REPUBLIC OF KENYA

MINISTRY OF ENVIRONMENT AND NATURAL RESOURCES
DEPARTMENT OF WATER DEVELOPMENT

COUNTRY STRATEGY ON INTEGRATED WATER RESOURCES MANAGEMENT

MISSION STATEMENT: "TO MANAGE WATER RESOURCES FOR SUSTAINABLE DEVELOPMENT AND POVERTY ALLEVIATION"

VISION STATEMENT: "ASSURED WATER RESOURCES FOR SUSTAINABLE DEVELOPMENT IN KENYA"

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ACRONYMS

AG	Attorney General
ASAL	Arid/Semi Arid Areas
Cap.	Chapter
CB	Catchment Board
CBA	Coast Development Authority
CBO	Community Based Organization
DCU	Dam Construction Unit
DRU	Dam Rehabilitation Unit
EIA	Environmental Impact Assessment
ENNDA	Ewaso Nyiro North Dev. Authority
GIS	Geographical Information System
GOK	Government of Kenya
GPD	Gross Domestic Product
Ha.	Hectare
IMSC	Inter Ministerial Steering Committee
IS	Information System
IWRM	Integrated Water Resources Management
KENGEN	Kenya Electricity Generating Company
KMD	Kenya Meteorological Department
KPLC	Kenya Power Lighting Company
KWS	Kenya Wildlife Service
LA	Local Authority
LBDA	Lake Catchment Development Authority
MARD	Ministry of Agriculture and Rural Dev
MCM	Million Cubic Meters
MD	Managing Director
MENR	Ministry of Env and Natural Resources
MFA& IC	Ministry of Foreign Affairs and International Corporation
MLS	Ministry of Lands and Settlement
MOA&RD	Ministry of Agriculture and Rural Development
MOU	Memorandum of Understanding
MTTI	Ministry of Tourism, Trade & Industry
NGOs	Non-Governmental Organizations
NIB	National Irrigation Board
NWCPC	Nat. Water Conservation and Pipeline Cooperation
OP	Office of the President
PPCSC	Permanent Presidential Commission of Soil Conservation
PSP	Private Sector Participation
RBDA/RDA	River Catchment Dev Authority
RS	Remote Sensing
TARDA	Tana & Athi River Development Authority
WDD	Water Development Department
WRA	Water Resources Assessment
WRM	Water Resources Management

FOREWORD

Competition for diminishing water resources in the country is negatively impacting on socio-economic activities and therefore, contributing to increased poverty. Until now, the water policy has been biased towards water development as against water resources management. Consequently, the inadequate attention and under investment in the management of water resources have lead to increased degradation of the catchment areas through reduced river flows, increased siltation and pollution. This is raising operation and maintenance, rehabilitation and investment costs to the point of closing down many water schemes.

The Government has, therefore, approved the Sessional Paper No. 1 of 1999 on the National Policy on Water Resources Management and Development to tackle issues pertaining to the water sector which include:-

(i) Water Resources Management;
(ii) Water and Sewerage Development;
(iii) Institutional Framework; and
(iv) Financing the Water Sector.

As a response to the water resources management challenges, the Ministry of Environment and Natural Resources has prepared the Country Strategy on Integrated Water Resources Management. This Strategy addresses the problems facing water resources management which revolve around:-

(i) Inadequate and unsustainable water resources management practices;
(ii) Weak water allocation procedures;
(iii) Lack of clear roles of different actors; and
(iv) Weak enforcement capacity and inadequate financing.

The Strategy has been developed through a comprehensive consultative process with the objective of ensuring sustainable water resources management practices, demand management and well defined roles of the various actors.

The Strategy underscores decentralization and separation of water resources management from policy formulation and administrative roles and putting in place sustainable financing mechanisms.

The revised Water Act proposes the establishment of the Water Resources Management Authority to undertake all water resources management activities. This is expected to elevate the profile of water resources management as water is a catalyst for economic development. The Authority will set and collect fees and levies, assess the water resources potential and demand, apportion water and ensure the participation of stakeholders at the various levels of management.

In conclusion, it is the sincere hope of the Ministry that actors within the sector will recognize the challenges and opportunities offered by the Strategy. The sector should utilize the enabling, liberalized environment and provide financial and other resources to sustain implementation of the Integrated Water Resources Management Strategy. The Government will continue to work with the World Bank, the Government of Sweden and other Development Partners, the Private Sector, Non-Governmental Organizations and the Communities to achieve a sound management of our scarce water resources.

Hon. Kipng'eno arap Ng'eny, EGH, EBS, M.P.
MINISTER FOR WATER DEVELOPMENT

ACKNOWLEDGEMENT

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The following institutions and organizations deserve special mention for having provided the bulk of background material necessary for generating the activities and action plans during the workshop held in Kenya Commercial Bank Management Training Institute, Karen from 14th to 16th February, 2001 and one held at the Kenya College of Communications Technology Mbagathi on 7th and 8th February 2002. : - MLS, TARDA, CDA, KENGEN, NIB, ENNDA, MTTI, KEWI, LBDA, KWS, KMD, NES, NWCPC, Nairobi City Council-Water and Sewerage Department (NCC-W&SD), Ewaso Ng'iro South Development Authority (ENSDA), Laikipia Research Programme (LRP), French Cooperation, Agro-Chemical and Food Co. Ltd., Permanent Presidential Commission on Soil Conservation and Aforestation (PPCSCA), *Agence Frangaise de* Development (AFD), Lake Victoria Environmental Management Project (LVEMP), PanPaper, Kenya Marine and Fisheries Research Institute (KMFRI), Fisheries Department, Forestry Department, University of Nairobi, Department of Remote Sensing and Resource Surveys (DRSRS), and Nakuru Region Inter-Diocesan Christian Community Services (NRIDCCS).

Others may have contributed directly or indirectly to the entire process and we may not have acknowledged their role out of oversight. For all those not mentioned, the Water Development Department would like to extend its gratitude to them.

Finally, the Water Development Department wishes to acknowledge the efforts of the Secretariat Team together with the members of the Task Force who put in long hours to ensure that contributions from various stakeholders found their way into the document. Without their dedication it would not have been possible to complete the document on time taking into account the substantive inputs and comments that were either proposed or submitted by various stakeholders.

EXECUTIVE SUMMARY

1 INTRODUCTION

Water is life. Its use and development underpins the social and economic fabric of Kenyan society. The Government of Kenya is committed to improving the management and protection of water resources to ensure that water is available for equitable allocation for all the demands in the country including water for domestic and public use, industry, agriculture, energy, livestock, wildlife, tourism and the many other uses of water. To achieve this the Government has begun a process of reforming the water sector. The reforms include the development of an autonomous institutional framework separate from that for service delivery provisions that will be solely responsible for the management of our scarce water resources in such a way that we can be assured of sustained development. The reforms are based on the globally accepted principles of decentralization, participation and sustainability of the water resources.

Water resources management attends to the protection and control of sources of our water - rivers, lakes, wetlands, and groundwater and other sources such as harvested rainwater. Water resources management is different to water supply which deals with water treatment, pipes and providing water to the users. The Government has developed a separate strategy for water supply services.

This integrated water resources management strategy has been developed with the inputs of many stakeholders. It is designed to implement the National Policy on Water Resources Management and Development (Sessional Paper No.1 of 1999) and it anticipates the new Water Bill.

Integrated water resources management is complex and if not financed or undertaken adequately can lead to serious degradation of the country's natural resources, resulting in shortages and serious water use conflicts, even irreversible damage to the water resource base itself.

2 THE NEED FOR URGENT ACTION

The water resources management problems facing Kenya are many and are explained in the Strategy paper. The problems include:-

- **Water scarcity** Kenya is classified as a *chronically water scarce* country with an annual renewable fresh water supply of only 647 cubic meters per capita. Some part of the country have abundant water, while the arid and semi-arid lands have very little water. Overall, water is not treated nor managed as a scarce social and economic resource.
- **Climate variability** Droughts are endemic and occasional floods caused massive economic damage. The annual rainfall is highly variable from year to year, which, combined with the scarcity of rainfall, places the population and the economy in a highly vulnerable situation and calls for disaster preparedness and management and protection of water resources.
- **Growing population and large unmet demand** The growing population increases the demand for water for domestic use, food security and hydropower to the point where the needs are outstripping supply.
- **Catchment degradation** Catchment degradation is a major problem which is undermining the limited sustainable water resources base remaining in the country. Catchment degradation results in increased runoff, flash flooding, reduced infiltration, erosion and siltation. The principal causes of catchment degradation are poor farming methods, population pressure, forest excisions, and deforestation.
- **Water Pollution** Increasing pollution from urban and rural sewage and sanitation facilities, industry, mines and agriculture is undermining the nation's water resources, escalating public health risks, intensifying poverty and curbing economic development. Most municipal sewerage plants and industries discharge partially treated or untreated wastewater directly into surface water courses.
- **Invasive species** The proliferation of invasive plant and animal species including fish species and aquatic weeds is a growing concern that is imposing a huge cost on the use and operations of water supply and energy facilities, navigation, fishery, and public health. Invasive species also are impacting important aquatic ecosystems.
- **Storage and infrastructure investment** To meet current demand, water resources storage will need to increase by 30 fold the current level. However, as a result of catchment degradation and deforestation, it is estimated that the amount of storage required by 2010 to ensure reliable water supply to the country will be even higher than the current storage. Investment levels in water management infrastructure has been inadequate for many years.
- **Water Demand** The water demand in the important categories of domestic water, industry, agriculture including irrigation, livestock, wildlife and hydropower, will increase significantly from 2,073 MCM/Year in the year 1990 to 5,817 MCM/year in the year 2010.

- **Groundwater depletion** High demand for water, encroachment on recharge areas and the unregulated use of groundwater is leading to serious depletion of groundwater.
- **Allocation** It is estimated that more than 50 % of water abstractions are illegal. The lengthy and ineffective process for issuing water permits has led to increased lawlessness in water abstraction and borehole drilling. Conflicts over water use are escalating in many parts of the country. Excessive groundwater abstraction is resulting in declining water tables and saltwater intrusion in the coastal areas.
- **Demand management** In the light of large water losses in the system and water scarcity and increasing demands, managing the demand for water and increasing the efficiency of water use is of critical importance. In few cases, this needs to take a priority over building new supplies.
- **Resource assessment** Current water resource monitoring is ineffective and records are incomplete both in time and coverage of the country. The capacity for data collection, storage, analysis and dissemination is weak.
- **Aquatic ecosystems** Lakes and riverine, wetlands and floodplain ecosystems provide important benefits to riparian communities such as flood recession agriculture, dry season water supply for pastoralists, and habitats for fish and prawn cultures as well as recharge for groundwater. Unplanned upstream developments can have significant impact on downstream uses and communities. Water resources planning needs to consider all the uses of water.
- **Enabling environment** The other factors which contribute to inadequate water resources management include centralized and ineffective water resources planning and management and inadequacies in legislation and institutional framework. Inadequate financing mechanisms and lack of professional and technical capacity are also contributing factors for a weak enabling environment.
- **Huge impact on the economy** Inadequate water resources management is imposing a huge cost on the nation's economy. Droughts and floods impose a huge cost of the people and the economy. The cost of water resources degradation relates to: (a) insecure water supplies due to over allocation of water, (b) public health problems due to pollution, (c) increased cost of water treatment from pollution and siltation, (d) water supply infrastructure damage from siltation, (e) damage to coastal and marine resources from siltation, and (f) cost of aquatic weed control.

3 PROPOSED STRATEGY

In order to address the current weaknesses and problems facing the water resources management sector and to achieve sustainable development and management, the Government prepared Sessional Paper No.1 of 1999 - the National Policy on Water Resources Management and Development. This Strategy Paper on integrated water resources management has been prepared in order to fully operationalize the National policy on Water Resources Management and Development. The Strategy underscores the provisions of the Government's Poverty Reduction Strategy Paper's recognition of the critical role of water for Kenya's economic development and poverty alleviation.

Water resources management has three main functions:

- ***Water utilization management - how water is allocated, how it is used, who uses it;***
- ***Water resources development - water infrastructure such as dams, reservoirs and intake and delivery structures for water supply, irrigation schemes, hydropower generation;***
- ***Water resources protection - Looking after the sources and the environment, conserving water, pollution control, catchment management.***

The Strategy recognizes that Kenya has a limited endowment of water and calls for actions to: (a) raise awareness about water scarcity and (b) treat and manage water as a scarce social and economic resource.

The Strategy proposes institutional reforms that separate water resources management functions from water supply service delivery functions. Policy and regulation matters from administrative matters. Under the proposed arrangements, the ministry in charge of water services will be responsible for policy formulation. An autonomous Water Resources Management Authority (WRMA) will manage all water resources and these roles will be decentralized at the Catchment/Sub-Catchment levels. The WRMA will be established under the revised Water Act, charged with the responsibility of providing water resources management services. Catchment and sub-catchment boards will be established and strengthened to perform the various water management functions such as water allocation, pollution control and catchment management. The new WRMA will coordinate some functions with NEMA and relevant government agencies.

An Inter-Ministerial Steering Committee (IMSC) will guide the transition process, ensuring a smooth transition, and will be phased out once the WRMA is established.

The strategy includes vigorous measures for the conservation of the water resource base, the protection of catchment areas and recharge areas from destruction and encroachment and the sustaining critical water related eco-systems and environmental functions.

To ensure that the needs of key sectors are met, including agriculture, commerce and industry, tourism, power generation and domestic use, investment in water management infrastructure will be necessary.

The strategy promotes improved efficiency of water use, equitable allocation between the competing needs and the establishment of a systematic program to monitor water resources to determine resource availability and proper planning of resource utilisation on a long term basis.

The strategy promotes decentralization of water management functions at the appropriate levels-catchment and community—where water allocation and control and catchment management functions will be carried out.

The development of human capital, which involves equipping people with the right skills and providing adequate incentives to perform is key to sustainable development and achieving the government's policy objectives in water resources management. It is therefore necessary to develop a comprehensive training and career development programme for personnel working in the sector.

The strategy recognizes the people and water users as the custodians of Kenya's water. It places emphasis on the active role and participation of water users in the planning and management decision making. It promotes the involvement of the private sector, NGOs, other stakeholders and river users associations in the management of water resources by direct involvement in decision making or by engaging in fora for dispute resolution.

To meet the costs of water resources management, the strategy outlines the necessity to mobilize local resources and to complement them with aid from development partners. An appropriate levy and fee structure will be developed that ensures cost recovery to enable sustainable management of water resources. Financial management systems will be rationalized to increase efficiency, transparency and accountability. Ultimately it is planned that the WRMA will achieve financial autonomy. This should help attract foreign capital and technical investment into the sector.

4 STRATEGY IMPLEMENTATION

The implementation of the Strategy will include the following elements:

The launching of a National Water Campaign through which the strategy will be implemented including the following key elements.

- Water resources assessment
- Water allocation, demand management
- Water conservation
- Catchment management
- Investment and infrastructure development
- Disaster management – floods, droughts and landslides
- Water Quality and pollution control
- International waters
- Environmental protection
- Public health promotion
- Institutions and Legislation
- Economics and Financing mechanisms
- Capacity building and human resources development
- Identify pilot projects for possible investment under the IWRMS.

SECTION I - INTRODUCTION AND SITUATION ANALYSIS

1 INTRODUCTION AND SITUATION ANALYSIS

1.1 INTRODUCTION

Water is life. Water resources contribute enormously to economic productivity and social well-being of human populace as both social and economic activities rely heavily on water being available in sufficient quantity and adequate quality. With the increasing growth in population and the subsequent socio-economic pursuits (including urbanization, industrial production, tourism and agricultural activities) demand for water has increased rapidly. In some areas of the country the stage has been reached where the availability of water is the limiting factor for any further development activities. In such areas conflicts have arisen amongst various competing sectors and users of water. This is further compounded by the fact that currently water resource management responsibilities are fragmented amongst several agencies, a situation which has become a major impediment to integrated water resources management. Effective implementation and coordination mechanisms are not clearly defined. This situation is undermining the sustainability of the water resource base and altering the hydrological and hydrogeological conditions of the resource base.

To address the above shortcomings, the government has formulated a series of policies. The definitive policy for the sector was promulgated in April 1999 as Sessional Paper No. 1 of 1999. This is the National Policy on Water Resources Management and Development which calls for decentralisation of operational activities from the central government to other actors. The Sessional Paper has also addressed the issues of the institutional framework and financing of the sector.

This strategy paper supports the implementation of the National Water Policy and anticipates the promulgation of the new Water Bill which, amongst other things, establishes the Water Resources Management Authority.

The strategy provides a framework for undertaking the following activities: -

- Implementing the National Policy on Water Resources Management and Development and Water Act 2001 to strengthen Water resources Management.
- Developing a decentralized institutional setup for managing water resources.
- Strengthening the hydrologic, hydrogeologic, climatic and water quality information networks and water resources assessment capacities.
- Protecting priority catchments and recharge areas.
- Strengthening groundwater management.
- Controlling pollution.
- Examining the complexity of water availability and water demand in relation to changing land use patterns.
- Strengthening catchment management.
- Strengthening capacity for integrating environmental quality objectives in WRM.
- Providing enabling environment, for empowerment of user groups and stakeholder participation.
- Providing basis for analysis necessary for equitable Water Apportionment.
- Providing basis for selection of pilot projects.

