



REPUBLIC OF KENYA
MINISTRY OF ENVIRONMENT AND NATURAL RESOURCES
DEPARTMENT OF WATER DEVELOPMENT

**COUNTRY STRATEGY ON THE INTEGRATED WATER
RESOURCES MANAGEMENT**

DRAFT PAPER

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

**VISION STATEMENT: "ASSURED WATER RESOURCES FOR SUSTAINABLE
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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 Development 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 Development
MCM	Million Cubic Metres
MD	Managing Director
MENR	Ministry of Environment 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	National 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 Development Authority
RS	Remote Sensing
TARDA	Tana & Athi River Development Authority
WDD	Water Development Department
WRA	Water Resources Assessment
WRM	Water Resources Management

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EXECUTIVE SUMMARY

1. THE CURRENT SITUATION

Through various policy documents the government has expressed commitment to improve the management of water resources to ensure availability of water for equitable provision of water and sanitation services. In the past, attempts have been made aimed at providing water services to a majority of urban and rural inhabitants, especially driven by the motto of "water for all by the year 2000". There have been attempts to re-organise the Ministry in charge of water services to steer water sector activities towards improved efficiency and expanded services to as many citizens as possible. Despite these attempts, access to improved water services has been deteriorating. One of the major factors of this poor state of the sector is inadequate integrated water resources management.

Inadequate Integrated Water Resources Management is not only creating serious water use conflicts but also undermining the sustainability of the water resource base itself, possibly altering the hydrology and threatening water supplies. In addition, it is also threatening the economic viability of water supply and water resources investments. Given that water is scarce, and there is competition for it, it is imperative to regulate water resources and manage it effectively so as to improve on its utilization and protect it against degradation.

Water apportionment and allocation practices and enforcement are inadequate and cause of isolated conflicts. The financial base for supporting activities of the catchment board is inadequate, and consequently, the decision making process is sometimes slow. Monitoring and enforcement of the abstractions is weak.

Catchment degradation in some cases is severe. It is altering runoff and infiltration rates, accelerating soil erosion, and increasing sediment transport and deposition. High sediment loads are reducing the economic life of water resources infrastructure, and imposing a huge cost on water utilities.

Increasing pollution is another factor undermining water resources thereby increasing public health concern in terms of morbidity and mortality. This has a bearing on poverty and economic development. High demand for development of groundwater, encroachment on recharge areas and increased water demand at the coastal strip is causing sea water intrusion, contamination as well as depletion of the resource.

Water Hyacinth and other invasive weeds are resulting in water losses, impacting on water supplies and both quality and quantity, causing serious operational difficulties.

The population growth rate that stood at 3% at independence rose to a record 4% in 1979 before declining to 2.9% in mid 1990's. Further, population growth rate in urban areas is over 7% largely attributed to rural to urban migration. The population of Kenya is currently estimated at 28 million of which 50% is under 15 years. This scenario has direct implication to water demand as it put pressure in the available resources.

The National Health Sector Strategic Plan, 1999-2004 states that the major causes of morbidity in Kenya are due to diseases and conditions arising from poor environmental

management and hygiene conditions. The existing environmental problems relate to the low level of safe drinking water, lack of hygienic sanitation disposal systems and poor environmental conditions. As a result, water borne diseases such as typhoid and cholera has become major threats. Closely linked to the lack of safe water is the problem of poor sanitation resulting in poor disposal of fecal matter thereby contaminating sources of water supply. In urban areas, the inadequate and poorly maintained sewerage system and lack of toilet facilities lead to fecal matter reaching water bodies.

Among the most critical challenge facing Kenya today is the reduction of poverty. Economic Survey for the year 2000 indicates that the overall poverty level as at 1997 stood at 52.6% (excluding the 7 arid and semi-arid districts). In the rural areas 53.1% (11.4 million) and 50.1% (2 million people) of the urban population are absolute poor. The hard-core poor were 34.9% (7.5 million people) and 7.7% (0.3 million) for rural and urban respectively. The overall poverty lines for rural and urban areas have been determined to be Ksh.1,238.9 and Ksh.2,648.0 per month per adult equivalent respectively. It can, therefore, be safely assumed that this is the category that has no access to safe drinking water and adequate sanitation. The implications are that their health is greatly compromised.

Historically, water resources management has been domain of the public sector, therefore, private sector have not had major inputs. Formal involvement of the private sector has essentially been limited to consultants and contractors. This has been in the areas of groundwater survey, drilling of boreholes and development partner funded studies. Incentives to effectively allow for private sector participation have not been adequate. There are many bottlenecks limiting involvement of PSP in the sector.

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

- Separation of water resource management from water supply and sanitation.
- Separation of policy, regulatory an implementation functions.
- Devolution of regulatory responsibilities from Director of Water Development to National Water Resources management Authorities and Catchment Boards.
- Establishment of a pricing policy that meets equity, economic and financial objectives and environment objectives (polluter pays).
- Human resources development/redeployment leading to more effective institutions.
- Increase public spending and budget allocation to the sector.

2. PROPOSED STRATEGY

In order to address the current weaknesses and problems facing the water sector and to achieve sustainable development and management, the Government has 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.

