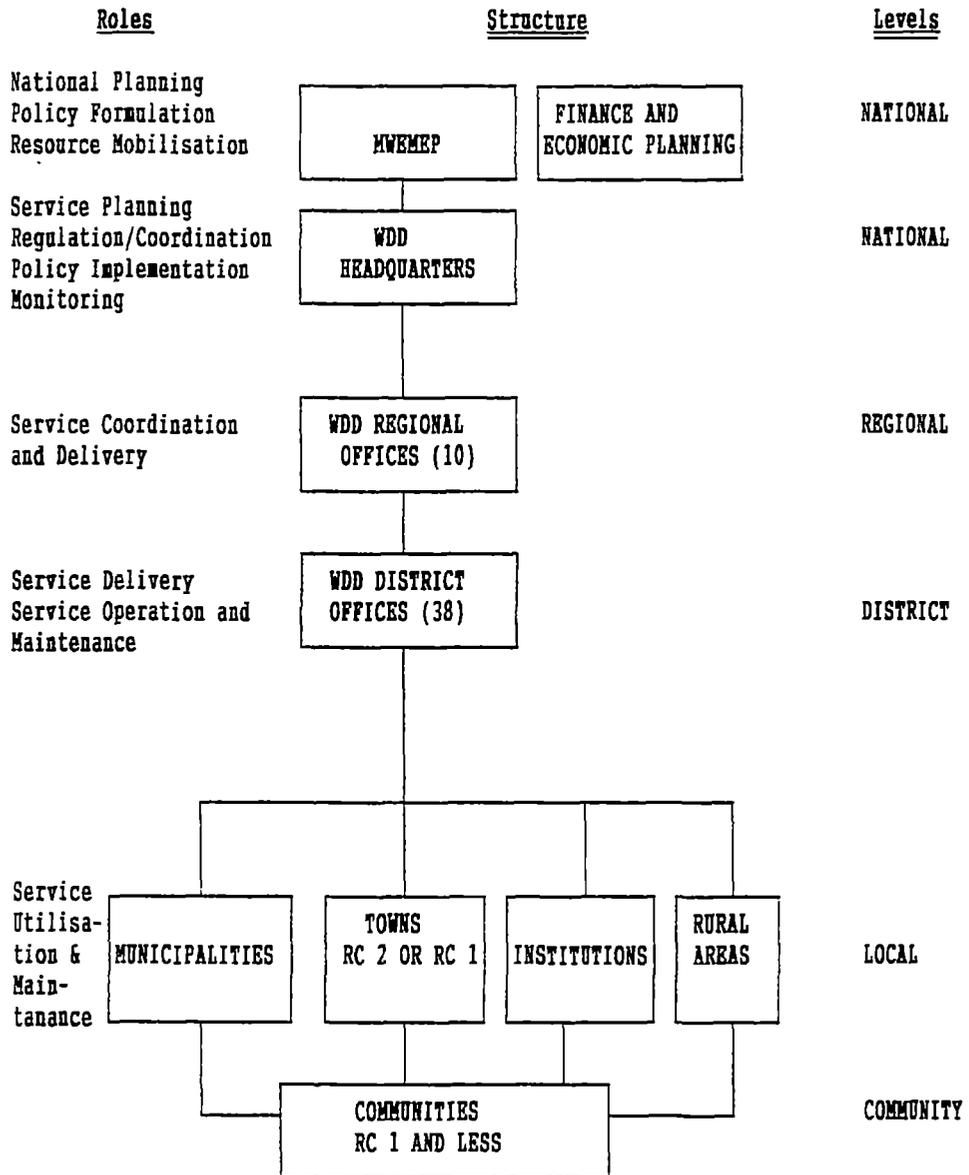
Uganda is in the process of implementing a policy of decentralisation, delegating government responsibilities to district and lower levels, and reorganising central institutions accordingly. As a result of this process the roles and functions at different levels of water resources development and management will change, as will the requirements for staffing levels and capabilities. New management tools and mechanisms will be required, especially at the local level.

A large number of bilateral and multilateral donor agencies and NGOs are becoming active in water resources development in Uganda. No effective mechanisms exist for the planning and coordination of the activities of these organisations.

It is in this context that Uganda has initiated preparation of a Water Action Plan to enable the government to deal effectively with these problems and develop a framework for coordinated development and management of the water resources - with linkages between land and water resources - of the country at the local, national and international level. The Water Action Plan can then allow the authorities to seek implementation of a set of coordinated programmes in line with national water policies and international agreements.

4.3 Decision-making Structure

In the following figure the present structure, which is prevalent in the decision-making process, is depicted. It should be noted that the regional offices are in the process of being abolished.



4.4 Economic and Financial Management

The Ministry of Finance and Economic Planning (MFEPE) has the responsibility of setting overall national financial and economic policy guidelines within which the Ministry of Water, Energy, Minerals and Environment Protection (MWEEMP) budget operates. It is also responsible for financial resource mobilisation.

The Permanent Secretary of MWEEMP is the overall accounting officer for all water related development activities assisted by the Commissioner who is WDD's responsible/accounting officer. WDD is not self-accounting with a sound revenue base to operate on. It depends solely on government budget and donor funds.

Tariffs and Revenue collection:

In urban areas, consumers are charged according to a established tariff system, e.g metered, blocks, etc. Revenue is collected on monthly basis and remitted according to Ministry of Finance and Economic Planning's established accounting procedures. No significant revenue is realised.

It is in this light that new principles regarding provision of services in small towns are being introduced whereby local user groups, associations, districts or local authorities will decide on the design, operation and maintenance of their water supply and sewerage systems with little financial interference from the central government. At the same time the beneficiaries are being assured of enough technical support.

In rural areas, the situation is different. The new system now being introduced is for the local communities to organise themselves into management committees responsible for setting, collecting and managing revenue from a given water source. The money collected helps them to operate and maintain their facilities. The initial capital invested comes from government or external support agencies (donors).

The larger private/industrial/institutional water users are licensed for both abstraction and effluent disposal but maintain/run their own water supplies.

In the National Water and Sewerage Corporation operated towns, water supply and sewerage services are charged according to established tariffs that allow the corporation to run on a capital recovery or self-financing basis. There is no government subsidy for these consumers.

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