Kenya is a water scarce country in absolute and relative terms, but water is neither recognized, treated nor managed as a scarce resource. The presence of high rainfall areas in the Lake Region and the Central Highlands, many rivers and large freshwater bodies such as Lake Victoria have contributed to a false sense of abundance of freshwater.

1.2 ANALYSIS OF THE SECTOR

1.2.1 Physical Conditions and Resource Potential

The Republic of Kenya has a territorial area of 582,646 km^2, consisting of water area of 11,230 km^2 and land area of 571,416 km^2. Of the land area, more than 85% is classified as arid and semi-arid lands (ASAL). The remaining land of approximately 81,000 km^2 sustains more than 75% of the nation's population and contributes a substantial portion of Gross Domestic Product (GDP).

Climate in Kenya is primarily controlled by the Inter Tropical Convergence Zone and a wide range of topographic relief. Air temperature varies from 40°C in the low altitude arid areas to below freezing on Mt. Kenya. The average annual rainfall over the country is approximately 630mm, ranging from less than 200mm in the northern ASAL area to 1,800mm in the western region.
The country is divided into 5 drainage systems or catchments;

Catchment	% of total land area
Lake Victoria	8.0%
Rift Valley inland drainage	22.4%
Athi River and Coast	11.5%
Tana River	21.7%
Ewaso Ng'iro North	36.3%

According to the 1994 National Water Masterplan, the annual quantity of renewable freshwater resources was 20.2 billion cubic meters (BCM) of surface water. Assuming that the 20.2 BCM is still available annually, with a current population of 31.2 million people, the per capita endowment of water is 647 m3 per year. Kenya's average annual per capita supply is only 24 percent of Tanzania's and 22 percent of Uganda's. In 2025, Kenya is projected to have just 235 m3 per capita per year.

The potential volume of the surface water resources is highest in the Lake Victoria Catchment (282.6×10^3 m^3/year/km^2) and the lowest in the Athi River and Coast Catchment (21.3×10^3 m^3/year/km^2). The 1998 surface water abstraction volume is estimated at 1.1×10^9 m^3/year which is only 5.4% of the potential resources volume which reflects a very low level of development.

Although only a small portion of the average annual rainfall infiltrates into the soil and recharges the groundwater, it represents a considerable resource of generally good quality water that occurs everywhere in the country. The country can be divided into 5 hydrogeological areas, out of which the Volcanic Rock and Quaternary Sediment areas have the highest groundwater potential. The safe abstraction volume of the groundwater is estimated to be as large as 610.5×10^6 m^3/year, consisting of 184.5×10^6 m^3/year by boreholes and 426.0×10^6 m^3/year by shallow wells. In 1998 the volume of groundwater abstraction was estimated to be 57.2×10^6 m^3/year which is 9% of the total potential. Groundwater possess large development potential and is a priority source of drinking water in ASAL areas.

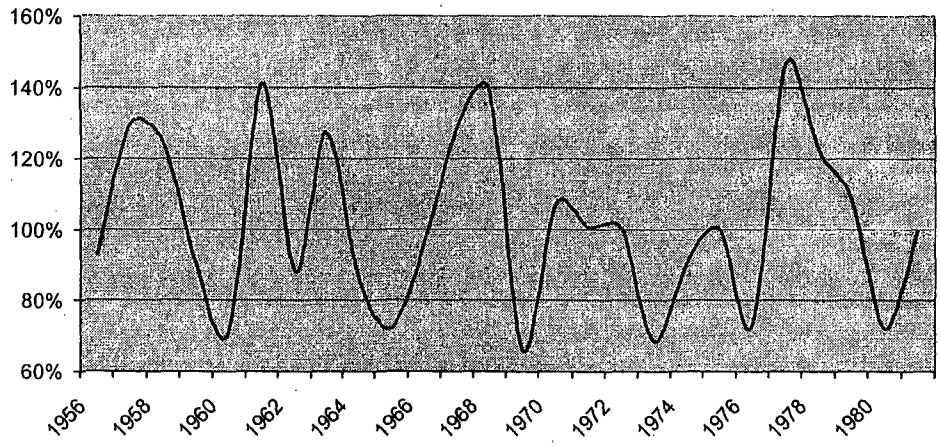
1.2.3 Water Resources Management Problems

Currently our country is facing a number of serious challenges related to our water resources. A number of these challenges are as a result of factors both within and outside the water sector or over which we have little control such as climate variability and increasing demand for water as a result of development and population pressure. Although we may not be able to control the causes, we can manage the consequences and must be for the sake of our future.

The problems facing the country include:-

Water scarcity Kenya is classified as a *chronically water scarce* country. The country's natural endowment of fresh water is limited by an annual renewable fresh water supply of only 647 cubic metres per capita. Globally a country is categorised as 'water stressed' if its annual renewable freshwater supplies are between 1,000 and 1,700 cubic meters per capita and 'water scarce' if its renewable freshwater supplies are less than 1,000 cubic meters per capita. By way of comparison, Kenya's neighbours, Uganda and Tanzania have annual per capita renewable fresh water supplies of 2,940 and 2,696 cubic metres respectively.

Annual Rainfall Variation about the Average



Climate variability In addition to Kenya being a water scarce country, its annual rainfall is also highly variable from year to year. Droughts are endemic. Occasional floods have caused devastating impact on the economy. This calls for careful preparedness and management and protection of

water resources so that water from high rainfall periods is available in low rainfall years. Climate variability requires greater storage per person in order to act as a buffer for dry years.

Growing population The growing population increases the demand for water for domestic use, food security and hydropower to the point where the needs are outstripping supply. This makes orderly economic and social development which depend on reliable water resources more difficult to achieve.

Water availability per capita

Year	Population	Per capita water availability m3/yr
1969	10,942,705*	1853
1979	15,327,061*	1320
1989	21,448,774*	942
1999	28,686,607*	704
2010	40,311,794**	503
2020	56,481,427**	359

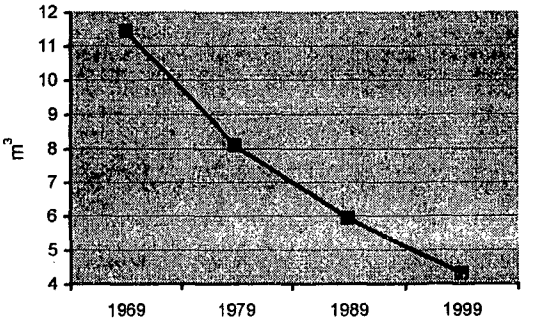
* GOK Census
** 1992 Masterplan Projections

Catchment degradation Catchment degradation in Kenya is a major problem which is undermining the limited sustainable water resources base remaining in the country. Catchment degradation results in increased runoff, flash flooding, reduced infiltration, erosion and siltation. The main causes of catchment degradation are poor farming methods, population pressure and deforestation. Deforestation is as a result of forest excision for resettlement, dependence on wood fuel, illegal logging and encroachment. Recent forest excisions have happened in all five major water catchments of Kenya. The sediment yield for the Ewaso N'giro and Tana rivers have increased 5 to 15 times the levels of 1970. Government reforestation and wood-fuel programmes have not achieved their goals. The protection of key watersheds must be therefore be a top priority and it is imperative that serious attention be given to reforestation of the country's forests with great urgency.

Invasive Species The proliferation of invasive plant and animal species in the region including fish species and aquatic weeds is of growing concern. Weeds such as water hyacinth, fern and lettuce are degrading surface water resources particularly in Lake Victoria where water hyacinth affects fishing, irrigation, drainage, water supply and public health developments.

Storage and infrastructure investment There are presently about 3000 small dams and water pans in the country with a storage capacity of approximately 124 million cubic meters. Approximately 3.4 billion cubic meters of storage is required by 2010 to ensure reliable water supply to the country, about 30 times greater than what currently exists. This estimate, however, is based on data and catchment conditions that existed prior to 1980. As a result of catchment degradation and deforestation since 1982, it is estimated that the amount of storage now required will be much higher than the 30 times the storage. Investment levels in water management infrastructure has been inadequate for many years.

Storage Volume per capita (m^3)

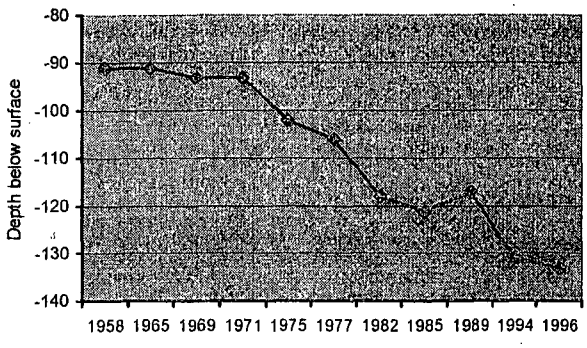


Water Demand The National Master Plan indicates that water demand in the important categories of domestic water, industry, agriculture including irrigation, livestock, wildlife and hydropower, will increase significantly from 2,073 MCM/Year in the year 1990 to 5,817 MCM/year in the year 2010. In order to provide for this increasing demand on the country's water resources, greater care will need to be taken of resources and more effective planning and project implementation will be necessary, especially since, according to the Master Plan, these needs cannot be met without regulation works in rivers (dams and reservoirs).

Groundwater depletion High demand for water, encroachment on recharge areas and the unregulated use of groundwater is leading to depletion of groundwater which is in turn leading to a number of other related problems including falling water tables, sea water intrusion into coastal aquifers, contamination of groundwater and the drying up of base flows in springs and rivers.

Pollution Increasing pollution is undermining the nation's water resources, escalating public health risks, intensifying poverty and curbing economic development. Most municipal sewerage plants and industries in the country discharge partially treated or untreated wastewater containing high levels of organic, heavy metal and other toxic substances directly into surface water courses. Pollution problems in the Upper Athi, Thika, Nairobi and Nzoia rivers as well as other rivers and lakes are com-

Static water level in a Nairobi well



mon, particularly during low flow periods. Despite the National Water Quality Monitoring Program, established in 1982 to monitor water quality and provide a database for water pollution control and planning purposes, the desired objectives have not been attained due to logistical problems and a lack of funding. European Union regulations on imported flowers have resulted in some promising pollution control activities around lake Naivasha.

Allocation As a result of inadequate information being available about water resources, allocation decisions related to surface water abstraction and the granting of borehole permits are made without adequate data. In addition it is estimated that more than 50 % of abstractions are illegal. Individual allocation decisions are made in disregard of a sustainable framework that take account of climate, flow, variability, regional economic planning and reserving water for basic human needs and for aquatic ecosystem protection. The lengthy and ineffective process for issuing water permits has led to increased lawlessness in water abstraction.

Demand management In previous years the overriding approach to water resource management was that all needs and demands for water could be met. This is not possible and so it is important to manage and reduce demand for water. Managing demand for water is aimed at reducing the huge inefficiencies in supply systems, large quantities of unaccounted for water, leakage, outdated technologies, poor design, illegal connections and theft. All means of managing demand need to be explored including economic, social and technical instruments.

Aquatic ecosystems Lakes and riverine, wetlands and floodplain ecosystems provide important benefits to riparian communities such as flood recession agriculture, dry season water supply for pastoralists, and habitats for fish and prawn cultures as well as recharge for groundwater. Unplanned upstream developments can have significant impact on downstream uses and communities. Water resources planning needs to consider all the uses of water in the project economic analyses and decision making process.

Resource assessment In situations of water scarcity it is all the more important to ensure that the water resources of a country are continuously monitored. In order to be able to plan for water security it is necessary to understand the climate and identify trends. Current records are incomplete both in time and coverage of the country and the capacity for data collection, storage, analysis and dissemination is weak. There is little coordination of information flow and the level of water resources assessment infrastructure is inadequate.

Enabling environment The other factors which contribute to inadequate water resources management include inadequacies in legislation, institutional framework, financial mechanisms, and lack of professional and technical capacity. There is little private sector engagement or investment and communities, NGOs and other stakeholders have not been given many opportunities or incentives to participate in water resources management.

Impact on the economy Inadequate water resources management is imposing a huge cost on the nation's economy. The economic costs of poor preparedness to climate variability entails disruption in water supply, energy production and industrial output, agricultural and livestock output, etc. The cost of water resources degradation relate to: (a) insecure water supplies due to over allocation of water, (b) public health problems caused by pollution, (c) increased cost of water treatment from pollution and siltation, (d) damage to water supply infrastructure from siltation, (e) damage to coastal and marine resources from siltation, and (f) cost of aquatic weed control.

1.2.3 Background of Sector Reforms

Following independence in 1963, the Kenya Government launched a policy document known as "Sessional Paper No. 10 of 1965 on African Socialism and its Application to Kenya". This paper directed the Government's policy towards priority areas for the African population, which were identified as poverty, illiteracy and diseases. The policy required that the core infrastructure for economic and social activity be in Government hands. Accordingly, the Government was engaged in all productive activities, including the provision of water and sanitation services, often at minimal charge to the consumer. In addition, the Government undertook programs to provide land to the people and some forest conservation areas were earmarked for human settlement.
In 1974, owing to the growing involvement of the Government in the development of water and sani-

In 1974, owing to the growing involvement of the Government in the development of water and sanitation services, the Water Department under the then Ministry of Agriculture was elevated to a full Ministry of Water Development. The Ministry intensified the Government's ambitious water development programme, and envisioned achieving the provision of water for all by the year 2000. Consequently the Government became involved in complete management of almost 100 urban water supplies and 600 rural water supplies. After some time it was realised that the Government was not the best placed institution to undertake the role of water supply and sanitation provision.

Water resources management was not regarded as a priority during this time.

Between 1990 and 1992 the Government developed a National Water Master Plan. The objective of the National Water Master Plan was to propose a national wide framework of orderly planning and development of water resources in the country.

The culmination of policy development in the water sector was the publication in 1999 of Sessional Paper No. 1 of 1999, the "National Policy on Water Resources Management and Development."

To operationalize the policy, the Ministry of Environment and Natural Resources begun by reviewing the Water Act (Cap 372) to spearhead the implementation process. The draft legislation is now ready and will replace the current Water Act with well-developed provisions that will achieve the necessary reforms required for improved water resources management in Kenya. Most importantly, the Bill provides mechanisms for financing water resources protection and management.

The emerging water crisis has generated serious public and private debate about water and its vulnerability to climate and environmental degradation. The current public and political mood provides a key opportunity to review the status of a vulnerable but strategic resource and the need for major reforms to strengthen the management of water resources in Kenya. The recent drought impacted all segments of society, all line ministries of the government, and it also highlighted serious weaknesses in existing water management systems. Currently, there exists strong support from the Ministries of Lands and Settlement, Energy, and Agriculture and Rural Development for supporting the IWRMS, and for the IWRMS to be linked with the sector policies and strategies being prepared by these line ministries. The National Environmental Management Act, an umbrella legislation that guides, coordinates and, at times, directs activities under all other legislation touching on the management of natural resources, is now in place. All these developments provide an opportunity for implementing the reforms and the IWRMS has built its recommendations upon this background.

1.3 POLICY OBJECTIVES AND PRINCIPLES

1.3.1 Overall Policy Objective

The overall objective of this strategy paper is:-

To lay the foundation for a rational and efficient framework for sustainably meeting the water needs of national economic development, poverty alleviation, environmental protection and social well-being of the people through sustainable water resources management.

1.3.2 Sector Principles and Objectives

The Government has embraced the following principles with the objectives of creating a new foundation for efficient provision of Integrated Water Resources Management.

1. Treat water as a scarce resources with high social and economic value.
2. Separation of water resource management functions from water supply and sanitation functions.
3. Separation of policy and regulatory functions from resource management functions.
4. Devolution of regulatory responsibilities from Director of Water Development to National Water Resources Management Authorities and decentralisation to Catchment Boards.
5. Establishment of a financing mechanism for the funding of the water resources management functions.
6. Establishment of a pricing policy that meets equity, economic, financial and environment objectives (polluter pays).
7. Human resources development and capacity building to meet the professional and technical skills needs of the country in water resources management.
8. Increase investment in essential water resources infrastructure.
9. Promote demand management, conservation and protection in conjunction with essential infrastructure development.
10. Promote environmentally sustainable water resources development and management.
11. Promote the participation and engagement of the private sector and other stakeholders.
12. Recognize the linkages between water resources management and the economy.

SECTION II WATER RESOURCES MANAGEMENT

2 WATER RESOURCES ASSESSMENT

2.1 BACKGROUND

Water resources assessment comprises the continuing measurement and recording of water resources, including their quantity and quality and the various human and other factors which affect the resources. The purpose of the collection of information is to provide a basis for planning and management of water resources and to contribute to macroeconomic planning and sectoral planning in agriculture, industry, rural development etc.