This Strategy Paper proposes institutional reforms that separate water resources management matters from policy and 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 will manage all water resources with advice from Catchment/Sub-Catchment Boards. WRMA will be established under the Water Act, Cap 372, charged with the responsibility of providing water resources management services.

An Inter-Ministerial Steering Committee (IMSC) will guide the transition process and will be phased out when the WRMA comes on board. Part of IMSC mandate is to establish necessary data bases, carry out baseline studies and carry out studies necessary to ensure a smooth transition.

Development of human capital, which involves equipping human resources with the right skills and providing adequate incentives to perform, is key to sustainable development and maintenance of services. It is therefore necessary to develop a comprehensive training programme for the sector personnel. Emphasis has also been laid on the private sector and river users associations to be involved in the management of water resources by direct involvement or by providing fora for dispute resolution.

To meet the financial requirements of the sector, it could be necessary to mobilize local resources and complement them with aid from development partners, increase investment efficiency by assessing demand and prioritizing rehabilitation, develop appropriate levies and fee structure that ensures cost recovery leading to sustainability; and rationalize financial management systems to increase efficiency, transparency and accountability. This will require that WRMA achieve financial autonomy and that financing and pricing policies and mechanisms be restructured. This should help attract foreign capital and technical investment into the sector.

This strategy paper proposes an action plan for the effecting of the proposed changes. The action plan will cover the following main activities.

- Develop internal consensus and cohesion within the 3 ministries of the MENR on the water resources management agenda of the MENR,
- Stakeholder workshop on the IWRM Draft Strategy Paper
- Meeting with Parliamentary Committee on Agriculture, Water and Natural Resources
- Donor Information meeting
- Prepare for and launch a Cabinet level National Conference on water resources management in Kenya 22 March 2002
- Form a high level advisory group comprising of a multi-sectoral team, including the academia and the private sector to:
 1. Advise the MENR on the transition to the new WRMA,
 2. Assess specific training needs in financial and team management for building a cohesive team within the new WRMA,
 3. Ensure effective linkage with the NEMA, and,
 4. Guide the IWRMS process,

- Strengthen the Inter-ministerial steering committee to include PSs of the relevant line ministries (energy, agriculture and rural development, lands and settlement, finance and planning, trade and industries, etc.)
- Establish as a priority National development plan and sector policy and strategy linkages. This will be done through the preparation of water resources management chapters for and ensure a high level and effective participation in 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; hold further donor support meetings..
- Initiate the various action items of the IWRMS process, including:
 1. Recruit chief executive of WRMA and necessary staff.
 2. A communications- public awareness and education- strategy
 3. Mobilize the teams for the 11 components of the IWRMS that will support the operationalization of the WRMA, including:
 - a) Water Resources Assessment
 - b) Water supply, Demand and Infrastructure
 - c) Water conservation
 - d) Catchment management
 - e) Disaster management – floods, droughts and landslides
 - f) Water Quality and pollution control
 - g) International waters
 - h) Institutions and Legislation
 - i) Economics and Financing of Water Resources Management
 - j) International Waters
 - k) Human Resources Development
- Identify pilot projects for possible investment under the IWRMS.

1.0 INTRODUCTION AND SITUATION ANALYSIS

1.1 INTRODUCTION

Water resources contribute enormously to economic productivity and social well-being of human populace as both social and economic activities rely heavily on the quantity and quality of its water. 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 a stage has reached where availability of water is the limiting factor for any development activities. In such areas there are fierce conflicts amongst the various competing sectors and users. This is further compounded by the fact that currently water resource management responsibilities are fragmented amongst sectoral agencies, a situation which has become a major impediment to integrated water resources management. Effective implementation and coordination mechanisms are not clearly defined. This inadequate Integrated Water Resources Management apart from creating serious water use conflicts, is undermining the sustainability of the water resource base and altering the hydrological and hydrogeological conditions of the resource base. This is directly threatening water supplies and other socio-economic investments.

Water Resource Management entails conservation of the water resource base, protection of the water catchment areas from destruction and encroachment and sustaining the environment through protection of the quality of water bodies. It is therefore closely related to land use, afforestation, energy, environment management and water quality protection by pollution control.

To ensure that sectoral needs for utilization of these resources are guaranteed, mainly water for agriculture; which uses over 70% of the resource, water for domestic and commercial purposes; which uses 15% of water, and water for hydropower; a non-consumptive use, water resource management will involve creation of storage facilities, allocation between the competing needs and careful mapping of resource availability and planning on resource utilisation on long term basis.

New fundamental approaches to the assessment, development and management of freshwater resources can only be achieved through political commitment, which needs to be backed by substantial and immediate investments, public awareness campaigns legislative and institutional changes, technology development and capacity building programmes.

To address the above shortcomings, the government, in the past, has formulated a series of policies, which have impacted on the water sector both positively and negatively. The definitive policy for the sector was however 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 de-centralisation of operational activities from the central government to other actors. The Sessional Paper has also tackled issues pertaining to institutional framework and financing of the sector.