In the past important initiatives have been successfully undertaken such as the Water Resource Assessment and Planning Project and the National Water Masterplan. However these were not sustained when funds ran out. Since late 1980s there has been a significant deterioration in accuracy and effectiveness of both surface and groundwater monitoring. In particular river gauging frequencies on the surface water network has fallen dramatically to the point where less than one-third of measuring stations remain effective. It can therefore be concluded that the hydrological network has practically collapsed. In addition, there is no functioning system of monitoring the volumes of water abstracted from rivers, wells and boreholes, so that water demand trends and estimations are very difficult to compute.

The water resource data that currently exists in the database of the country is inadequate. It does not reflect the significant changes that have occurred over the last two decades as a result of deforestation, catchment degradation, urbanization, continued groundwater abstraction, pollution, and other impacts. This state of unreliable and unavailable data creates uncertainty in water planning and increases investment risks and discourage external capital investment.

There is a good general understanding of groundwater occurrence in Kenya, but detailed analyses of groundwater recharge systems and groundwater flow in specific aquifer systems, and the impact of these on other resources and the environment is not known making management and allocation ineffective. Ineffective groundwater management, resulting from the absence of groundwater monitoring data and other management tools, has led to uncontrolled development resulting in over pumping of aquifers and in groundwater pollution. An example of this problem is the Nairobi aquifer, where due to the absence of monitoring, no measures are currently taken to regulate and control the drilling of new boreholes. The issuing of permits is a slow process and the functioning of the Water Apportionment Boards is not effective.

Main information sources for groundwater assessment are the National Water Resources Data Base (NWARD) and available reports on groundwater assessment studies. The NAWRD contains only data on new boreholes and has no new entries since 1998. Reports and studies are not centrally filed in the MENR and are therefore difficult to access. Data that is available at other stakeholders in the groundwater sector, e.g. NGO's, drilling contractors, consultants and pump suppliers, is not commonly shared and hence not fully effective.

2.2 PROBLEM STATEMENT

Nationally, the assessment water resources coverage is inadequate and data collection is irregular and uncoordinated. The database and information flow in the water sector is characterized by data gaps due to disruption in water resource assessment programs.

As a result of there being no reliable data, decisions regarding allocation, surface abstraction and borehole permits are cannot be properly made. It is estimated that more than 50 % of abstractions are illegal.

There is low level of water resources assessment infrastructure and inadequate institutional arrangements which leads to inefficiencies, lengthy delays, the potential for corruption and a disregard for the law.

Technology currently in use is old, inadequate and inefficient. Use of modern technology such as GIS, satellite communication, GPS, echo sounders and the Internet can lead to cost-effective data collection and significantly increase productivity of staff. Comprehensive databases and information systems should be updated and maintained on a regular basis.

The databases and information systems in the NWARD should contain stream flow; water quality and sediment transport data for rivers, as well as

groundwater levels, abstraction and water quality data for boreholes and groundwater supply schemes. Inclusion of water level data in the country's reservoirs into the database will, in addition, provide information to support surface water apportionment decisions during times of drought.

2.3 POLICY DIRECTION

The policy direction is geared towards setting up mechanisms for continuous assessment of resources through all the stages of data collection, storage, analysis, dissemination and monitoring of water resources data and information, using modern and efficient technology. This will include strengthening of the institutional capacity of the various responsible agencies. Full databases will be established to capture and monitor a wide range of hydrological and hydrogeological and related information at all the water resources management levels. This will be essential for sustainable water resources management, development and protection.

2.4 GOAL, STRATEGY AND ACTIVITIES

2.4.1 Goal

Accurate, timely and efficient water resources data and information collection, storage, analysis, dissemination and monitoring for sustainable water resources management and planning.

2.4.2 Strategy

Develop and strengthen a water resources assessment and monitoring system that is based on the catchments systems with appropriate data and information dissemination system.

2.4.3 Activities

1 Carryout an inventory of existing data assessment and monitoring system
2 Determine upgrading and modernization requirements of system
3 Expand and rehabilitate water resources monitoring systems (e.g. hydrometeorological, stream flows, groundwater, and water quality)
4 Upgrade the technology in data collection processing (Geographical information Systems, Remote Sensing, Groundwater Survey Equipment, Global Positions Systems, E-mail.)
5 Establish and maintain an up-to-date database at the national, Catchment and sub-Catchment levels.
6 Initiate a regular annual/seasonal publication of key water resources data and information for public consumption.
7 Put in place coordination mechanism to ensure access and linkage to database.
8 Establish inter-linked data bases with institutions that have relevant data in IWRM
9 Establish farm onsite data collection systems.
10 Establish the human capacity to support the new developments.

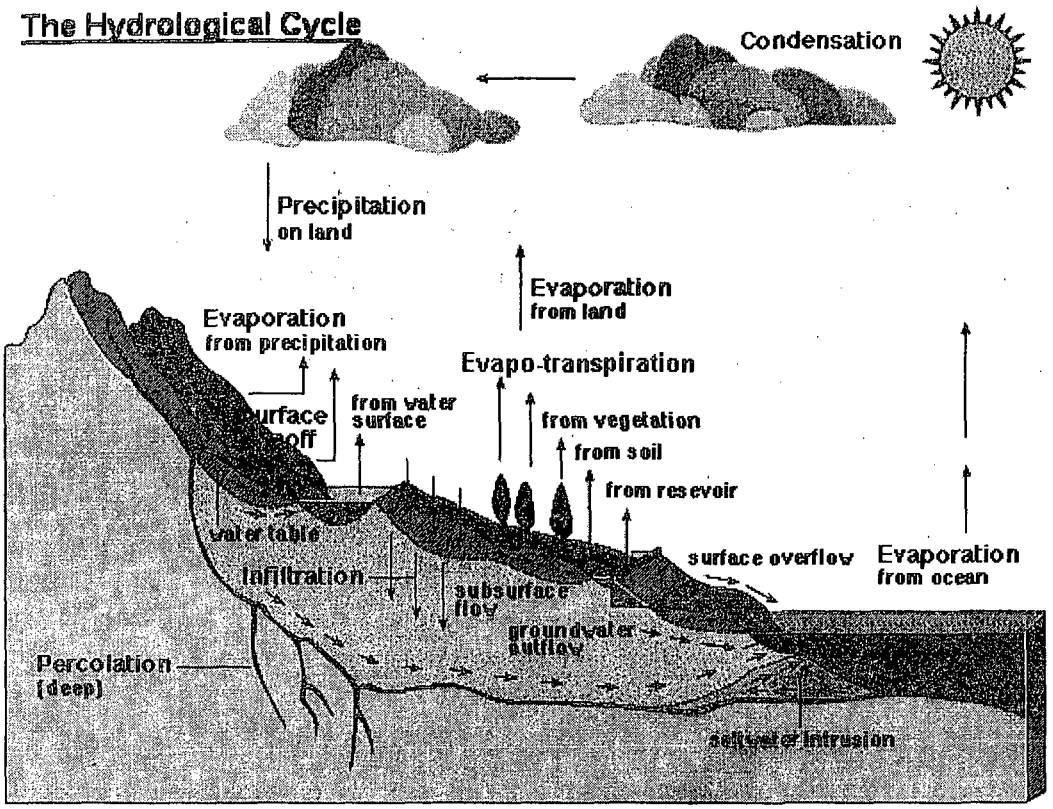
3 ENVIRONMENTAL PROTECTION AND CONSERVATION

3.1 BACKGROUND

Increasingly the interaction and integrity of the hydrological cycle with all other elements of the natural environment have been recognized as indivisible. The environment is the source of water and must be protected both in terms of quantity, quality and essential natural functions. Therefore the environment, as the source of water, should not compete as a 'user' or 'demander' of water when considering allocations of water. Instead, sufficient water should be reserved to ensure that critical environmental functions are sustained and the water that remains should be considered available for allocation to the range of competing demands such as domestic, agriculture, industry, tourism, hydropower etc.

It is therefore critically important that, in the planning and management of resources, we safeguard the sources of water and their natural functions, which balance and maintain our water in terms of both quality and quantity, and protect critical environmental assets including riverine biotic species, plants, animals, insects, catchments, wetlands, deltas etc.

As the carrying capacity of the environment is increasingly stressed due to growing needs and improper use of the resources, the vulnerability of the environment increases. To assess the vulnerability in a decision-making context, appropriate criteria must be identified and the sequence of hydrological processes understood in order to link actions with their respective outputs. To be able to carryout the assessment on vulnerability of the environment a continuous supply of reliable data and information is essential but unfortunately currently this information and data is lacking.



In Kenya environmental problems include deforestation, soil erosion and sedimentation, water pollution, inadequate stream base flows for aquatic flora and fauna life support, wetland degradation, inadequate institutional and collaborative mechanisms, intrusive weeds, poverty and high population growth rate, all of which pose threats to the resource base and life support systems. The extent of these problems in the country are well known and some are detailed in the Chapters of Pollution Control and Catchment Protection.

Studies done on some dams and lakes in the country make the following findings;

- On the Ewaso Ng'iro and Tana catchments the sedimentation rates have drastically increased and are threatening investments already in place, as a result of catchment degradation.
- In Lake Baringo, sedimentation due to catchment degradation is affecting the quality of the important natural resource and bird habitat.
- There are high nutrient concentrations in Lake Nakuru which have produced cyanobacterial toxins resulting in about 50,000 Flamingo deaths in 1993 and 35,000 deaths in 2001.
- Despite large population increase and dramatic growth in the horticultural industry in the shores of Lake Naivasha, the water quality has remained remarkably good. This is attributed to good management of effluent to the lake by the horticulture industry which is complemented by the natural filtering action of the fring reed beds which assist in filtering sediments from the town sewerage treatment plant, the in flowing rivers and from the surrounding agricultural industries.
- Due to high nutrient levels in Lake Victoria, rapid growth of invading water hyacinth is affecting the fish habitat and the fishing industry and causing damage to some infrastructure.

3.2 PROBLEM STATEMENT

The primary problem is the lack of well defined criteria and guidelines and regulations for environmental protection and where these do exist there is a lack of enforcement. Reliable and regular environmental data and information is also lacking. There is little awareness on environmental management issues and how they impact on human health, nature and other natural resources.

3.3 POLICY DIRECTION

The overall policy is to ensure environmentally sustainable development. The policy is geared towards the integrating and strengthening of environmental values and considerations into water resources planning, management and development and increasing awareness on their impact on human health, development and other natural resources. Focus will primarily be concentrated on clarifying, improving, and streamlining the institu-

tions and processes responsible for the integration of environmental aspects in overall water resources management.

3.4 GOAL, STRATEGIES AND ACTIVITIES

3.4.1 Goal

Environmentally sustainable water resources management by maintaining reserve flow levels in lakes and rivers at all times in order to protect bio-diversity, sensitive environments and species with important eco- and socio-economic functions such as wet-lands, watersheds, deltas, riverine environments etc.

3.4.2 Strategies

1 Strengthen water conservation measures to enhance water availability for environmental sustainable bio-diversity and socio-economic activities.
2 Restoration of degraded strategic environments.
3 Ensure implementation of the measures detailed elsewhere in the strategy related to abstraction licensing, borehole drilling control, levies etc to address the over-exploitation of surface and ground-water resources, water quality control, EIA and demand management.

3.4.3 Main Activities

1 Prepare environmental management and implementation plans
2 Carry out survey and map critical water bodies for environment conservation.
3 Determine abstraction limits and quality standards.
4 Enforce Environmental Management and Coordination Act No. 8 of 1999.
5 Identify and restore degraded strategic environments
6 Gazette conservation area.

4 WATER QUALITY AND POLLUTION CONTROL

4.1 BACKGROUND

The long- term objective of the Government is to ensure that all residents in the country have access to clean and potable water, and that water is available for key economic activities such as agriculture, industry, power generation and tourism. This is only possible if the available water resources are protected from pollution. Surface and ground water resources in Kenya are increasingly becoming polluted from both point and no-point sources caused by the activities of agriculture, urbanization, industry, leaches from garbage dumps, sediments, salts, eutrophication of lakes, infiltration of fertilizer and pesticide residues, increasing catchment degradation etc. Lack of effective pollution control compromises the quality of water, posing potential health hazards, increasing treatment and maintenance costs, and affecting inland, estuarine and coastal aquatic ecosystems. Water pollution exacerbates water scarcity because it limits the use by, or imposes a higher cost for treatment on downstream users.

Most municipal sewerage plants in the country discharge partially treated or untreated wastewater into surface water courses, posing significant health hazards and localized eutrophication. Pit latrines and septic tanks located in recharge zones constitute a risk of groundwater contamination. Tanneries, paper and pulp mills, coffee processing factories, breweries, cane sugar processing factories and other industries typically do not have properly functioning wastewater treatment plants. Their effluent contributes significant organic loads, heavy metals and other toxic substances to receiving waters.

Pollution problems in the Rivers of Upper Athi, Thika, Nairobi, Nzoia and other rivers in the Lake Victoria Basin are common occurrences, particularly during low flow periods. There is also concern regarding the severely deteriorating water quality in the other Lakes especially Nakuru and Naivasha. The European Union's regulations related to imported flowers have had promising results in pollution control around lake Naivasha.

As an effort to address this pollution issue and ensure a sustainable protection of our water resources, a National Water Quality Monitoring Program was established in 1982 to monitor water quality and provide a database for water pollution control and planning purposes. The program has been constrained by lack of funding and compounded by other logistical problems and has therefore not attained the desired objectives.

4.2 PROBLEM STATEMENT

There is inadequate pollution control and enforcement measures and weak institutional capacity to monitor water quality and effluent discharges from industries and sewerage works. There is a general lack of awareness of the impacts of pollution and a

general disregard of the needs and rights of other water users.

4.3 POLICY DIRECTION

The formulation of standards and guidelines for the disposal of undesirable elements in water supported by effective enforcement. The National Water Quality Monitoring Programme will to be strengthened to achieve effective monitoring. Water abstraction and disposal licenses will be constantly review and effluent discharge levies introduced as instruments for pollution control. The level of the levy will be set to cover the cost of treatment required for individual effluent discharges in line with the 'Polluter-Pays' principle.

4.4 GOAL, STRATEGIES AND ACTIVITIES

4.4.1 Goal

Effective national water quality and pollution control for sustainable water resources management.

4.4.2 Strategies

1. Establish effective water quality and effluent discharge standards and guidelines and enforcement system for water quality and pollution control.
2. Strengthen the capacity to monitor and enforce water quality and waste water discharge standards.
3. Ensure implementation of related activities of classifying water bodies according to quality
4. Awareness creation of the effects of pollution.

4.4.3 Main Activities

1 Carryout studies on the extent and effect of pollution
2 Prepare standards and guidelines for effluent discharge.
3 Develop, implement and monitor water quality and pollution control management plans
4 Develop guidelines and enforce EIA on proposed projects and land use changes.
5 Strengthen the National Water Testing Laboratory and its provincial branches for efficient water testing.
6 Establish capacity for management of oil-spills in the marine environment
7 Establish laboratory linkages and accreditation mechanisms for the analytical laboratories.
8 Involve the participation of land owners in pollution control.
9 Cross check implementation of related activities of classifying water bodies according to quality and of awareness creation

5 CONSERVATION AND DEMAND MANAGEMENT

5.1 BACKGROUND

Water conservation and demand management involves protection of water sources including catchments, ground water aquifers, wetlands etc. and increasing the efficiency with which water is used. Water conservation and demand management techniques include: -

- Unaccounted for water and leak management
- Efficient irrigation methods
- Rain water harvesting
- Delineating and zoning areas for water conservation
- Protection against catchment deforestation and degradation
- Water recycling
- Protection of wetlands and important ecosystems

The level of unaccounted for water in our domestic and commercial water supply systems is well over 50 percent. There are also cases of misuse of water due to low water tariffs. Effective demand and leak management of these systems will impact positively on the conservation of scarce resources.

Agriculture is the mainstay of our economy but with more than 85% of the land area being arid or semi-arid, irrigation is required to maintain a sustainable level of food security. Irrigation is the largest user of water therefore conservation of water through the development and utilisation of efficient irrigation technology will have a significant impact on the conservation of water.

Rain water harvesting, to some extent, reduces pressure on demands from rivers and stream flows and also retards the degradation of catchments by reducing water available for surface run-off likely to cause erosion. Encouraging recycling of water, especially in industry, reduces the demand on water resources, enabling water to be available for other uses. The positive conservation effects of catchment, wetlands and ground water sources protection is discussed in subsequent Chapters of this document.

5.2 PROBLEM STATEMENT

The following factors impact directly on the conservation of water resources.

- Inadequate and unsustainable rehabilitation of degraded catchment areas.
- Inadequate community participation in water conservation activities.
- No source of finance for use in water conservation activities.
- Lack of emphasis by regional development authorities and catchment boards water on conservation measures.
- Inadequate coordination of those responsible for water conservation by the Government agencies.
- Lack of awareness of conservation issues
- Degradation of catchments and deforestation leading to high sedimentation rates
- Encroachment of wetlands
- Dumping of waste into water courses
- Increased population
- Wastage and inefficient use of water

5.3 POLICY DIRECTION

All instruments at the government's disposal will be used to promote the conservation and efficient use of water including regulation, enforcement and the economic pricing of water.

5.4 GOAL AND STRATEGY

5.4.1 Goal

The water needs of the country are met through sustainable conservation and the management of demand, and all citizens are aware of the scarcity and value of our water resources.

5.4.2 Strategy

1 Formulate a National Water Conservation Programme to promote sustainable water conservation.
2 Build public awareness of the scarcity and value of water.
3 Ensure implementation of other related activities, elsewhere in the strategy, on catchment management, awareness creation and potential resources monitoring.

5.4.3 Main Activities

1 Develop a system for volumetric monitoring of abstraction rates
2 Develop a levy system to promote conservation measures by using volumetric levying
3 Develop and implement guidelines for use of efficient irrigation technology.
4 Promote public awareness of water scarcity and value through the National Water Campaign.
5 Cross check implementation of other related activities, elsewhere in the strategy, on catchment management, awareness creation and potential resources monitoring

6 CONSERVATION BY WATER WORKS

6.1 BACKGROUND

The National Water Master Plan indicates that approximately 3.4 billion cubic meters of storage is required by 2010 to ensure reliable water supply to the country. The current storage capacity in large water supply reservoirs is approximately 124 million cubic meters. This indicates that the amount of storage that is needed to reliably supply water to Kenya is approximately 30 times greater than what currently exists. This estimate, however, is based on data and catchment conditions that existed prior to 1980 but since then catchment degradation and deforestation has occurred and baseflow in rivers is reported to have decreased whilst sediment loads have drastically increased. As a result the amount of storage required could increase several times the current storage. Sedimentation reduces the value of investments made in infrastructure and also reduces the reliability of water and power supply. The economic impact of catchment degradation and deforestation is very significant and will require greater investment in infrastructure in the near future to reliably meet the country's water needs.

Such infrastructure development is expensive and needs to be carefully undertaken, within the context of national development planning, with full awareness of the need to increase the country's ability to survive natural climate variability. Such investments need to be economically and financially viable. The development of infrastructure also needs to be undertaken under internationally accepted safeguard criteria to ensure that it is environmentally sustainable and socially acceptable. Negative impacts need to be adequately mitigated including loss of bio-diversity, habitat destruction, and social and cultural impacts such as resettlement and the loss of ancestral and archaeological heritage sites. Stakeholder involvement and con-

sultation of interested and affected parties is therefore critical.

Criteria and guidelines will be developed for sediment surveys, infrastructure design and the operation and maintenance of dams and reservoirs. Rehabilitation of catchment areas will be necessary to minimize the impact of reservoir sedimentation and to ensure sustainable use of water resources and associated infrastructure.

6.2 PROBLEM STATEMENT

The following factors impact directly water conservation infrastructure and the ability of the country to manage water resources.

- Inadequate number of water conservation structures in arid and semi arid areas, and poor operation and maintenance of the existing structures leading to reduced and unreliable water storage capability.
- Inadequate and unsustainable rehabilitation of existing structures.
- Lack of adequate financing of infrastructure operation and maintenance development.
- Increased sediment loads, due to poor catchment management, in dams and lakes reducing storage capacities.
- Inadequate funds for development of new structures

6.3 POLICY DIRECTION

The Sessional Paper No.1 of 1999 adopts the policy of maintaining strategic storage of water through the construction of conservation works especially in arid and semi-arid areas to ensure sustainable availability of water to all.

6.4 GOAL, STRATEGY AND ACTIVITIES

6.4.1 Goal

Providing adequate and sustainable water resources storage for development purposes through investment in water management infrastructure and the maintenance of existing assets.

6.4.2 Strategy

1 Formulate a National Water Resources Management Infrastructure Development Programme to promote water conservation and to meet the current and future demand.

2 Ensure implementation of other related activities, elsewhere in the strategy, on catchment management, utilisation and conservation and demand management.

6.4.3 Main Activities

1 Take inventory of all existing storage facilities and infrastructure assets
2 Review storage requirements to meet the country's medium and long term development needs
3 Rehabilitate existing water conservation structures.
4 Engage in an infrastructure development program as determined by the review of national requirements (item 2 above.)
5 Investigate and implement an artificial groundwater recharge programme.
6 Cross check implementation of other related activities, elsewhere in the strategy, on catchment management, utilisation and conservation and demand management.

7 CATCHMENT PROTECTION

7.1 BACKGROUND

Catchment degradation is a result of the destruction of natural vegetation in a catchment through such activities as poor farming practices, (over cultivation and over grazing) and deforestation.

Some zones, particularly upper-catchment high rainfall areas, are particularly sensitive to degradation and have major impacts on water resources. The natural vegetation in these areas in Kenya is forests and therefore deforestation has devastating effects on the countries water resources and materially impacts on the country's development potential.

Although Kenya's forests cover only 2-3 % of its land surface, they play important roles in the country's water resources. All major rivers in Kenya originate in forests that maintain their base-flow. Deforestation prevents a range of natural processes from occurring and results in the following:-

- significant reduction in the volume of water that infiltrates into and recharges groundwater,
- a reduction in the baseflow which sustains the dry season low-flows of streams and rivers,
- reduced ability to survive and recover from droughts,
- increased rainfall runoff resulting in floods,
- intensified erosion and sedimentation

Comparison of estimates of sediment yields for the Ewaso N'giro and Tana River for current conditions and for conditions prior to 1970 indicates that sediment yield in these rivers are 5 to 15 times greater than what it was prior to 1970.

The causes of deforestation include forest excision for resettlement, dependence on wood fuel, illegal logging and encroachment. The recent forest excisions are all located in the five major water catchments of Kenya. Given the already degraded conditions, their impact on runoff and infiltration is likely to be very significant and will undermine the limited sustainable water resources base that is remaining in Kenya.

To counter the dependence of wood-fuel by small scale farmers the government embarked on the agro-forestry programme whose purpose was to improve the health of the forests. The programme has however failed to accomplish this goal.

The protection of key watersheds (Mt. Kenya, Aberdares, Mau Complex, Mt. Elgon and Cherangani) must be a top priority. It is imperative that serious attention be given to reforestation of the country's forests with great urgency.

Effective catchment management will involve formulation of harmonized policies on land use for agriculture, wildlife, environment, industry, forests, soils and water for improved coordination in catchment management across government departments.

7.2 PROBLEM STATEMENT

The following are the noted problems in catchment management;

- The major cause of catchment degradation is deforestation caused by forest excision for resettlement, dependence on wood fuel, illegal logging and encroachment.
- There is uncoordinated policies, poor land use and inadequate planning leading to excessive soil erosion affecting many rivers in the country.
- Inadequate budget allocation for water shed conservation.
- Inadequate engagement of communities in catchment protection

7.3 POLICY DIRECTION

The government will promote the protection of catchments by strengthening catchment preservation and conservation measures through the prevention of deforestation and by encouraging effective land use management and planning practices. All the stakeholders will be encouraged to pool their efforts and resources to protect the country's catchments.

7.4 GOAL AND STRATEGY

7.4.1 Goal

Effective and sustainable catchment management

7.4.2 Strategy

1 To formulate harmonized policies on land, water and forests for management of catchment areas.
2 To strengthen catchment protection measures.
3 Identify critical catchment areas and target for action as fast track pilot areas.
4 Involve local and international stakeholders through conferences and other fora
5 Increase conservation knowledge and technology through research, training and use of appropriate methods.
6 Ensure implementation of other related activities, elsewhere in the strategy, on environment and conservation.

7.4.3 Main Activities

1 Prepare a National Land Use Policy in conjunction with other related government departments
2 Set up a National Standing Committee to deal with water related cross-sectoral issues
3 Call a national conference specifically on catchment management to include all parties involved including National, international and other experts for example from the FAO.
4 Identify, survey, map and gazette water catchment and groundwater recharge areas to enhance their protection.
5 Prepare Regional Physical Development Plans covering areas declared special under Physical Planning Act No.6 of 1996) as Riparian Reserves including coastal, groundwater and wetland conservation areas.
6 Identify critical degraded catchment areas and embark on fast-track rehabilitation programs
7 Develop co-operative structures at appropri-

ate levels to bring together officials from all responsible authorities and stakeholders (including communities, local authorities and private landowners) to prepare catchment management plans and strengthen the monitoring and enforcement systems of catchment areas.

8 Develop a research programme to research causes, protection and rehabilitation methods.

9 Develop a training programme for extension officers to ensure adequate training in catchment conservation methods, in conjunction with the agricultural sector.

10 Review and reintroduce, where practical, traditional conservation methods.

11 Cross check implementation of other related activities, elsewhere in the strategy, on environment and conservation.

8 DISASTER MANAGEMENT – FLOODS, DROUGHTS

8.1 BACKGROUND

Floods and droughts create severe stress on the people and economy and on already over-taxed water resources.

The 1998-2000 drought was classified as the third worst ever and affected all sectors of the economy. The energy sector suffered a huge financial losses. In the agriculture sector, rice production dropped 40%, productive land lay fallow, and the cost of implementing mitigation measures as well as financial losses due to unproductive staff time and machinery was immense. Agro industries lost 30-40% of production, and there was a cereal deficit valued at Kshs 2.82 billion. Many areas endured livestock losses of 40% of their total stock and value of livestock dropped by 80%. Many industries in the Coastal region relocated to Nairobi, resulting in large regional job and revenue losses. Major tourist facilities incurred high costs due to installation of desalination plants to obtain secure supplies. The prevalence of water borne diseases increased. Five out of six community water supply earth dams and pans in the Ewaso N'giro South Basin dried up.

The El Nino induced floods of 1997-1998 caused some US $ 151.4 Million in public and private property damage. This figure does not include the number of people who lost family members, savings, property and economic opportunities.

Historically, disaster management was not viewed as an integral part of development planning and water related disasters were responded to in an ad hoc manner when they occurred. The other elements of disaster management i.e. prevention, mitigation, preparedness, recovery and rehabilitation were either ignored or haphazardly dealt with. It was not until November/December, 1997 when the El Nino floods hit our region that the National Disaster Operation Centre (NDOC) was set up in January 1998. In June, 1999, the GoK, in collaboration with the United Nations Disaster Management Theme Group (UNDMTG), formed the Kenya Action Network for Disaster Management (KANDM). KANDM was mandated to evolve disaster management strategies tailored to the Kenyan situation. Concurrently much effort is being put into the preparation of a Disaster Management Policy Paper.

The impacts of droughts and floods are increased and their duration extended as a result of catchment degradation and deforestation.

8.2 PROBLEM STATEMENT

There is inadequate IWRM related disaster management capacity in terms of facilities, information, manpower and funding. Poor land use practices, deforestation and catchment degradation exacerbate the effects of floods and droughts.

8.4 POLICY DIRECTION

The government will continue the establishment of integrated water related disaster management capacity and will seek to ensure that the country is less vulnerable to disasters through the rehabilitation and conservation of critical catchment areas. A policy of investment in water resources management infrastructure, including increasing storage of water to offset the effects of climate variability will be pursued.

8.5 GOAL AND STRATEGY

8.5.1 Goal

Effective flood and drought management through sustainable water resource management resulting in reduced vulnerability to climate variability and water related natural disasters.

8.5.2 Flood Disasters

8.5.2.1 Strategies on Prevention and Mitigation.

1 Formulate policies on settlement in flood prone areas
2 Improve Catchment conservation and protection so as to retard surface run-off.
3 Develop infrastructure design parameters and regulations to ensure that structures can sustain flooding at the design return periods
4 Develop flood control infrastructure.

8.5.2.2 Strategies on Preparedness

1 Enhance data recording and information management systems, particularly of extreme events, to enable design for protection against floods.
2 Increase public awareness on dangers of settling in flood prone areas and the need for insurance so as to indemnify losses.
3 Develop flood forecasting and early warning systems at National, District and grassroots levels.
4 Train and build capacity for appropriate response.

8.5.2.3 Strategy on Response.

1 Establish institutional framework for flood management (i.e. Disaster Operation Centres (DOC)) at National District and Grassroots levels:
2 Develop funding mechanisms.

8.5.2.4 Strategy on Recovery and Rehabilitation

1 Established institutional framework for disaster management i.e. Disaster Operation Centres (DOCs).

8.5.3 Drought

Drought is a recurring phenomenon in the country and it impacts on all sectors of the economy including agriculture, energy, health, trade and industry, water, statistics and weather. It is therefore necessary to involve a wide range of players in all elements of prevention, mitigation, preparedness, response and recovery by putting in place national drought mechanisms which should include setting up of interdepartmental committees.

Drought causes food insecurity both in the country and also in the region and mechanisms for regional coordination, for example in East Africa are essential to mitigate the effects of drought in the region. Existing structures and approaches need to be adequately coordinated.

8.5.3.1 Strategies on Prevention and Mitigation

1 Undertake catchment management activities so as to improve on soil infiltration and groundwater storage.
2 Run a public awareness campaign on water saving techniques.
3 Put in place an advisory services system for drought prone areas to increase resistance to drought effects particularly in such factors as borehole drilling for water supplies etc.
4 Developed long term strategies for planning and construction of infrastructure to increase the per capita storage of water in critical areas and to ensure food security.

8.5.3.2 Strategies on Monitoring and Preparedness

1 Advise consumers on the need for water storage for security.
2 Provide strategic water reserves.
3 Enhance appropriate water use management practices.
4 Develop funding mechanism.
5 Set up a monitoring and data collection system for indicative data such as water table levels.

8.5.3.3 Strategies on Response

1 Establish drought management institutional structures at the National District and Grassroots levels.
2 Develop food and water supply contingency plans to include local authorities, NGOs, international organisations such as the International Red Cross, United Nations agencies etc. and the army if appropriate.

8.5.4 Landslides

8.5.4.1 Strategies on Prevention and Mitigation.

1 Put in place appropriate land use management practices that protect vulnerable soils.
2 Create awareness on vulnerable areas.
3 Review design criteria in landslide prone areas.

8.5.4.2 Strategy on Preparedness.

1 Determine vulnerable areas so as to plan for their protection.
2 Develop funding mechanisms.

8.5.4.3 Strategy on Response.

1 Establish a mechanism for land slide management at National, District and Grassroots levels.

8.6 ACTIVITIES

1 Cross check implementation of related activities elsewhere in the strategy in the area of catchment management, conservation and environment
2 Community sensitization, mobilization and resettlement.
3 Identify and map the flood, drought and landslides prone areas.
4 Rehabilitate disaster prevention structures including dykes and dams
5 Establish and operationalize early warning systems
6 Sensitize public on various insurance coverage available
7 Determine training needs and train personnel in water disaster management
8 Establish emergency centres e.g. search and rescue
9 Provide essential basic needs
10 Encourage resettlement away from disaster areas
11 Undertake restoration of original waterways

9 APPLIED RESEARCH & TECHNOLOGY

9.1 BACKGROUND

Applied research in IWRM related issues in the Ministry of Water commenced in 1989 following successes in on water supply and sanitation research carried out by a research unit started in 1984 upon the recommendations of the first National Water Master Plan of 1979-1980.

The Division of Applied Research and Technology, as it is now refereed to, was to undertake research in a wide range of hydrological and hydrogeological related fields. The Division was upgraded to a Branch in 1998 with additional responsibilities. However, due largely to a lack of capacity and insufficient funds, the Branch has not been very effective.

Research is essential if the country is to achieve its long term development targets. Important areas of research are :-

- the application of appropriate technology in combination with modern technology in IWRM,
- effective and efficient methods of catchment protection, pollution control, conservation and water use efficiency, particularly in agriculture.
- efficient methods of disaster preparedness, intervention and recovery, and the creation of mechanisms for disbursing disaster contingency funds to the focal points.

9.2 PROBLEM STATEMENT

There is inadequate research and development capacity to carry out effective research programmes in the sector. Although previously the emphasis has been on water supply issues, after the floods of 1997-1998 and the drought of 1999-2000 the Government has taken steps to facilitate limited research in water resources management. The main constraints have been funding and personnel. Obtaining donor funding for research has proven very difficult.

9.3 POLICY DIRECTION

The Sessional Paper No. 1 of 1999 on National Water Policy on Water Resources Management and Development states that "Water levies and fees will be introduced where necessary and applicable for utilization of water from all public watercourses. Such levies/fees will be used in ensuring a healthy state of the nation's water and will include support for research into technologies suited to our water needs."

Research will be promoted as a basis for sustainable management of water resources by initiating collaboration with relevant research institutions and where possible other stakeholders. The intention is to establish a Water Research Institute complemented by other research institutes. Financial support will be increased, particularly for research programs aimed at the development of improved water resources management based on the sector needs.

9.4 GOAL, STRATEGIES AND ACTIVITIES

9.4.1 Goal

Promotion of applied research and the dissemination of findings in support of sound water resources management.