This strategy paper is meant to enhance implementation of the National Water Policy and to guide the activities geared towards minimizing constraints such as uneven distribution of water resources, inefficient utilization of resources, centralized decision making, inadequate

financial allocation, inadequate management information systems, inadequate skills, increasing poverty levels and increased pressure on land. The strategy provides for initiatives aimed at responding to these main constraints by provide a framework to guide in the carrying out of the following: -

- Implement the National Policy on Water Resources Management and Development and Water Act 2001 to strengthen Water resources Management.
- Develop an effective institutional setup for managing water resources.
- Strengthen the hydrologic, hydro-geologic, climatic and water quality information networks and water resources assessment capacities.
- Protect priority catchments and recharge areas.
- Strengthen groundwater management.
- Control pollution.
- Examine the complexity of water availability and water demand in relation to changing land use patterns.
- Strengthen catchment management.
- Strengthen capacity for integrating environmental quality objectives in WRM.
- Provide enabling environment, empowerment of user groups and stakeholder participation.
- Provide basis for analysis necessary for Water Apportionment.
- Provide basis for selection of pilot projects.

The Strategy on Integrated Water Resources Management has been prepared based on the principles of the National Policy on Water Resources Management and Development requirements, and comprises seventeen main chapters including;

- Introduction and Situation Analysis
- Water Resource Assessment
- Water Demand
- Water Conservation
- Catchment Management
- Disaster Management – Floods, Droughts and Land Slides
- Water Quality and Pollution Control
- International Waters
- Institutional Framework
- Legislation, Regulation and Enforcement
- Capacity Building
- Private Sector Participation
- Applied Research and Technology
- Financial Mechanisms
- Pilot catchments
- Action Plan

All the chapters are laid out in a similar manner; background, problem statement, policy direction, the respective strategies and finally the logical framework spelling out the various activities, indicators and assumptions as necessary for each strategy.

Finally the paper proposes an Action Plan to operationalise the WRMA

The Paper also contains a list of members of the drafting and reference documents in Appendices A and B respectively.

1.2 SITUATION ANALYSIS OF THE SECTOR

1.2.1 Physical Conditions

The Republic of Kenya has a territorial area of 582,646 km², consisting of water area of 11,230 km² and land area of 571,416 km². Of the land area, more than 85% is classified as arid and semi-arid lands (ASAL). The remaining land of approximately 81,000 km² sustains more than 75% of the nation's population and substantial portions 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 area 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 hence forth known as Catchments;

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

The potential volume of the surface water resources is estimated at about 19.7×10^9 m³/year. It is the highest in the Lake Victoria Catchment (282.6×10^3 m³/year/km²) and the lowest in the Athi River and Coast Catchment (21.3×10^3 m³/year/km²). On the other hand, the 1998 surface water abstraction volume is estimated at 1.1×10^9 m³/year that corresponds to only 5.4% of the potential resources volume. The quality of the surface water is assessed to be adequate for drinking water use. It is, therefore, concluded that there is a great development potential in the surface water resources quantitatively and qualitatively.

Geologically, the country could be divided into 5 hydrogeological areas, out of which Volcanic Rock and Quaternary Sediment areas are evaluated to be rich in groundwater resources. The safe abstraction volume of the groundwater is estimated as large as 610.5×10^6 m³/year, consisting of 184.5×10^6 m³/year by boreholes and 426.0×10^6 m³/year by shallow wells. The 1998 groundwater abstraction volume estimate is 57.2×10^6 m³/year i.e. 9% of the potential. The groundwater is concluded to possess a large development potential and to be a priority water resource for drinking water in ASAL areas.

1.2.2 Background

Following the country's attainment of 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 engaged in all productive activities, including the provision of water and sanitation services, often at minimal charge to the consumer. In addition to these, 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 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. This necessitated the expansion of water services throughout the country as rapidly as possible and somehow, its activities in Water Resources Management took a backseat. Therefore, the Government not only carried out development of schemes; it also took over several water supplies, which were at the time managed by local communities, local authorities and private institutions. Consequently the Government became involved in complete management of almost 100 urban water supplies and 600 rural water supplies. The phase of rapid expansion in government provision of water services was short-lived as it was quickly realised that the Government was not the best placed institution to undertake the role of water supply and sanitation provision.

Subsequently, between 1990 and 1992 the Government developed a National Water Master Plan. The objective of the National Water Master Plan study was to propose a national wide framework of orderly planning and development of water resources in the country. It should however be noted that the Master Plan study was at National level and did not provide complete detail at local levels. It further recommended that subsequent studies on each river Catchment be carried out.

The culmination of the policy developed in the water sector was the publication in 1999 of Sessional Paper No. 1 of 1999 under the title "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.

1.2.3 Demography, Social-Economic Water Indicators

The population growth rate that stood at 3% at independence rose to record 4% in 1979 before declining to 2.9% in mid 1990's. Further, population growth rate in urban areas is over 7% largely attributed to rural to urban migration. The population of Kenya is currently estimated at 28 million of which 50% is under 15 years. This scenario has direct implication to water demand.

Water is a critical resource in social economics development. Therefore its availability is an

indicator of development.