9.4.2 Strategies:

1 Develop a comprehensive national research programme to support sustainable water resource management.

2 Support the development of the Applied Water Research Branch and develop KEWI to the status of a full Water Training and Research Institute.
3 Develop collaboration with relevant Research Institutes both locally and abroad as a means of sharing research experience and results.

9.4.3 Main Activities

1 Determine research needs
2 Develop a comprehensive national research programme
3 Carryout a study on the capacities of KEWI and The Applied Water Research Branch and recommend requirements for rationalisation and upgrading.
4 Upgrade, rationalise and establish a fully functional water training and research institute.
5 Modernize and update data gathering, processing, analysis, archiving and dissemination of techniques.
6 Setup a data base capable of networking with other research institutes
7 Set-up pilots and trials on selected technologies

10 INTERNATIONAL WATERS

10.1 BACKGROUND

Kenya shares some surface and ground water resources with neighbouring countries which affects how these waters are managed.

The major water bodies which Kenya shares with neighbouring countries include the following:-

Water body	Countries
Lake Victoria	Uganda and Tanzania
Lake Natron	Tanzania
Lake Turkana	Ethiopia
Various seasonal rivers	Neighbouring countries

At the international level, the Lake Victoria Tripartite Agreement set the stage for the Lake Victoria Environmental Management Program (LVEMP) and the Nile Basin Initiative provides the basis for cooperation of all riparian countries in the development of the water resources of the Nile Basin. The emphasis is towards the need for equitable sharing of benefits, the sustainability of resources, the need to build trust and co-operation between riparian countries and the need for protection of resources. As a result of these initiatives, there are great opportunities to significantly improve the management of shared water resources.

It is essential for Kenya to strengthen its capacity to negotiate and manage international sharing and management issues.

10.2 PROBLEM STATEMENT

There are no ratified international agreements or treaties on shared inland waters.

10.3 POLICY DIRECTION

Examine the requirements of international treaties on shared water resources and adopt those that are appropriate to our country's conditions and needs. Explore ways of participating in the formulation of international treaties and conventions in regard to inland waters.

10.4 GOAL AND STRATEGIES

10.4.1 Goal

Establishment of collaboration and co-operation mechanisms allowing for catchment wide approaches in management of international water resources to the benefit of all riparian countries.

10.4.2 Strategies

1 Improve collaborative IWRM by incorporating interests of trans-national stakeholders.
2 Establish national institutional framework to address international waters.
3 Integrate relevant international conventions and treaties governing the management and administration of international waters into national legislation and policy.

10.4.3 Main Activities

1 Create a forum for collaboration and coordination on international water resources management issues.
2 Review domestic legislation related to international waters.
3 Set-up new or enhance existing national institution to coordinate activities related to international waters
4 Sign, ratify and comply with international conventions and treaties as appropriate.

SECTION III WATER UTILISATION AND APPORTIONMENT

11 WATER FOR OVERALL UTILISATION

11.1 BACKGROUND

The National Master Plan indicates that water demand for essential uses (domestic, industrial, irrigation, livestock, wildlife and hydropower) will increase significantly from 2,073 MCM/Year in the year 1990 to 5,817 MCM/year in the year 2010. This will take up an estimated 15% of available resources. Only 12.6% of gross run-off in river can be obtained without regulation works in rivers such as dams and reservoirs.

Currently demands in all sectors are not being met. Until recently the emphasis has been on the provision of water supplies and water resources management has been neglected. The levels of storage for urban and rural requirements is very low with poor operation and maintenance, and assets are being increasingly depleted due to siltation as a result of catchment degradation. Shortage of resources and lack of control of water use is resulting in conflicts between users. In order to meet the present and the future demands for water and to promote the country's development, systematic Integrated Water Resources Management is required.

Urban and rural water utilities, irrigation supply and hydropower generation companies are facing a range of management problems including huge inefficiencies in the systems due to large unaccounted for water, leakage, outdated technologies, poor design, illegal connections and theft. Individual allocation decisions are not made within a sustainable framework that take account of climate, flow, variability, regional economic planning and environmental protection. The long and ineffective process for issuing permits has led to increased lawlessness in water abstraction. In areas of heavy water use such as the Ewaso N'giro North catchment, it is accepted that "illegal" abstractions amount to some 90% of the total abstractions.

It is crucial that utilization and allocation of water be determined in each catchment and sub-catchment, together with the water requirements for maintaining required resources protection, on an equitable basis to meet economic and social requirements.

11.2 PROBLEM STATEMENT

In summary of the problems mentioned above, the following factors have direct impact on water demands utilisation:

- Low water supply and water resource development,
- Very low level of storage for urban and rural, irrigation and livestock supply, continuing deterioration of existing water resources management infrastructure
- Weak allocation and management of surface and ground water leading to lack of control over the behavior of users resulting in severe water allocation conflicts
- Lack of management of demand and a prevailing view that all demands can be met through supplying water in sufficient quantities - the supply-driven approach. This is not achievable or sustainable.
- Inefficiency in water usage.

11.3 POLICY DIRECTION

In order to meet the present and future demands for water and to promote the country's development, systematic, efficient and sustainable management of water resources, cutting across all sectors and regions, will be the underlying principle of removing availability of water as a constraint to sustainable development.

11.4 GOAL AND STRATEGY

11.4.1 Goal

Economic and social development objectives will be met through sustainable management of water resources including their proper allocation, development and protection and through increased efficiency of water use.

11.4.2 Strategies:

1 Develop a National Water Resources Management Master Plan
2 Develop equitable utilization and allocation criteria of all users for each catchment to meet economic and social requirements

11.4.3 Main Activities

1 Establish current status of water abstraction in terms of purpose of use in each catchment.
2 Review the National Water Master Plan water requirements
3 Develop and implement National Water Resources Management and allocation Master Plan
4 Design comprehensive operational plans for harmonizing abstraction records.
5 Develop and implement a plan to monitor water allocation and abstraction.
6 Review and update National Water Master Plan

12 WATER FOR DOMESTIC AND PUBLIC PURPOSES

12.1 BACKGROUND

The water requirements for domestic purposes includes provision of water for household and sanitary purposes, watering and dipping of stock, for public purposes to municipalities, townships, villages, communities and small industries, and for all reasonable demands for public undertakings but not involving the use of water for generation of power or major irrigation and industrial use.

The function of providing water supplies is addressed under a separate national strategy – Water Supply and Sanitation Strategy. The concern of this strategy document is the management of resources so that water is available to meet the needs of the country's domestic and public purposes.

The present level of formal supply coverage is 70% for an urban population of 7.5 million and 46% of a rural population of 23.7 million. Many urban and rural centers that are supplied with piped water have unaccounted for losses of up to 50% of the supply. A combination of inadequate water resources management, especially in conservation, and poor management of supply functions has led to water shortages in most utilities. Even under average rainfall years, Nairobi faces shortages in piped supply and Mombasa and the coastal region face chronic shortages. During periods of drought most urban and rural water supply become irregular with resulting negative impacts on the economy.

The Water Supply and Sanitation Strategy, which has already been prepared, provides the details of how services are to be provided, on the assumption that adequate water will be available from the country's water resources.

The WSS strategy makes an estimate of the water demand as summarized in Table 12.1 below. The total population served is estimated to increase to 37 million in 2010. Urban water supply schemes will serve 11 million people, while 15 million and 11 million people will be serviced by large and small-scale rural water supply schemes respectively.

Table 12.1 Estimated Water Demand

Category	Demand (1,000 m^3/day)	
	1995	**2010**
Residential urban	747.8	1,642.8
Residential rural	468.2	932.6
Sub-Total	**1,216.0**	**2,575.4**
Non-residential, health facilities, schools, industry and commerce	593.9	986.3
Total	**1,809.9**	**3,561.7**
Livestock water	376.6	621.4
Grand Total	**2,186.6**	**4,183.2**

The WSS strategy established the need for further supply development to meet the projected demands. This is provided in Table 12.2 below.

Table 12.2 Summary of the Water Sources Development Plan

Scheme	Deficit 2010	Proposed water Resource development (1,000 m3/day)				
		Surface	Ground	Ground and surface		Total
				Surface	Ground	
Urban	1,112	1,046	42	20	4	1,112
Rural large	36	35	1	0	0	36
Rural small	218	4	84	94	36	218
Total	1,366	1,085	127	114	40	1,366

To meet these projected demands it is critical that efficient and effective water resources management be put in place. Mechanisms must be developed to minimise water losses through leakage by ensuring that all water abstracted form the sources are accounted and paid for. Water storage facilities, especially in the high demand areas of Nairobi and Mombasa must be increased to meet the demands.

12.2 PROBLEM STATEMENT

Due to low levels of investment and inadequate management of existing infrastructure, large parts of the country in both rural and urban areas, are

faced with water insecurity in relation to domestic and public supplies. Shortages within areas which are covered by development are partly caused by poor leakage management and inadequate storage facilities.

12.3 POLICY DIRECTION

The government intends creating a framework for improving health, social and economic well being of the populace, by ensuring equitable provision of adequate water to all competing users at affordable cost, on a sustainable basis.

12.4 GOAL AND STRATEGIES

12.4.1 Goal

To ensure that provision is made for basic needs and that there is security of water services in terms of both quality and quantity, so as to ensure the maintenance of public health.

12.4.2 Strategy

1 Maintain adequate water resources, through sustainable water resources management, to meet the domestic demands
2 Ensure implementation of activities in earlier sections for develop of mechanisms and levies to account for all actual volumetric abstractions, environment, conservation, pollution and catchment management.

12.4.3 Activities

1 Undertake a rapid assessment of the water resources required to meet the domestic needs of people in key urban and rural locations, and prepare a plan of action to ensure water security for at least basic needs.
2 Cross check implementation of activities in earlier sections for develop of mechanisms and levies to account for all actual volumetric abstractions, environment, conservation, pollution and catchment management.

13 WATER FOR INDUSTRY

13.1 BACKGROUND

Water is vital for industrial development as it is a major input in industrial production and is also used for dilution of harmful effluents. The water demand for industries, apart from water for the agriculture industries, is included as part of the domestic demand, discussed in the previous Chapter. Thus the issues raised, on the need for sustainable conservation and effective demand management under the domestic water Chapter, are also applicable here.

A common issue among all industries is that of effluents discharge and pollution to the water resources and the environment.

Most agro-based industries are located outside the major urban centers and near watercourses into which they often discharge their effluent directly. Such industries include coffee pulping and fermenting, sugar cane milling, sisal fibre processing, pulp and paper mill, tanneries, textile mills, canneries, vegetable oil extraction, food processing, etc. The urban-based industries which have a big reliance on water include tanneries, textile mills, breweries, creameries, paper recycling mills, chemical processing factories (paints, pharmaceuticals, plastics, soaps, detergents, glass, etc.), slaughterhouses, soft drink industries, engineering and Metal fabrication, and various other small-scale industries.

Currently industrial use of water does not take into account the true environmental and economical cost of water. There is a lack of adequate data on the amount of water used by industries in Kenya and the amounts of effluent discharges, whether treated or untreated. The challenges facing the water sub-sector in the context of industrialization relate to the need for effective water demand management, improved efficiency of use, effective conservation measures, realistic pricing and prevention of industrial pollution of water resources and the environment.

It will be necessary to carry out Environmental Impact Assessment (EIA) on all new industrial projects before they are implemented. These considerations should be given special emphasis in Nairobi, Mombasa, Nakuru, Machakos and Thika. For existing industries, it is recommended that self-environmental audits be carried out on a yearly basis.

13.2 PROBLEM STATEMENT

Water for industry is inadequate. Shortages are due to poor management of such factors as leakage and inadequate investment in storage and conveyance infrastructure.

The problem of effluent discharge, as stated in the Chapter of Pollution, is lack of adequate regulation and enforcement.

13.3 POLICY DIRECTION

It is the government's policy to transform Kenya into an industrialised country by the year 2010. To realise this goal it is necessary to introduce sustainable water resources management in order to provide water of adequate quality and quantity to meet industrial demand. Industrial development should not be at the expense of the people and the environment.

13.4 GOAL AND STRATEGIES

13.4.1 Goal

Ensure availability of adequate water for industrial development through sustainable water resources management.

13.4.2 Strategies

1. Facilitate availability of water resources for industrial uses through sustainable water resources management.
2. Require industries to develop and implement environmental management systems which take into account the impact of industries on the country's water resources.

13.4.3 Main Activities

1. Encourage industries to develop own water sources in terms abstraction and water quality control permits.
2. Develop code of practice for efficient water use and cleaner production technologies

14 AGRICULTURE

14.1 BACKGROUND

Agriculture has been the mainstay of the country's economy since independence and constitutes the source of livelihood for most Kenyans. Agriculture contributes 29% of Kenya's GDP and, up to 1999, about 80% of Kenya's population were employed in the sector. Agriculture is predominantly rain-fed and is concentrated in the narrow middle 33% of the country, which is categorized as high to medium potential for agricultural purposes. The remaining 67% of the country, is arid and semi-arid (ASAL), and is categorized as having low potential for agricultural purposes. These areas are predominantly used for livestock development and wildlife conservation. In view of the large land area of the country with low moisture content, Kenya's agricultural potential can only be exploited effectively through irrigation development. Current estimates indicate that there exists a potential for irrigation of 540,000 Hectares. Over the years availability of high potential agricultural land has declined with the growth of population and the expansion of competing uses for high potential lands, such as forestry, wildlife conservation and urban development, among others.

As at 1999 there was only 1.5 % of the cultivated area (or about 82,000 ha) under irrigation, which is about 14 % of the potentially irrigable area (540,000 ha). Private farmers cultivate 40 % of irrigated land for horticulture and export crops, and smallholder farmers and government managed schemes cultivate 42 % and 18 % of the irrigated land, respectively, for food crops and vegetables. In general, irrigation efficiencies are low and there is room for improving the efficiencies through technology and policies that encourage and mandate conservation. There is a growing demand for horticulture and floriculture products, which is generating much needed foreign exchange. The main constraints to the development of the full potential of irrigation agriculture especially among the small scale farmers include low yields per hectare, lack of proper support systems; outdated technologies; lack of incentives; lack of clear strategies; and the current inappropriate and ineffective institutional framework.

Irrigation water accounts for 76 % of total water use and is thus the highest user. Improved management of agricultural water will therefore result in the highest gains in water conservation. The growing demand for horticulture and floriculture products is introducing rapid changes in water use patterns and at the same time is encouraging use of technologies with improved water use efficiencies. The estimated water demand for agricultural use is 389,000 m3/day (year 2000) and is projected to be 465,000 m3/day by the year 2010. It is clear therefore that irrigated agriculture has not been developed to its full potential in Kenya. The poor water allocation process and inadequate control of fertilizer and pesticide uses is having a significant impact on the use and quality of water resources.

Public institutions have not been successful in implementing irrigation projects as they have faced considerable management problems. The implementation of the Kenya Rural Development Strategy will need to address reforms in irrigation institutions and consider sustainable water management practices related to irrigated and rain-fed agriculture.

14.2 PROBLEM STATEMENT

Most agricultural activities, both rain-fed and irrigation dependant, are concentrated within the high potential areas which is a small proportion of the overall area which may be put under irrigation. The effect of this is over-demand on available water resources, especially without efficient resources management. This also limits increases in production capacity. Developing irrigation projects in the large arid and semi-arid areas of the country is expensive and will be out of reach of small scale farmers. The government will need to make funds available for the development of such areas or encourage private sector involvement. The current poor state of infrastructure in these areas does not give enough incentive for private sector to venture to such areas.

In some areas there is use of inefficient irrigation practices and inappropriate technology leading to excessive water wastage and which combined with ineffective water resources management has led to shortages which then lead to conflict among competing users.

There is lack of adequate technical support in efficient production and marketing from the government to the small scale farmers.

There is a problem with effluent discharges as discussed in the previous Chapters.

14.3 POLICY DIRECTION

The Government's policy objective is to develop the potential of irrigated agriculture in order to strengthen the country's overall agricultural performance, and increase the productivity in the sector through sustainable water resources management.

14.4 GOAL AND STRATEGIES

14.4.1 Goal

Attainment of food-security, increased real income of farmers, enhanced livestock production, increased irrigation production and ability to withstand drought.

14.4.2 Strategies

1. Formulate water resources management plans that will meet the present and future water demand for agricultural sector in a sustainable way.
2. Expand irrigation farming to other areas outside of the high potential area.
3. Strengthen the agricultural sector institutions capacities for provision of support to small scale farmers for efficiency in water use, production and marketing.

14.4.3 Main Activities

1. Review the National Water Master Plan data on irrigation demand and prioritise schemes for rehabilitation and implementation
2. Rehabilitate priority irrigation schemes
3. Implement new irrigation schemes
4. Provide watering points in nomadic pasturage in arid lands.
5. Undertake training of staff categories such as extension officers in water-wise farming practices.