Table 1: Water Indicators year 2000

Indicator	Unit
GDP per growth rate	US\$ 300 equivalent year 1999
GDP per capital (Provisional Estimate)	0.5%
Water Consumption per capita	0.2m ³ / day
Available water per capita	675m ³ /year
Water use ratio to that available	6%

Source: Economic Survey 2000 and WDD Reports

1.2.4 Water and Human Health

The National Health Sector Strategic Plan, 1999-2004 states that the major causes of morbidity in Kenya are due to diseases and conditions arising from poor environmental management and hygiene conditions. The existing environmental problems relate to the low level of safe drinking water, lack of hygienic sanitation disposal systems and poor environmental conditions. As a result, water borne diseases such as typhoid and cholera has become major threats. Closely linked to the lack of safe water is the problem of poor sanitation resulting in poor disposal of fecal matter thereby contaminating sources of water supply. In urban areas, the inadequate and poorly maintained sewerage system and lack of toilet facilities lead to fecal matter reaching water bodies.

1.2.5 Poverty and Access to Water

Among the most critical challenge facing Kenya today is the reduction of poverty. Economic Survey for the year 2000 indicates that the overall poverty level as at 1997 stood at 52.6% (excluding the 7 arid and semi-arid districts). In the rural areas 53.1% (11.4 million) and 50.1% (2 million people) of the urban population are absolute poor. The hard-core poor were 34.9% (7.5 million people) and 7.7% (0.3 million) for rural and urban respectively. The overall poverty lines for rural and urban areas have been determined to be Ksh.1,238.9 and Ksh.2,648.0 per month per adult equivalent respectively. It can, therefore, be safely assumed that this is the category that has no access to safe drinking water and adequate sanitation. The implications are that their health is greatly compromised.

1.2.6 Private Sector Participation (PSP)

Historically, water resources management has been domain of the public sector, therefore, private sector have not had major inputs. Formal involvement of the private sector has essentially been limited to consultants and contractors. This has been in the areas of groundwater survey, drilling of boreholes and development partner funded studies.

Incentives to effectively allow for private sector participation have not been adequate. The bottlenecks may be summarized as below: -

- a) Administrative barriers and lengthy bureaucratic process in licensing of PSP.
- b) Undefined regulation, criteria and guidelines for PSP entry.

- c) Lack of Public awareness on PSP concepts.
- d) Poor enabling environment, political interference, and inadequate legislative provisions.
- e) Monopoly of the playing field by the public sector who are players as well as referees thereby creating a barrier to entry of competition (exclusivity and monopoly).
- f) Limited of access to finance; development financiers are unwilling to lend to PSP for long term programmes.
- g) Local financial institutions are not familiar with water resources management as commercial operations.
- h) Limited capacity in technical and management in local PSP with regard to IWRM.

National water quality and pollution control remains a core activity of the Ministry for purposes among others of ensuring that water quality standards are adhered to in supply service delivery and enforcement of the statutes pertinent to water resources management. Currently, matters of water quality are channeled through Water Quality and Pollution Control Division in the Water Department in the Ministry of Environment and Natural Resources.

As the water sector incorporates the Private Sector participation initiatives, both water resources development, water supply and sanitation undertaking and water resources management, there will be increased need for water analysis for various purposes. In this connection, therefore, it is imperative that a legal provision be made in the Water Act Amendment Bill to allow participation of Private Sector in the water analysis. It will also be necessary to establish a mechanism for accreditation of the private analytical laboratories. This will further call for ways and means of validating and evaluating the analytical reports generated by such laboratories.

Water analysis done by the private sector may in general terms be used for self-monitoring of the private sector activities including those of the industry. The private sector upon accreditation of its analytical facilities, personnel and methodologies may also participate in general water quality monitoring and contribute data. Such data after validation can be incorporated into the various water databases.

1.2.7 Integrated Water Resources Management

How?
Inadequate Integrated Water Resources Management is not only creating serious water use conflicts but also undermining the sustainability of the water resource base itself, possibly altering the hydrology and threatening water supplies. In addition, it is also threatening the economic viability of water supply and water resources investments. Given that water is scarce, and there is competition for it, it is imperative to regulate water resources and manage it effectively so as to improve on its utilization and protect it against degradation.

Water apportionment and allocation practices and enforcement are inadequate and cause of isolated conflicts. The financial base for supporting activities of the catchment board is inadequate, and consequently, the decision making process is sometimes slow. Monitoring and enforcement of the abstractions is weak.

Catchment degradation in some cases is severe. It is altering runoff and infiltration rates, accelerating soil erosion, and increasing sediment transport and deposition. High sediment

loads are reducing the economic life of water resources infrastructure, and imposing a huge cost on water utilities.

Increasing pollution is another factor undermining water resources thereby increasing public health concern in terms of morbidity and mortality. This has a bearing on poverty and economic development. High demand for development of groundwater, encroachment on recharge areas and increased water demand at the coastal strip is causing sea water intrusion, contamination as well as depletion of the resource.

Water Hyacinth and other invasive weeds are resulting in water losses, impacting on water supplies and both quality and quantity, causing serious operational difficulties.

1.3 POLICY OBJECTIVES AND PRINCIPLES

1.3.1 Overall Objective

The overall objective of this strategy paper is to put in place, a framework to guide the Nation into removing water resources constraints thereby promoting national economic development, poverty alleviation, upgrading environmental quality and improving the social well-being of the people.

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. Separation of water resource management from water supply and sanitation. *How?*
2. Separation of policy, regulatory and implementation functions.
3. Devolution of regulatory responsibilities from Director of Water Development to National Water Resources management Authorities and Catchment Boards.
4. Establishment of a pricing policy that meets equity, economic and financial objectives and environment objectives (polluter pays).
5. Human resources development/redeployment leading to more effective institutions.
6. Increase public spending and budget allocation to the sector.