15 WATER FOR ENERGY

15.1 BACKGROUND

Hydropower plays a dominant role in the supply of electricity and contributes over 70 % of the average consumption of 127 Kwh per capita. Kenya imports about 18 % of its electrical power from Uganda. Much of the local hydropower is generated from the Tana River and from Turkwel Dam. Electrification reaches only 7-9 % of the population and demand for power is increasing at the rate of 6 % per year, while development of supply lags behind, impacting negatively on urban and industrial development. The recent drought worsened the situation and energy supply from hydropower generation was reduced significantly and power outages became common. The reliance on hydroelectricity to continue to meet Kenya's electricity needs is likely to remain heavy due to the unavailability of hydrocarbon energy resources.

In Kenya, water projects in general and hydropower projects in particular, have been adversely affected by poor resources management. Catchment degradation has adversely affected energy generation. The drought and consequent water and power shortages that occurred in 2000 served to underscore the extent of the crisis in this sector. At the same time they have strengthened the Government's resolve to put in place the necessary measures needed to transform the energy sector into one that can support and service an industrial economy by the year 2020. The completion of the Sondu Miriu project is currently facing serious opposition due to inadequate mitigation of environmental and social concerns.

Even though there is additional potential for developing new hydropower facilities on the Tana and other rivers, harnessing the potential will require a serious shift in policy and action on the ground.

15.2 PROBLEM STATEMENT

Overall, Kenya's current energy production and consumption are well below the levels needed to support not only a satisfactory standard of living, but also the country's vision of an industrial economy by the year 2020.

Ineffective water resources management and failure to address environmental and social concerns have led to reduction in production capacities of the current investments and oppositions to new hydroelectricity developments respectively, resulting in shortfalls in supplies.

15.3 POLICY DIRECTION

The government's policy is to meet present and future hydroelectric and geothermal power demands by addressing the competing water needs of the other sectors, the fuel-wood challenges and implications of deforestation, and incorporate measures to protect and manage catchments in order to ensure the sustainability of existing and future infrastructure.

15.4 GOALS AND STRATEGIES

15.4.1 Goal

Sustainable use of resources to provide increased hydro power to meet the increased national power demand.

15.4.2 Strategies:

1. Formulate hydroelectricity development plans to meet current and future demands in conjunction with other uses, through sustainable water resources management.

15.4.3 Main Activities

1. Carry out feasibility study on hydroelectric potential developments in all catchments.
2. Implement feasible and viable schemes to meet demands.

SECTION IV LEGAL, INSTITUTIONAL FRAMEWORK AND FINANCING MECHANISMS

16 LEGISLATION, REGULATION AND ENFORCEMENT

16.1 BACKGROUND

Legislation is the legal instrument required to enable the implementation of policy and create the *enabling environment for effective water resources* management. Until recently, water was generally considered to be in relative abundance in Kenya, but this perception is changing and there is growing realization about the limitations of in-country freshwater and of trans-boundary resources as well as the low level of water resources development. Harnessing available resources for the beneficial use of the Kenyan people requires careful control. This can be effected through legislation, as the major objective of water law is to establish a framework for the protection and control of water resources in the country. Appropriate water resource management will require appropriate and adequate legislation and a mechanism for it to be enforced.

The major current legislation relating to the development and management of water resources are:

(a) The Water Act, to be amended in 2001, which is the primary legislative basis for water resources management
(b) The Environmental Management Act, which is the primary legislative basis for managing water pollution
(c) The Forestry Act, the primary legislative basis for protecting and managing watersheds.
(d) Tana and Athi River Development Authority Act
(e) Kerio Valley Development Authority Act
(f) Lake Victoria Valley Development Act
(g) Ewaso N'giro Basin Development Act
(h) Coastal Development Authority Act
(i) National Environmental Management Act
(j) Relevant sector policies for agriculture, energy, trade, industries etc.

A review of these laws and other related laws will be conducted during the initial stages of the IWRMS. The draft water bill has been circulated for comments before being published and tabled in parliament for enactment. The draft Bill is of a framework nature and details will be provided for in the promulgation of regulations. Possible amendments to the Water Act arising from institutional changes recommended under the IWRMS will be elaborated during the initial stages of the IWRMS implementation. It is proposed that the IWRMS promote necessary amendments of the Water Act to support the process of institutional and operational changes. The Bill will be harmonised with the policy and legislation of other related sectors.

16.2 PROBLEM STATEMENT

The Water Act (Cap372) is relatively comprehensive in defining the main actors, their roles and responsibilities and the determination, allocation, utilization and protection of the resource. However the main shortfall has been in its implementation and enforcement. Some institutions provided for in the Act have not been created and those which have are very weak, lack funding and are wholly dependant on the Department for their operation and facilitation. It has been observed that some of these statutes have not been able to provide sufficient support for the proper management of water resources. Other weaknesses include:

- The penalties provided for in the Act have been overtaken by inflation and are not a deterrent to offenders.
- There is conflict between the Water Act and the other statutes that have relevance for the sector, such as the various acts creating the River and Lake Catchment Development Authorities and the various other statutory provisions.
- There is inadequate legislative framework and enforcement capability

16.3 POLICY DIRECTION

The government is intent upon the establishment of a comprehensive and enabling legal environment for the proper utilisation, development and protection of the county's scarce water resources.

16.4 GOAL AND STRATEGIES

16.4.1 Goal

Responsive and effective legislation for management, conservation, control, apportionment and sustainable use of Kenya's water resources.

16.4.2 Strategies:

1. Enact and implement the Water Resource

Management Act in harmony with other related policies and legislation.

16.4.3 Activities

1 Finalise drafting of amendment Bill to the Act (CAP 372)
2 Publish the Bill
3 Send the bill to parliament for enactment

17 INSTITUTIONAL FRAMEWORK

17.1 BACKGROUND

There are many organizations involved in water resource management in the country. These organizations include the Ministry in charge of water affairs, other Government Ministries, State Corporations, Local Authorities etc. These organizations have not been very successful in the management of water resources due to institutional weaknesses including poor organizational structure, non-existence of certain institutions, conflicting or overlapping functions and responsibilities, bureaucracy, inadequate funds, lack of skilled personnel and shortage of essential facilities.

The main functions performed by the various institutions are summarized in Appendix 1.

Within the Ministry of Environment and Natural Resources, there are the following offices and roles

- The Director of Water Development. Is the technical body of the Government on all matters concerning water resources represented by Provincial and District Water Offices (PWO and DWO respectively).
- The National Water Apportionment Board (WAB). - issuing all water authorizations and permits. The Chief Technical Advisor of the Water Apportionment Board is the Director of Water Development.
- The Water Catchment Boards.- The Boards consider the applications for water exploitation for each Catchment and recommend them to the Water Apportionment Board.
- The District Water Boards, a Sub-Committee of the District Development Committee (DDC).- management of water at the district levels in accordance with the District Focus for Rural Development.

17.2 PROBLEM STATEMENT

The main problems in the integrated water resources sector are attributable to institutional weakness caused by: lack of clear allocation of responsibilities aggravated by limited national economic growth; poor organizational structures; lack of autonomy and unclear definition of roles. Other weaknesses include:

- Poor coordination between sector institutions leading to wastage of resources and duplication of efforts
- Inadequate logistical and institutional capacity for effective maintenance, material supply and cost recovery to sustain resources management.
- At the catchment level, the present water catchment boards have low capacity and are for this reason ineffective.
- The Catchment Boards have no autonomy and lack financial resources.
- Catchment Boards do not possess powers of enforcement even though they have clear mandate.
- There is no link between the government, the private sector and other stakeholders (NGOs Churches etc.)

17.3 POLICY DIRECTION

The policy of the government with respect to institutional arrangements as regards water resources management is to decentralise water resources management adopting three water resources management levels: National, Catchment and Sub-Catchment/Catchment levels, and establishing and or strengthening appropriate institutions, clearly defining the role of each and how they relate to each other.

A Water Resources Management Authority (WRMA) will be established with overall responsibility for water resources management.

The government will have a diminishing role in direct activities of water resources management and will seek participation of the private sector and other stakeholders including NGOs, churches, communities etc. A key role of the emerging institutions will be to ensure that levies and fee levels are sufficient to sustain their operations.

17.4 GOAL, STRATEGIES AND ACTIVITIES

17.4.1 Goal

Enhanced performance of all actors as provided for in law in a decentralized water resources management system, whose management approach incorpo-

rates checks and balances, decentralized management and well defined linkages.

17.4.2 Strategies

1. Develop an appropriate and effective institutional framework with clear responsibilities for actors.
2. Set catchments as the proper units for meaningful and effective IWRM management systems.

17.4.3 Activities

1. Enact the new Water Bill which makes provision for the establishment of the proposed institutions
2. Set up the inter-ministerial committee to operationalise the Water Resources Management Authority
3. Restructure the functions and activities of the Ministry according with new roles
4. Establish Catchments boards
5. Detailed mapping of catchments
6. Human resource redeployment and development
7. Undertake affirmative action to ensure that women are represented at all levels in IWRM
8. Identify and map out vital water catchment areas and initiate action for the Gazettement for protection purposes.

17.5 PROPOSED INSTITUTIONAL ARRANGEMENT

17.5.1 Principles

The policy proposes a redefinition of the roles of the various actors which will be accompanied by institutional reforms that promote an integrated approach, including changes in procedures, attitudes and behaviour, and ensuring gender balance in participation at all levels in sector institutions. The proposed institutional reforms will be guided by the following principles:

a) Decentralisation- the decision making and operations are being decentralised from the national level to the catchment level to increase efficiency and effectiveness
b) Devolution of responsibilities for water resources management to the Water Resources Management Authority, Catchment Boards, communities and other actors.
c) The inclusion of stakeholders and users in advisory and decision-making capacities wherever possible
d) "No responsibility without authority"- all actors will have clearly defined roles and will have delegated authority when performing their defined roles
e) Avoid conflict of interest - institutions and authorities should not at the same time be both "referee and player" - Separation of policy, implementation functions within the water resources management sector.
f) Clarity of mandate - Avoid duplication of functions and confusion of competencies
g) Human resource redeployment and development leading to more effective institutions. Redeployment of existing staff to the proposed institutions will be supported by performance based incentive schemes, promotional policies and competitive salaries and benefits. This is aimed at ensuring the availability of sufficient numbers of qualified staff of all disciplines required by the sector.

The proposed Institutional framework involves a range of agencies the main ones being the Minister in charge of water, a Water Resources Management Authority, Catchment Boards and Water Appeals Board. The institutional framework is illustrated below, while Appendix 2 provides the roles for the various actors in the institutional framework. The WRMA will be a lean, but an effective agency comprising of highly skilled and motivated staff. Its staff will be selected on a competitive basis that will consider qualification, skill, experience and motivation.

The control of every body of water, which is vested in the State, is exercisable by the Minister. The right to use water is vested in the Minister. The Minister also promotes the investigation, conservation and proper use of the water resources. The

Following designation of catchment areas, and where applicable sub-catchment areas, the Authority shall devolve its powers and functions to the catchment and sub-catchment wherever practicable. Catchment board members will predominantly

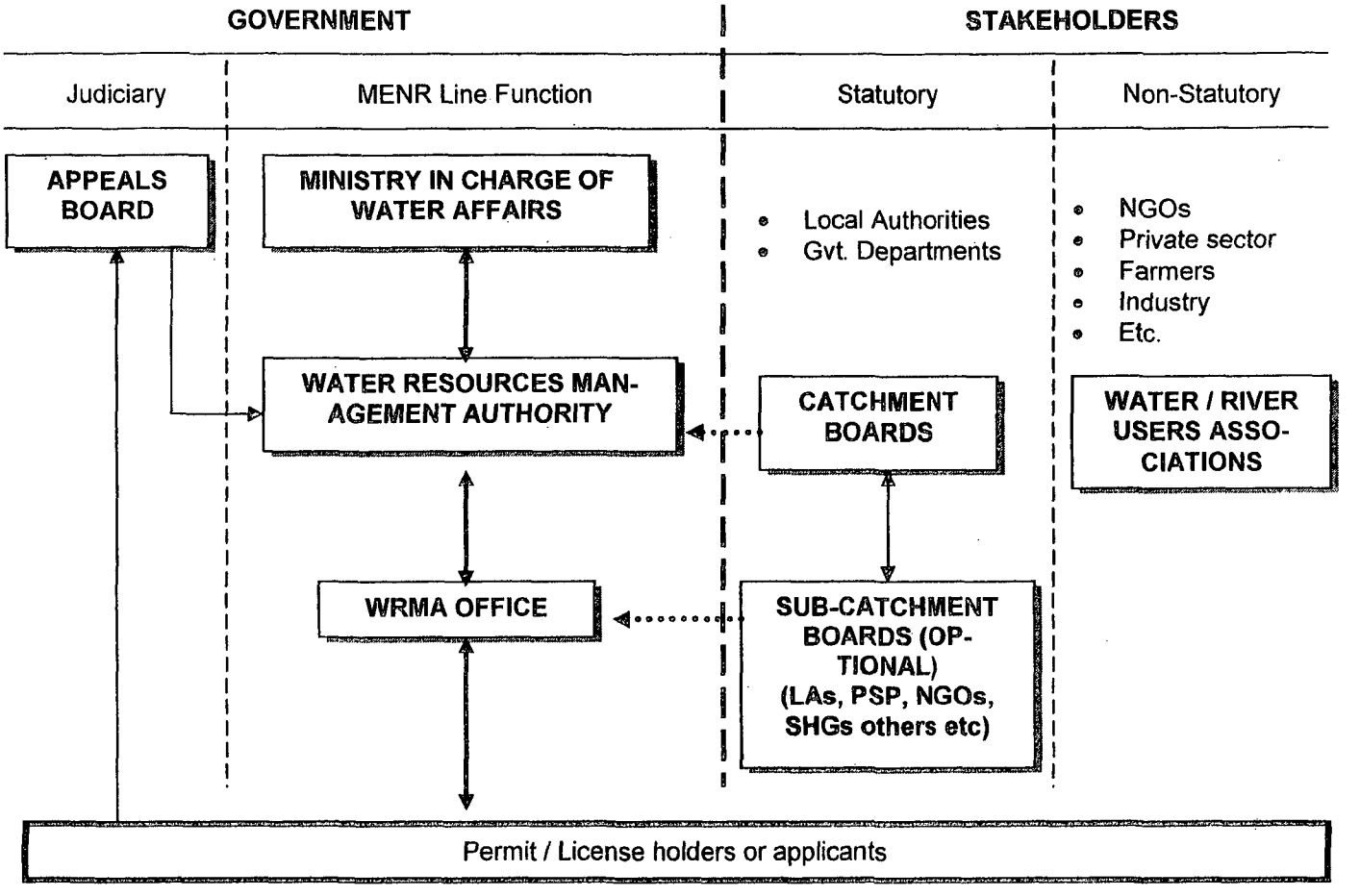


Diagram: Institutional arrangements

Minister will establish and periodically review the National Water Resources Management Strategy (NWRMS). The other roles and powers of the Minister include the prescription of a system for classifying water resources, determining the reserve for all or part of that water resources and licensing borehole and dam contractors. The Minister will also be responsible for establishing a monitoring and information system on water resources and he will also set up a Water Resources Trust Fund.

Water Resources Management Authority (WRMA) is the lead agency in all water resources matters. It is a corporate body being able to sue and be sued. The Authority shall be exercised and performed under the direction of a governing board which shall consist of a chairman to be appointed by the President while the Minister will appoint the members of the Board. The Authority shall advise the Minister concerning any matter in connection with water resources.

comprise of water users from the catchment and few other members. The Authority will facilitate the activities of the Catchment and Sub-Catchment Boards by making available secretariat services and logistical and administrative support. The Authority will also pay to members of the Catchment and Sub-Catchment Boards reimbursable expenses for sittings, traveling expenses and other out of pocket expenses.

The Authority will prescribe the purposes for which permits may be granted and the priority to be given to such purpose. The Authority will receive applications for permits and must process the applications within six months. The permits will be subject to EIA and meet requirements of Environmental Management and Conservation ACT 1999.

The Authority will prescribe the procedures for making and consideration of applications for permits, issue permits and determine efficiency of utilisation. In addition the Authority will decide on

utilization levels or to limitation of supply owing to abnormal conditions.

The Authority will receive proposals from community and any association other than appointed under takers, for better storage, distribution and utilization of water resources in any particular area and will vary, cancel or amend permits. The Authority will establish a catchment Management strategy, prescribe standards, management practices guidelines and codes of conduct and establish Mechanisms, systems and procedures for data gathering, analysis and dissemination.

The Authority will establish and maintain a register of water use permits, establish charges for use of water, approve the cancellation, variation of a public or urban Project and receive notices of abandonment from operators who have ceased to utilize the water in accordance with the terms of the licence.

The Authority may establish physical offices in the Catchments/Sub-catchments as necessary to facilitate its operations.

The Governing Board of the Authority will appoint its Chief Executive Officer following consultation with the Minister. The chief executive will be the principal officer of the Board responsible for day to day Management of the Authority.

The Authority will be responsible for keeping of all fees and levies from water users in all the Catchments.