2.0 WATER RESOURCES ASSESSMENT

2.1 BACKGROUND

Water resources assessment comprises the continuing determination of sources, extent, dependability and quality of water resources and of the human activities that affect those resources. Thus with the knowledge of demand scenario, assessment should constitute the practical basis for sustainable water resources management and a prerequisite for evaluation of the possibilities of their development. Monitoring of the various hydrologic and hydrogeologic activities is essential for the analysis and forecasting of available surface and groundwater at national, river catchment, and local levels. The monitoring of water quality, parameters provide baseline data for the purposes of pollution control. Similarly, the monitoring of water abstraction and water use is necessary for working out naturalized river flows, misuse and over abstraction. The product of Water Resources Assessment is the information made ready for consumption and use.

Few important initiatives such as the Water Resource Assessment and Planning Project and the National Water Masterplan were implemented successfully when the project remained funded but were not sustained when funds ran out.

2.2 PROBLEM STATEMENT

Nationally, water resources assessment coverage is inadequate; data collection is uncoordinated and at the same time analytical, monitoring and enforcement capabilities are weak. The database and information flow in the water sector is characterized by data gaps due to discontinuous water resource assessment programs and an inadequate user database.

There is no systematic monitoring on hydrologic (ground water levels, sediment transport, water quality, land use or water use), hydrologic analysis and assessment, economic evaluation, or strategic planning being carried out. Allocation decisions, surface abstraction, and borehole permits are granted on an arbitrary and ad hoc basis.

There is low level of water resources assessment infrastructure and institutional arrangements and this is leading to critical conditions which need to be addressed urgently.

2.3 POLICY DIRECTION

The solution to these problems calls for setting up mechanisms for continuous assessment of water resources, which include strengthening of the institutional capacity of the various agencies responsible for the collection, storage and analysis of water resources data. This should be followed by the establishment of a fully fledged hydrologic, hydro-geologic, water quality, water permits, and socio-economic databases at all the water resources management levels.

2.4 GOAL AND STRATEGY

2.4.1 Goal

Accurate and timely determination of sources, extent, dependability and quality of water resources and the human activities that affects these resources

2.4.2 Strategy

To develop/strengthen a water resources assessment and monitoring system that is based on the Catchments/sub-Catchment systems with appropriate data and information dissemination system.

Table 2: Logical Framework Matrix on Water Resources Assessment and Information System.

Goal: Accurate and timely determination of sources, extent, dependability and quality of water resources and the human activities that affect these resources						
Strategy: To develop/strengthen a water resources assessment and monitoring system that is based on the Catchments/sub-Catchment systems with appropriate data and information dissemination system.						
Activities	Output	Cost of Input	Monitoring Indicators	Time frame	Actors	Assumptions/Risks
1. Establish and maintain an up-to-date database at the national, Catchment and sub-Catchment levels.	Updated data bases at national, Catchment and sub Catchment levels	10 million	Timely, complete and accurate information provided	July 2002 to June 2004	WDD KMD	No unexpected administrative difficulties.
2. Initiate a regular annual/seasonal publication of key water resources data and information for public consumption.	Annual /seasonal publication	1 million	Media reports quoting source of information. No. of audited publications.	Dec. 2002 thereafter to be continuous	WDD Print and electronic media houses	Availability of funds.
3. Expand and rehabilitate water resources monitoring systems (e.g. hydrometeorological groundwater and water quality).	An expanded and rehabilitated network	25 million	Data entries into database	July 2001 and continuous	WDD PSP	
4. Development of Catchment-wide Water Master Plan.	Long range development plan	25 million	No. of ref to Plan. Minutes. Field survey reports.	July 2001 and continuous	MENR RBDA PSP	Availability of support.
5. Upgrade the technology in data collection processing (Geographical information Systems (GIS/RS) Remote Sensing, Groundwater Survey Equipment, Global Positioning Systems, E-mail.	Improved technology in data collection processing and analysis	5 million	Number of computers acquired and software developed installed. Teleretry installed.	July 2002 and continuous at pace of technology advancement	Catchment Boards WDD RBDA DRSR	Availability of licenses.
6. Create awareness on the importance of water resources monitoring and product	Awareness creation mechanisms put in place	2 million	No. of awareness creation forums	July 2002 and ongoing at low intensity	WDD Inter-sectoral PSP	Cooperation among stakeholders.
7. Establish multi disciplinary water assessment teams.	Functional teams established at operational levels.	50 million	No. of Assessment reports written on areas covered	July 2002 and continuous	WDD CB	Availability of qualified staff.
8. Put in place coordination mechanism to ensure access and linkage to database.	Coordinate linkage mechanism in place	1 million	MOU Minutes Wide area network.	July 2002	WDD Inter-sectoral KMD RDA	No unexpected administrative difficulties.
9. Establish inter-linked data bases with institutions that have relevant data in IWRM	Network in place	1 million	Guidelines on institution linkages.	July 2002 continuous	MENR BDA PSP	No unexpected administrative difficulties.