Catchment Board is a board for each catchment or sub-catchment appointed by the Authority. The Board shall be not have more than 15 members, most of whom will represent water user interests within the catchment. The role of the Board will be to advise the Authority on;

- Water Resources Management, conservation use and apportionment
- The granting adjustment cancellation, or alteration of any licence, sanction or permit
- any other pertinent matters

Each Board will elect its own chairman

Any water user who feels aggrieved with the decision, actions or otherwise by the Authority may make appeal to the Water Appeals Board.

The Authority will encourage and facilitate the formation and functioning of a river water users association for the resolution of conflicts and cooperative management of the water resources in the Catchments. Such associations will be voluntary.

18 FINANCIAL MECHANISMS

18.1 BACKGROUND

Immediately after independence the Government decided that provision of water was to be promoted. It, therefore, committed itself wholly to the provision of water supply services so as to ensure that water scarcity does not become a constraint to the country's development. Resources therefore were made available to the service sub-sector and the needs of integrated water resources management were overlooked. Financial resources for development and management of the water resources have been declining due to decreases in donor funding, inadequate and declining development budget allocation by the Central Government and increasing development costs.

To bridge the financing gap, the Government is seeking to bring in more actors as outlined in the National Water Policy. Along with efforts to interest official development partners in funding the sector, attention is also being directed at involving the private sector in water resources management. This requires the introduction of appropriate incentives together with enabling policies such as flexibility in tariff setting. None of the policies or activities will be possible if not adequately financed. Finance needs to be sourced from public revenue, those who benefit directly from services (permit holders etc.) and those whose actions are a cost to the government and the broad community (e.g. polluters).

It is unlikely that institutions such as the Authority will be able to be self sufficient in financing. It is critical that revenue earning activities are 'ring-fenced' so that income derived from specific sources such as the permitting of agricultural water use is used in water resources management activities (e.g. catchment protection) which have a tangible benefit for those who are paying for the services, without which the revenues will be seen as an unrelated form of taxation and resisted. Corruption in the water sector must be addressed at all levels if any success is to be achieved.

18.2 PROBLEM STATEMENT

In the past, the water sector has relied heavily on the exchequer for financing. However, over the years, with declining resources, the sector has suffered from inadequate funding. Water has also not been recognized and considered as an economic good hence consumers have been paying for are treatment and delivery services only. Consequently, the sector has not been able to meet its obligation in conservation, monitoring, protection

and exploration of water resources thereby constraining IWRM activities.

Problems that have affected the sector include the following:

- Currently MENR apply very low level of levies and fees which are unsustainable
- Lack of autonomy to collect funds specifically for water resources management.
- Bureaucratic procedures limit the ability to respond in timely manner to operational and developmental requirements.
- Low billing and collection resulting from poor incentives, lack of facilities and failure to supply the existing management with modern management systems
- Use of inappropriate technology has resulted in higher unit water costs, which are not covered by the tariff structures.
- Overall weak revenue base

18.3 POLICY DIRECTION

The Sessional Paper No. 1 of 1999 on National Policy on Water Resources Management states that, "Water abstraction in its natural form will be charged a fee commensurate with the amount of water abstracted and the funds so generated will be used for the assessing, monitoring, conservation and management of water resources and related research."

The WRMA will put in place the necessary mechanisms to mobilize local financial resources for integrated water resources management in addition to soliciting for external funding to complement where necessary, must be put in place. Income raised through water related tariffs and levies will be 'ring-fenced' to be used in water resource management activities only.

18.4 GOAL AND STRATEGIES

18.4.1 Goal

Efficient, effective and sustainable financing mechanism.

18.4.2 Strategies

1. Devise a sector financing system to support IWRM activities.
2. Implement the polluter-pays-principle.
3. Create attraction for private sector involvement

18.4.3 Activities

1. Seek for increased disbursement of funds by GOK towards IWRM activities
2. Create a water resources management fund
3. Prepare project proposals that development partners can support
4. Gazette water user charges covering social and economic aspects
5. Carry out comprehensive collection of water charges and professional fees.
6. Review IWRM data pricing and promote data sales
7. Institute effluent discharge levy
8. Introduce appropriate incentives together with enabling policies such as flexibility in tariff setting to attract PSP
9. Provide risk uncertainty mechanisms for PSP investments for water works for WRM through adequate insurance

SECTION V CAPACITY BUILDING

19 SECTOR HUMAN RESOURCE

19.1 BACKGROUND

Water resources management functions have not being undertaken within the Ministry in the past to the extent required by the new national strategy. Previously, most of the functions of the Ministry related to water supply.

There are a large number of issues to be addressed within the full scope of integrated water resources management and it is necessary to establish the required functions and then review existing skills and experiences to perform the required functions. After undertaking such an analysis it will be possible to determine the gaps which exist and to design a capacity building programme to "fill the gaps". In addition to filling the gaps, a long-term programme of upgrading and developing skills and experience of all levels of personnel within the Department and the Authority will need to be developed and implemented. The human resources development programme will encompass the broad process of review and support of career development in order to meet the requirements of professionals, technicians and all staff in order to attract and keep top staff in the service of the country.

As women play an important role in provision, management and safeguarding of water, particular attention will be placed on adequately incorporating and representing gender considerations in water resource management. The issue will be addressed from two perspectives; facilitating the participation and involvement of both sexes in water resource management; and the access (benefits) of both sexes in availability of water.

The organizational restructuring in public sector water management will create a powerful opportunity for a cultural shift in public administration that will free up the undoubtedly high quality human resources within government to rise to peak performance. The IWRMS will provide the basis for establishing a strong, lean and an operationally effective WRMA which will make efficient use of modern technologies.

19.2 PROBLEM STATEMENT

The water sector requires a diverse range of skills and technical expertise, however, the sector has been affected by high rate of staff turn-over to other sectors of the economy and attrition of personnel. The continued slow down in the economic performance has affected the sector , in relation to capacity building and on-the-job training programs, in that not many projects have been implemented lately thereby leading to a situation where most personnel lack 'hands on' experience.

This situation may be summarized as below;

- The poor performance of sector professionals mostly results from inability to offer competitive packages and incentives to competent managers.
- Lack of sector financing resulting from non-cost recovery activities and poor commercial management.
- Due to the changes and expanded roles, officers now lack coordination skills in relations with communities

19.3 POLICY DIRECTION

The Ministry will be required to relinquish its involvement in direct water resources management to the Authority and focus more on policy formulation and direction. There will be need for MENR staff redeployment and retraining to take up the new responsibilities.

19.4 GOAL, STRATEGIES AND ACTIVITIES

19.4.1 Goal

Efficient and productive workforce who are well trained and motivated and with adequate physical infrastructure and financial resources to undertake water resource management

19.4.2 Strategies

1 Establish the required functions and review existing skills and experience
2 Determine the gaps which exist and design a capacity building programme which will fill the gaps
3 Develop and implement a long-term programme of upgrading and developing skills and experience of all levels of personnel within MENR and the WRMA

19.4.3 Activities

1 Carryout staffing norms and job description for the new institutions
2 Carryout a survey on available skills in the MENR and other GoK departments
3 Determine training needs
4 Design a training programme
5 Carryout training
6 Establish data bases on available technical manpower in IWRM
7 Reinforcing performance appraisal based on objective assessment
8 Develop a national manpower plan for IWRM
9 Source needed capacity from private sector on short term contracts or consultancy

20 LOGISTICAL INFRASTRUCTURE

20.1 BACKGROUND

The water supply and sanitation infrastructure has expanded rapidly since independence, taking up most of the budget allocation in the water sector. This has left the water resources management infrastructure without adequate allocation. In this regard, therefore, maintenance and upkeep of facilities such as gauging stations, laboratories, surface water monitoring equipment, transport, etc. has not taken place. In most cases the facilities are run down mainly due to poor maintenance, poor managerial skills and lack of service parts.

Like in the case for human resources capacity building, it will be necessary to determine the additional requirement of logistical infrastructure from the deficit of actual requirements and what is available and useable within the MENR and other GoK departments. A programme for maintaining a serviceable logistical infrastructure for both MENR and WRMA will also need to be developed.

20.2 PROBLEM STATEMENT

- Most facilities are in need of repair, rehabilitation and replacement for the effective and efficient provision of services.
- There is inadequate networking and of spatial coverage of the infrastructure.
- The expansion of the infrastructure and networks has not been undertaken due to budget restriction.
- Modern technology and equipment are lacking.

20.3 POLICY DIRECTION ON INFRASTRUCTURE

The Sessional Paper No. 1 of 1999 on National Policy on Water Resources Management and Development states that "Funding for the procurement and establishment of water resources assessment tools will be stepped up to ensure that modern equipment is obtained."

20.4 GOAL, STRATEGIES AND ACTIVITIES

20.4.1 Goal

Adequate, well maintained, modern facilities and equipment to enable sustainable water resources management

20.4.2 Strategies

1 Establish the required logistical equipment to perform and take inventory of what is existing
2 Determine the deficit required to be filled and make a programme to procure the required equipment.
3 Develop and implement a long-term programme for maintaining adequate equipment within MENR and the WRMA

20.4.3 Activities

1 Determine the equipment requirement
2 Revitalize the existing laboratories
3 Refurbish and install IWRM facilities and equipment.
4 Develop comprehensive maintenance packages including preventive, repair and user training instructions
5 Rehabilitation of vehicles and computers
6 Provide modern communication tools and equipment

21 PRIVATE SECTOR PARTICIPATION

21.1 BACKGROUND

Historically, water resources management has been dominated by the public sector. To date, formal involvement of the private sector has been essentially limited to consultants and contractors. The inability of the public sector to provide funding for effective management of the resources calls for providing incentives for PSP in the sector.

PSP has potential for making contribution of skills and expertise, suppliers and contractors and providing private sector finances and investment in the water resources management sector especially for infrastructure.

There is a need to create the institutional, policy and legislative space and enabling environment to encourage the participation of the private sector.

21.2 PROBLEM STATEMENT

The problems which hinder effective PSP include;

- Lack of well defined regulation, criteria and guidelines for PSP entry
- Lack of public awareness on PSP role
- Poor enabling environment, political interference, and inadequate legislative provisions
- Lack of level playing field as a barrier to entry of competition (exclusivity and monopoly)
- Lack of access to finance; development financiers are unwilling to lend to PSP
- Limited capacity in, financial, technical and management in local PSP.
- Poor state of infrastructure
- Lack of encouragement by GoK for PSP

21.3 POLICY DIRECTION

The water sector policy direction as mentioned in the Sessional Paper No. 1 of 1999 which recognizes the challenge of bringing private sector on board in management of water resources. Towards this end a framework is set out to bring about a culture that will promote comprehensive water resources management and development with the private sector and community participation as prime movers.

21.4 GOAL AND STRATEGIES.

21.4.1 Goal

The goal is to encourage and provide enabling environment for PSP

21.4.2 Strategies

1. Establish joint consultative committees consisting of Government and the private sector.
2. Include, through nomination, private sector people to Boards.
3. Undertake regulatory, institutional and legal reforms to give private sector more incentives to participate fully in areas prior dominated by public sector.

22 ENGAGEMENT OF OTHER STAKEHOLDERS

22.1 BACKGROUND

The National Water Policy (NWP) foresees a situation whereby NGOs and communities will play a greater role in the water sector including water resources management. This would require that the new actors undergo capacity building in order to be sensitized and mobilized towards sustainable water resources management. This would include creating awareness in catchment protection, water abstraction, pollution control measures, etc.

NGOs and communities have been involved in water resources management activities but in most cases their efforts have not been made public. Some of the noted activities include;

- Ngare Nything / Sirgon River Water Users Association operating in the Ewaso N'giro North catchment. Confronted with water sharing arrangements that produced conflicts in dry times, and with an impotent public administration, water interests along this river got together and improved their situation.

- The sand dam project in Kitui District (supported by SASOL) is an excellent example of community based water conservation by groups of families that successfully solved their severe water shortage problem during dry seasons.

- Lake Naivasha Riparian Association has moved to create a coalition of water interests that have agreed to work together in a coordinated way to safeguard the sustainability of this very special Lake. They are doing this through the voluntary adoption of codes of practice aimed at achieving this vision of sustainability.

- The Kenya-Sweden Rural Water Supply and Sanitation Programme (KSRWSSP) has for the past year been promoting community participation in integrated water resources management on small pilot catchment basis.

22.2 PROBLEM STATEMENT

- Lack of recognition of community actors
- Lack of capacity, among communities, to provide direction for use of finances available for mobilizing, training and implementation of

WRM projects by non governmental development agencies

22.3 POLICY DIRECTION

The water sector policy direction as mentioned in the Sessional Paper No. 1 of 1999 recognizes the challenge of bringing stakeholders on board in management and provision of water. In order to ensure sustainable water resources management there is need to apply alternative management options and technologies that are participatory rather than those that are wholly recipient. These strategies will best be achieved through the participation of the community and private sector.

22.4 GOAL AND STRATEGIES.

22.4.1 Goal

Encourage and provide enabling environment for the engagement of nongovernmental stakeholders in water resources management

22.4.2 Strategies

1 Carry out a survey of all the actors /stakeholders in water resources management and publicise their activities
2 Undertake coordination, sensitization and networking of actors/stakeholders in the sector
3 Develop and implement a programme on sustainable water resources management by the actors.

SECTION VI COMMUNICATIONS AND IMPLEMENTATION

23 COMMUNICATION

23.1 BACKGROUND

Communications is a two-way activity requiring both the publication and dissemination of information related to water resources management, which informs the public of the activities of the water resources management institutions, and provides a channel for the stakeholder input into these institutions. Communications should transparently promote access to information to produce an informed and motivated public which will participate in government programmes and contribute in meeting the demands which face the country in relation to water resources management.

Communications is central to the ongoing functioning of the water resources management sector and there should be constant communications within the Ministry, between the Ministry and the proposed Authority, between both the Ministry and the Authority and other government institutions and between the water resources management institutions and the public.

Information on activities within the sector needs to be disseminated to the public and other stakeholders. Some of the recent documents on water resources and management issues which need to be published and information disseminated to the public include;

- This Draft Country Strategy on Integrated Water Resources Management which has been prepared by the Ministry of Environment and Natural Resources.
- The Water Bill which is at an advanced stage of publishing and is soon to be presented to Parliament.
- A number of missions and studies reports which have been undertaken by the World Bank to better analyse the current crises and to identify strategies to reverse the present trends.

Historically Radio and TV programmes have covered the World Water Day events just as news items but the actual message and information has not come out clearly and effectively. The issues of Water resources management have therefore taken a very low profile in national issues. There is a need to lift this profile to get some attention. This can be done through a tool of communication, the proposed National Water Campaign.

A campaign will spread the message and get everybody involved and initiate the efforts to meet the central challenge to ensure that the strategy and the new legislation are implemented without which all the work that has been done will be to no effect. It will not be possible for the government to implement the Strategy on its own and it will be necessary that every person who uses water, every industry, every farmer, public official needs to play their part. A Campaign will be the mechanism which will provide a 'Window of Opportunity' to get things done, and it is therefore very necessary to highlight the issue and create political and institutional commitment, and to generate public awareness.

23.2 PROBLEM STATEMENT

Lack of harmonization of policies and insufficient information flow to the people has led to a lack of public awareness of the problems arising from water scarcity and the need for every citizen to value and conserve water.

23.3 POLICY DIRECTION

The policy direction is towards the elevation of the profile of critical water resources management issues through harmonization of policies and enhancement of information flow to ensure public awareness. This will result in sustained national water campaign stakeholders and public participation.

23.4 GOAL AND STRATEGIES

23.4.1 Goal

Informed public who can effectively participate in the national water campaign for sustainable water resources management.

23.4.2 Strategies

1 Launch the national water campaign
2 Establish and maintain a continuous communication system in the sector

23.4.3 Activities

1 Hold a national water resources conference
2 Provide water consultative fora for policy harmonization by establishing Water Campaign Committees at national and catchment levels.

3 Develop committee action plans.
4 Collect, collate and process WRM information for public consumption.
5 Dissemination of WRM information.

24 IMPLEMENTATION

The implementation of the Strategy on water resources management will be kick started with the launching of the National Water Campaign at the national water resources management conference involving all key stakeholders. The immediate requirement for the implementation of this strategy is to broaden and strengthen political support at the highest level in order to develop operationally effective WRMA. This will be built around the policy and legal frameworks that are in place or are in the process of being legislated. To adequately address the water crisis it will require firm political will, support and commitment as well as bold and innovative actions that will, on one hand, mobilize Kenya's high-caliber professional expertise, and on the other hand harness and facilitate the desire and ability of communities and organizations to help themselves.