3.0 WATER DEMAND

3.1 OVERALL

3.1.1 Background

It is clear that disparity in the development of the various regions of our country is a direct consequence of the availability or lack of water, as one of the factors. Agriculture, livestock, industry and good health of the people will only be sustained and enhanced where water is available in sufficient quantity and acceptable quality. Water, therefore, is an essential input in all our development endeavors. The population is increasing rapidly resulting in a rapid increase in the demand for water. As the country develops, the demand for water to support these development activities will continue rising.

The level of water supply and water resource development is low and water demand for all sectoral uses outstrips supplies. The level of storage for urban and rural, irrigation and livestock supply is very low. Long term neglect and narrow focus on water development has contributed to weak allocation and management of surface and ground water leading to lack of control over the behaviour of users precipitating severe water allocation conflicts. Proliferation of invasive weeds and climatic variability have compounded the problems of water scarcity.

The study on the National Master Plan reports that "The essential water demand (domestic, industrial, irrigation, livestock, wildlife, hydropower) in the year 2010 will increase significantly from 2,073 MCM/Year in the year 1990 to 5,817 MCM/year. This will take up 15% of an estimated available resources. It is foreseen that the exploitation of this 15% of the water resources will be a hard task needing greater care and efficiency in both planning and implementation." The National Master Plan further states that "only 12.6% of gross run-off in river can be obtained without regulation works in rivers. To increase the portion of water for year round use, it is necessary to construct storage dams so that flood flows can be retained."

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.

3.1.2 Problem Statement

Lack of an integrated approach to the development and management of water resources has led to available water resources in regions of major water demand being committed, and the resources in these regions are threatened with overexploitation/abstraction. The following factors have direct impact on water demands;

- Low water supply and water resource development
- Very low level of storage for urban and rural, irrigation and livestock supply
- Weak allocation and management of surface and ground water leading to lack of control over the behaviour of users precipitating severe water allocation conflicts
- Proliferation of invasive weeds and climatic variability

3.1.3 Policy Direction

In order to meet the present and future demands for water and to promote the country's development, systematic 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.

3.1.4 Goal and Strategy

3.1.4.1 Goal

Water demand met through rational criteria for water resource allocation

3.1.4.2 Strategies:

1. To Develop a National Water Resources Management Master Plan and Catchment wide Plans.
2. To formulate a prioritization criteria between domestic, agriculture, power generation, industry, environment uses to balance demand vis-à-vis availability with an objective of minimizing conflict.
3. To Update the National water Master Plan and develop Catchment-wide Development Plans.

What Technologies?

Table 3.1: Logical Framework Matrix on Water Demand

Goal: Water demand met through rational criteria for water resource allocation.					
Activities	Output	Cost of input	Monitoring Indicators	Time Frame	Actors
Strategy 1: To formulate water resources management plans that will meet the present and future water demand.					
1. To review the National Water Master Plan water requirements for: Domestic, Industrial, Irrigation, Livestock, Wildlife and fisheries, Power generation – hydro and geothermal and Environment – Wetlands and Bio diversity	A revised National Water Master Plan	200 million.	Revised plans every 10 years.	July 2002 to June 2004 and periodically	WDD Other sectors
2. Enhance the implementation of the National Water Master Plan and river Catchment plans.	National Water Master Plan & River Catchment plans implemented.	5 billion	Implemented programs and projects as provided in budgets.	2001 and continuous	WDD Stakeholders RBDAs
3. Develop inter and intra water Catchment transfer plans	Inter and intra water transfer plans in place	20 million	Reports plans	2002 and continuous.	WDD RBDAs Stakeholders
4. Initiate and strengthen Catchment-wide integrated water resource management programme	Catchment wide integrated water management in place	5 billion.	RDA/CBAs Operation plans	2002 and continuous	RDA Catchment Boards
Strategy 2: To formulate a prioritization criteria between domestic, agriculture, power generation, industry, environment uses to balance demand vis-a-vis availability with an objective of minimizing conflict.					
1. Review current status of water abstraction in accordance to purpose of use in each Catchment /catchment.	Report with recommendation.	7 million	No. of reports.	2002 and continuous	WDD RBDAs Catchment Boards Stakeholders
2. Design comprehensive operational plans for harmonizing abstraction records.	Catchment and aquifer abstraction operational plans.	2 million	Determined maximum permissive amount for constructions	2002 and continuous	WDD Catchment Boards RDA Stakeholders
3. Monitor use of abstraction operational plans and carry out periodic evaluation of its impact.	Integrated abstraction plans. Evaluation reports in place.	5 million	Enhanced low flows. Monitoring reports.	2001 and continuous	WDD Catchment Boards
				Harmonised abstraction records. Co-opt from abstractors	
				Co-operation and improved enforcement.	
				Adequate corporation by abstractors.	

3.2 WATER AND AGRICULTURE

3.2.1 Background

Agriculture has been the mainstay of the country's economy since independence and constitutes the source of livelihood for most Kenyans. This is because Kenya has only a small industrial base, very limited mineral resources and an insufficiently developed services sector. Agriculture contributes 29% of Kenya's GDP and, up to 1999, about 80% of Kenya's population was 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 parts of the country, which constitute about 67% of the land area are arid and semi-arid (ASAL), and are categorized as 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.

It is clear that irrigated agriculture has not been developed to its full potential in Kenya. As of 1999, only 82,000 Hectares were under irrigation, which is only about a sixth of the country's agricultural potential. The main constraints to the development of the full potential of irrigation agriculture include low yields per hectare, lack of proper support systems; outdated technologies; lack of incentives; lack of clear strategies; and an inappropriate and ineffective institutional framework.

Therefore, 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.

The Water Development and Conservation Programme for Ministry of Agriculture and Rural Development currently manages livestock with technical support from Ministry of Environment and Natural Resources. For the livestock sector, the River Catchment Authorities are also involved in formulating their projects. The present implementation system, with the inter-Ministerial coordination, seems to function well and it is felt that this effort should continue.

The estimated water demand, for agricultural use, is at 389,000 m³/day (year 2000) and is projected to be 465,000 m³/day by the year 2010.

Rainfed or
Rainfed + Irrigation

3.2.2 Goal and Strategies

3.2.2.1 Goal

Attainment of self-sufficiency in food, increase of farmers' real income, security for drought and enhanced livestock production and poverty alleviation.

3.2.2.2 Strategies

1. To formulate water resources management plans that will meet the present and future water demand for agricultural sector.
2. To participate in formulation of land use policy and strategy component focusing on arid and semi-arid lands with a view to enhancing the potential of these lands for irrigated agriculture.
3. To strengthen the institutional framework for managing and facilitating irrigation by rationalizing the mandates of the key actors in the sector such as the Ministry of Environment and Natural Resources, the Ministry of Agriculture, the National Irrigation Board, Local Authorities and others.
4. To strengthen water conservation programmes including the construction of reservoirs, encourage rain-water harvesting and facilitate greater reliance on groundwater for agriculture, livestock in the arid and semi-arid lands.
5. To pursue of integrated development management of water storage facilities so as to make provision for all requirements i.e. multipurpose use of dams.

What type?

Table 3.5: Logical Framework Matrix of Water Demand for Agriculture

Goal: Activities	Output	Cost of input	Monitoring Indicators	Time frame	Actors	Assumptions/Risks
Attainment of self sufficiency in food, increase of farmers' real income, security for drought and enhanced livestock production.						
Strategy 1: To formulate water-resources management plans that will meet the present and future water demand for Agricultural sector. Review the National Water Master Plan data on irrigation demand on:- i) major schemes (500 projects) 110,000 ha; ii) small schemes (140 projects) 7000 ha; iii) livestock water	A revised National Water Master Plan		Revised plans.	2002 every 10 years	WDD MARD NIB Other stakeholders	Availability of funds
	Draft Revised sectoral plans					
	Report.		Various no. of papers.	2002 continuous	MENR NIB MOARD Mol.G	Funds are available
Strategy 2: To Participate in formulation of land use policy and strategy component focusing on arid and semi-arid lands with a view to enhancing the potential of these lands for irrigated agriculture.	Under take feasibility studies on water availability in relation to the land use policy					
Strategy 3: To Strengthen the institutional framework for managing and facilitating irrigation by rationalizing the mandates of the key actors in the sector such as the Ministry of Environment and Natural Resources, the Ministry of Agriculture, the National Irrigation Board, Local Authorities and others.						
Put in place a coordination mechanism.	Committee		Minutes	July 2001 continuous	MOARD NIB Stakeholders	Irrigation policy in place by 2002
Strategy 4: To Strengthen water conservation programs including the construction of reservoirs, encourage rain water harvesting and facilitate greater reliance on groundwater for agriculture, livestock in the arid and semi-arid lands.						
1. Provide watering points in nomadic pasturage in arid lands.	Watering facilities of small dam/pan		No. of small pans and dams, boreholes and wells	2002 continuous	MOARD MENR CBO	Communities will manage schemes.
2. Identify irrigation schemes and provide priority ranking.	Implementation programme		Plan of action.	2002 continuous	MOARD NIB MENR Stakeholders	Communities will manage schemes
Strategy 5: Pursue of integrated development management of water storage facilities so as to make provision for all requirements i.e. multipurpose use of dams.						
To prepare comprehensive river Catchment development study covering all water related sectors.	Multi purpose development project.		Study reports	2002 continuous	RIDA MENR	Availability of funds.

3.3 WATER AND ENERGY

3.3.1 Background

The majority of Kenya's population, whether living in rural or in urban settings, rely primarily on wood fuel for their energy needs. This is either in the form of firewood or charcoal. The industrial and service sectors as well as the more affluent households rely on electricity, gas and fuel oil. Most electricity is generated from hydropower, standing presently (2001), at about 70% of the installed generation capacity.

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 as outlined in Sessional Paper No. 2 of 1996 on "Industrial Transformation to the Year 2020".

The heavy reliance on wood fuel has led to deforestation and destruction of the water catchments. As a result of which soil erosion, land degradation, and loss of bio-diversity, have become endemic. This has adversely affected energy generation.

The drought and consequent water and power shortages that occurred in the year 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.

3.3.2 Goals and Strategies

3.3.2.1 Goal

Increased hydro and geothermal power exploitation to meet the increased national power demand.

3.3.2.2 Strategies:

1. To formulate Water Resources Management plans that will meet the hydro power water demand.
2. To Gazette as appropriate other areas left out of the Forest and Wildlife Acts as water catchment under the Water Act as a necessary step in an effort to halt catchment degradation and restore degraded catchments.
3. To develop catchment management plans.