24.1 THE NATIONAL WATER CAMPAIGN

Key actions will need to be initiated as a basis for developing the political support and for formulating the IWRMS that will establish an operationally effective and efficient WRMA. In this connection efforts have been made to develop internal consensus and cohesion within the 3 ministries of the MENR on the water resources management agenda. The Inter-ministerial Steering Committee (IMSC) including PSs of the relevant line ministries (energy, agriculture and rural development, lands and settlement, finance and planning, trade and industries, etc.) is already in place and operational. A stakeholder workshop on the IWRM Draft Strategy Paper was held on 7 and 8 February 2002 and the outcome and conclusions have been used in the preparation of the IWRMS paper. All plans have been put in hand for the Launch conference on 22 March 2002, to coincide with the World Day of Water. The objectives of the conference, which will be officially opened by His Excellency the President, will include;

- Elevation of water resources management as a key national priority
- Sensitising senior government officials and key stakeholders on the challenges and opportunities of WRM
- Building of consensus and support from government and key stakeholders on the need and urgency of WRM reforms
- Building of consensus on the implementation of the IWRMS
- Soliciting support for the implementation of the WRM reforms

This conference will thus mark the beginning of the National Water Campaign.

24.2 PILOT CATCHMENTS

One key element of the implementation of the WRMS will be the development of specific pilot projects to support the strengthening of the catchment boards to address specific water resources management challenges such as water apportionment and catchment degradation. The pilot project or projects will be selected carefully to address priority issues and they may be identified either on the basis of ongoing projects or new priority areas. The pilots will be used to draw lessons that will be learned and replicated in other Catchments.

The following pilot catchments, to support community based water resources management, or government-community based partnership to address specific catchment management or water use conflicts, or the strengthening of catchment boards and river basin boards during the first year of the IWRMS process have been identified;

1. Upper Ewaso Nyiro
2. Upper Tana
3. Mau Complex
4. Nyando
5. Athi – Ngong River Catchment
6. Suam

Some preliminary hydrological investigations have been done on Athi – Ngong River Catchments and the Mau Complex catchment. For these catchments, on the basis of these preliminary studies, the required IWRM activities can be identified and quantified to enable early commencement of the management activities. For the other pilot catchments the preliminary hydrological investigations will need to be put in hand immediately to enable proceeding with the rest of the activity stages.

24.2 ACTION PLAN

Other key activities to be undertaken will include;

- Arranging and holding of a meeting with Parliamentary Committee on Agriculture, Water and Natural Resources
- Arranging and holding of a donor Information meeting

- Forming of a high level advisory group comprising of a multi-sectoral team, including the academia and the private sector to:

  a) Advise the MENR on the transition to the new WRMA,
  b) Assess specific training needs in financial and team management for building a cohesive team within the new WRMA,
  c) Ensure effective linkage with the NEMA, and,
  d) Guide the IWRMS process,

- Establish a National Development Plan and sector policy and strategy linkages through the preparation of water resources management chapters for the new land use policy, energy policy, Kenya Rural Development Strategy, National Development plan, and other relevant government policy fora.
- Mobilize financial support for the IWRMS.
- Initiate the various action items of the IWRMS process, including:
  a) Recruit chief executive of WRMA and necessary staff.
  b) A communications- public awareness and education- strategy
  c) Initiate studies and preparatory works for the components of the IWRMS that will support the operationalization of the WRMA

The proposed Action Plan Logical frame for the first five years is given in Appendix 3.

APPENDIX 1: CURRENT ROLES OF VARIOUS ACTORS IN THE SECTOR

ACTOR	LAW (Chapter)	ROLES
Ministry of Environment and Natural Resources (MENR)	Water Act (Cap 372)	• Policy development, direction and management of Water Resources. • Formulation of long and short term plans for National Water Resources and Conservation and Development. . • Identification, development, operation and maintenance of WR systems. • Minor irrigation and drainage systems, sewerage and other hydraulic systems.
Water Resources Authority	Water Act (Cap 372)	• To investigate the water resources of Kenya and to advise, and make recommendations to, the Minister in regard to the improvement, preservation, conservation, utilization and apportionment of such resources, and as to the provision of additional water supplies. • To carry out a survey of the existing consumption of, and demand for, water supplies, and of the water resources of Kenya. • To prepare estimates of the future water supply requirements of any area of Kenya. • To formulate proposals for meeting the existing and future water supply requirements of any area, by water undertakers, bodies or persons. • To furnish to the Minister, and by his direction to water undertakers, bodies or other persons, such information relating to water supplies or resources as is available.
Ministry of Energy; and Regional Development Authorities	Electric Power Act (Cap. 314). Kerio Valley Development Authority Act (Cap.441). Tana and Athi River Development Authority Act (Cap. 443).	• The conservation and rehabilitation of water catchment areas to ensure proper management and conservation of the environment. • The promotion of integrated planning for WR within the various river Catchments.
River Catchment	Coast Development Authority; Lake Catchment Development Authority; Ewaso Nyiro North Development Authority; and Ewaso Nyiro South Development Authority Act (Cap. 442)	• The conservation and rehabilitation of water catchment areas to ensure proper management and conservation of the environment. • The promotion of integrated planning for water resources within the various river Catchments.
Ministry of Agriculture	Agriculture Act (Cap. 318)	• Irrigation activities • Water and soil conservation activities
Ministry of Transport and Communications	Territorial Waters Act (Cap. 371). Kenya Ports Authority Act (Cap. 391). Lakes and Rivers Act (Cap. 409).	•
Ministry of Health	Public Health Act (Cap. 242). Malaria Prevention Act (Cap. 246).	• Powers dealing with water supplies, waste water, sewerage and water pollution. • Control standards of treated effluents. • Control industries liable to pollute water courses.
KEWI		• Manpower training and development for the sector.
Water Sector NGO		• Provide services. • Financing.
Religious Organizations		• Discretionary powers to provide services.
Self-help Groups and Water Associations.		• Discretionary powers to provide services. • Set by-laws and regulations.
Consultants in Water (PSP).		• Contracted in development.
Water Appeal Board		• Settle conflicts.

APPENDIX 2: PROPOSED ROLES FOR THE ACTORS IN THE INSTITUTION FRAME WORK

REF.	ACTOR	LAW (Chapter)	ROLES
1	Ministry of Environment and Natural Resources (MENR)	New Water Act	• Exercise the control of ever body of water and the right to the use • Policy formulation/strategy development. • Water quality/pollution control, standards (national, local) regulator. • Sector Coordination and financing. • Provide enabling environment for Research and training. • Appointment of Chairman and Board members of NWRA. • Establishing relevant institutions and legal framework. • To ensure compliance to the provisions of the Water Act (Cap. 372) • strategic national water resources management planning • Integration between planning in water resources management and the national macroeconomic strategy process • Periodically review the national water resources management strategy and publish in the gazette a revised strategy • Prescribe system for classification of water resources on type, location or other factors. • Determine the reserve for each water resource that has been classified
2	National Water Resources Authority (NWRA)	New Water Act	• Lead agency for management and protection of water catchments • Develop principles, guidelines and procedures for the allocation of water resources • Monitor and from time to time re-assess the WRMS • Receive and determine applications for permits for water use • Monitor and enforce conditions attached to permits for water use and institute criminal proceedings as necessary • Regulate and protect water resources quality • Manage and protect water catchments • Determine fees, levies, premiums, and other water resources charges • Gather and maintain water resources data and make periodic publications on forecasts and projections. • Advise the minister concerning any matter in connection with water resources • Liaise with other bodies for better regulation of water resources • Undertake assessment of water resources. • Policy implementation. • Appoint Catchment Boards/Sub-Catchment Boards • Facilitate activities of the boards through availing secretarial, logistical and administrative support • Pay allowances to board members • Encourage and facilitate formation and functioning of River Water Users Associations. • Planning, design, construction, and operation and maintenance of water resources management infrastructure
3	Catchment/Su-Catchment Boards.	New Water Act	• Advise the WRMA on Water Resource management, conservation use and apportionment • Advise the WRMA on the granting, adjustment, cancellation or alteration of any license sanction or permit • Advise the WRMA on any other pertinent matters. • Assisting in the enforcement of the Water Act (Cap. 372).
4	River Water Users Association		• Create for a for conflict resolution and co-operative management of water resources in the Catchment
5	Resources Users (PSP, NGO, Self-Help groups, others etc)	New Water Act	• Comply with water quality standards. • Obtain operation permit.
6	Water Appeals Board		• Receive and resolve complaints from resources users
7	Ministry of Health		• Policy formulation on Environmental Sanitation/Public Health Act; Environmental Bill (MENR).

8	Kenya Forest Service	Forest Act	• Manage forests on water catchment areas for purposes of water and soil conservation. • Advice the minister on declaration of Provisional and Local Authority forests.
9	National Environmental management Authority		• In consultation with WRMA issue guidelines for management of the environment of lakes and rivers • Develop, issue, and implement regulations, guidelines and measures for sustainable use of hill sides, hill tops, mountain areas and forests. • Establish criteria for measurement of water quality and recommend water quality standards • Recommend standards for pollution control and laboratories to provide analytical services. • Recommend effluent standards, monitor and enforce compliance of the effluent discharges standards into water courses • Receive applications for and issue EIA license

APPENDIX 3: ACTIVITIES FROM THE LOGICAL FRAMEWORK

REF.	ACTIVITY
1	Develop internal consensus and cohesion
2	Stakeholder workshop on the IWRM Draft Strategy Paper
3	Meeting with Parliamentary Committee ;Agriculture, Water & NR
4	Donor Information meeting
5	Launch of a Cabinet level National Conference on WRM
6	Form a high level multi-sectoral advisory group
7	Inter-ministerial steering committee (IMSC)
8	National development plan and sector policy and strategy linkages
9	Financial support for the IWRMS
10a	Establishment of WRMA
11	Recruit chief executive of WRMA and necessary staff.
	OTHER ACTIVITIES TO SUPPORT WRMA
	WATER RESOURCES ASSESSMENT
12	Inventory of existing data assessment and monitoring system
13	Determine upgrading and modernization requirements of system
14	Expand and rehabilitate water resources monitoring systems
15	Upgrade the technology in data collection processing
16	Establish IWRM data base. at the national, catchment levels
17	Regular publication of key WR data and information
18	Put in place coordination mechanism for access/ linkage to database
19	Establish inter-linked data bases with other institutions on IWRM
20	Establish farm onsite data collection systems
	ENVIRONMENT
21	Survey and map out of critical water bodies quality and quantity
22	Determine max. abstraction limits and minimum quality standards
23	Enforce Environ. Management and Coordination Act No. 8 of 1999.
24	Work out and restore degraded strategic environments
25	Draw environmental management and implementation plans
26	Gazette conservation area
27	Cross check implementation of relevant activities.
	WATER QUALITY AND POLLUTION CONTROL
27	Studies on the extent and effect of pollution
28	Prepare effluent standards and guidelines.
29	Develop, imp. and monitor water quality and pollution Manage. plans
30	Involve the participation of land owners in pollution control
31	Strengthen the national and provincial water testing laboratory
32	Establish accreditation mechanisms for the analytical laboratories.
33	Develop guidelines and enforce EIA on projects and land use changes
34	Capacity for management of oil-spills in the marine environment
35	Cross check implementation of related activities
	WATER CONSERVATION
36	Develop a system for volumetric monitoring of abstraction rates
37	Develop volumetric levy system to promote conservation measures
38	Develop and implement guidelines of efficient irrigation technology.
39	Cross check implementation of other related activities
	WATER CONSERVATION WORKS
40	Take inventory of all storage facilities
41	Review storage requirements
42	Rehabilitation of water conservation structures.
43	Construction of new reservoirs
44	Construction of artificial groundwater recharges facilities.
45	Cross check implementation of other related activities,
	CATCHMENT MANAGEMENT
46	Prepare a National Land Use Policy
47	National Standing Committee on water related cross-sectoral issues
48	Identify, survey, map and gazette catchment and groundwater recharge
49	Prepare Regional Physical Dev. Plans coverings Riparian areas
50	Prepare catchment management plans
51	Preserve and conserve the gazetted catchment areas

52	Strengthen the monitoring and enforcement systems of catchments
53	Rehabilitate the degraded catchment areas
54	Provide control on private land , non gazetted forests etc.
55	National conference specifically on catchment management
56	Develop co-operative structures at appropriate levels
57	Involve communities, LAs, other stakeholders, in catchment protection
58	Research programme on causes, protection and rehabilitation methods
59	Training programme for extension officers in catchment conservation
60	Review and reintroduce traditional conservation methods
61	Cross check implementation of other related activities
	DISASTER MANAGEMENT
62	Cross check implementation of related activities
	Community sensitization, mobilization and resettlement
63	Identify and map the flood, drought and landslides prone areas
64	Rehabilitate construction disaster prevention structures
65	Establish and operationalize early warning systems
66	Sensitize public on various insurance coverage available
67	Determine training needs and train on water disaster management
68	Provide equipment and facilities for flood management
69	Allocation of funds by the exchequer.
70	Establish emergency centres e.g. search and rescue
71	Provide essential basic needs
72	Undertake inter/intra Catchment water transfer
73	Encourage resettlement away from disaster areas
74	Undertake restoration of original waterways
	RESEARCH AND APPLIED TECHNOLOGY
75	Determine research needs
76	Develop a comprehensive national research programme
77	Study on the capacities of KEWI and Applied Water Research Branch
78	Upgrade, rationalise and establish water training and research institute
79	Modernize and update data gathering, processing, analysis, etc.
80	Setup a data base capable of networking with other research institutes
81	Set-up pilots and trials on selected technologies
	INTERNATIONAL WATERS
82	Create of a fora for collaboration and coordination
83	Legislate and domesticate laws on international waters as need arises
84	Set-up new or enhance existing institution to coordinate inter. waters
85	Sign, ratify and comply with inter. conventions and treaties
	OVERALL UTILISATION AND ALLOCATION
86	Establish current status of water abstraction in accordance to use
87	Review the National Water Master Plan water requirements
88	Develop National Water Resources Man. and allocation Master Plan
89	Implementation of the NWR management and allocation Master Plan
90	Study on the requirements of inter and intra water Catchment transfer
91	Develop inter and intra water Catchment transfer plans as necessary
92	Initiate and strengthen Catchment-wide integrated WRM programme
93	Design comprehensive operational plans to harmonizing abst. records.
94	Monitor use of abstraction operational plans.
95	Review and update National Water Master Plan
	WATER FOR DOMESTIC UTILISATION
96	Cross check implementation of relevant activities
	WATER FOR INDUSTRY
97	Encourage industries to develop own water sources
98	Cross check implementation of relevant activities
99	Develop CP for efficient use and cleaner production technologies
	WATER FOR AGRICULTURE
100	Cross check implementation of relevant activities
101	Review the National Water Master Plan data on irrigation demand
102	Rehabilitate priority irrigation schemes
103	Implement new irrigation schemes
104	Provide watering points in nomadic pasturage in arid lands.
105	Training of extension officers in water-wise farming practices.
	WATER FOR ENERGY
106	Feasibility study on hydroelectric potential developments

107	Implement feasible and viable schemes to meet demands
108	Cross check implementation of relevant activities
	LEGISLATION
109	Finalise drafting of amendment Bill to the Act (CAP 372)
110	Publish the Bill
111	Send the bill to parliament for enactment
	INSTITUTIONAL FRAMEWORK
112	Enact the Water Act
113	Set up the inter-ministerial committee to operationalise the WRMA
114	Carryout necessary studies to map out catchments
115	Human resource redeployment and development
116	Affirmative action to accommodate women representation in IWRM
117	Establish Catchments boards
118	Restructured Ministry's according with new roles
	FINANCING MECHANISM
119	Increased disbursement of funds by GOK towards IWRM activities
120	Create of a water resources management fund
121	Prepare project proposals that development partners can support
122	Gazette water user charges covering social and economic aspects
123	Comprehensive collection of water charges and professional fees
124	Review IWRM data pricing and promote data sales
125	Institute effluent discharge levy
126	Introduce appropriate incentives to attract PSP
127	Provide risk uncertainty mechanisms for PSP investments
	HUMAN RESOURCES
128	Carryout staffing norms and job description for the new institutions
129	Survey on available skills in the MENR and other GoK departments
130	Determine training needs
131	Design a training programme
132	Carryout training
133	Establish data bases on available technical manpower in IWRM
134	Reinforcing performance appraisal based on objective assessment
135	Develop a national manpower plan for IWRM
136	Source capacity from PS on short term contracts or consultancy
	LOGISTIC INFRASTRUCTURE
137	Determine the infrastructure requirement
138	Revitalize the existing laboratories
139	Refurbish and install IWRM facilities and equipment
140	Comprehensive maintenance packages
141	Rehabilitation of vehicles and computers
142	Provide modern communication tools and equipment
	PSP
143	Joint consultative committees consisting of GoK and the private sector
144	Include, through nomination, private sector people to Boards
145	Undertake regulatory, institutional and legal reforms
	OTHER STAKEHOLDERS
146	Survey of all the actors /stakeholders in WRM and publicise activities
147	Undertake coordination, sensitization and networking
148	Develop and imp. a programme on sustainable WRM by the actors
	COMMUNICATION
149	Hold the national water resources conference
150	Establish Water Campaign Committees at National and Catchments
160	Develop committee action plans.
161	Establish information dissemination network.
162	Collect, collate and process WRM information
163	Dissemination of WRM information.

APPENDIX 4: LIST OF REFERENCE DOCUMENTS

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