Table 3.3: Logical Framework Matrix of Water Demand for Energy

Goal:	Increased hydro and geo power exploitation meeting the increased national power demand.					
Activities	Output	Cost of input	Monitoring Indicators	Time frame	Actors	Assumptions/ Risks
Strategy 1: To formulate Water Resources Management plans that will meet the hydro power water demand.						
1. Enhance inter-sectoral collaboration with sectors involved in soil, water and forest conservation activities	Collaboration.		Memorandum of understanding. Minutes/joint programmes	2001 continuous	Catchment Board MOA Forest Department All stakeholders	Cooperation
2. Involve community development committees and other relevant organizations in conservation efforts	Committees in place.		Minutes of meetings. On going projects.	2001 continuous	CBO BDA CB	Cooperation
3. Develop and put in place cost effective interventions to combat soil erosion and sedimentation	Soil and water conservation programmes.		Conservation structures. Ongoing projects.	2001 continuous	MOARD BDA CBO Other stakeholders	Cooperation and increased funding
Strategy 2: Gazette as appropriate other areas left out of the Forest and Wildlife Acts as water catchment under the Water Act as a necessary step in an effort to halt catchment degradation and restore degraded catchments.						
1. Identification of key catchments	Gazetted catchment areas		No. of areas identified.	2002 continuous	MENR CB Other stakeholders	Cooperation
2. Identification of location of major springs.	Spring locations map.		Map	2001 continuous	MENR CB Other stakeholders	
3. Identification of forests land functioning as sources of water.	Map.		Map	2002 continuous	MENR KWS Mol.S	Collaboration
Strategy 3 To develop catchment management plans.						
1. Determination of costs for catchment conservation.	Financial budgets.		Reports/plans	2002 continuous	MENR CB Other stakeholders	
2. Identification of beneficiaries.	List of abstractors.		No. of abstractors. Information materials available.	2001 continuous	MENR CB RDAs	
3. Creating awareness to water users.	Acceptance of water user charges.		No. of workshops. Willingness to pay.	2002 continuous	MENR, BDA Other stakeholders	Cooperation
4. Gazettement of water user charges.	Complete and accurate charges.		Legal notice	2002 continuous	MENR, AG All stakeholders.	

3.4 WATER AND ENVIRONMENT

3.4.1 Background

Water and environment are inextricably linked. Water serves a basic ecological function of sustaining bio-diversity. Watershed with the highest biological value, as measured by the number of fish species and the number of areas with endemic birds, also have high population densities, high levels of modified and irrigated land and high rate of deforestation, therefore the most degraded. For much the same reason, human habitation and socio-economic development tend to concentrate around water points. Human society has always sought to harness water for various purposes, and the more industrially advanced a society is, the more the demand for water.

When and if the neglect of conservation of water for the environment leads to declining levels in lakes and rivers, the outcome is a visible impact on the environment. Water resources developments should preserve and enhance the buffering capacity of the environment against unexpected shocks or long-term trends. Options for the future must be developed to serve future requirements. However, water resources projects are planned, designed and operated under various sources of uncertainty. Their inadequate consideration in the decision-making process can lead to poor results.

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 also increases. To assess the vulnerability in a decision-making context, appropriate criteria must be identified and the sequence of hydrological process understood in order to link actions with their respective outputs.

Environmental problems include deforestation, soil erosion and sedimentation, inadequate institutional and collaborative mechanisms, poverty, high population growth rate which pose threats to resource base and life support systems

*Exemplifying?
Assessing?*

3.4.2 Goal and Strategies

3.4.2.1 Goal

Requisite quantity of water flow (low flow) maintained during dry season in lakes and rivers at all times thereby sustaining bio-diversity and socio-economic activities

What of semi-perennial rivers?

3.4.2.2 Strategies

1. To strengthen water conservation measures to enhance water availability for environmental sustainable bio-diversity and Social economic.
2. To explore options for increasing availability of water environmental restoration activities.
3. To enforce Environmental Management and Coordination Act No. 8 of 1999.

Table 3.4 Logical Framework Matrix of Water Demand for the Environment.

Goal:	Requisite quantity of water flow (low flow) maintained during dry season in lakes and rivers at all times thereby sustaining bio-diversity and socio-economic activities					
Activities	Output	Cost of input	Monitoring Indicators	Time frame	Actors	Assumptions/Risks
Strategy 1: Strengthen water conservation measures to enhance water availability for environmental sustainable bio-diversity and Social economic.						
1. Carry out survey for critical water bodies.	Survey Report		No. of reports.	2002 continuous	MENR CB Stakeholders BDA	Cooperation
2. Workout naturalized yields flows and the maximum abstraction limits.	Maximum permissible yields.		No. of Reports.	2002 continuous	MENR CB Stakeholders BDA	Cooperation
Strategy 2: To Explore options for increasing availability of water for environmental restoration activities.						
1. Study to determine water demand/areas affected by water shortage.	Reports		No. of reports	2001 and continuous	PSP MENR CB	
2. Survey and map-out and determine boundaries for water bodies.	Reports and maps		No. of publications	2001 and continuous	PSP MENR ML-S	
3. Draw management plans	Plans		No. of plans	2002	CB RBDA	
4. Gazette conservation area.	Gazette Notice		Legal Notice	2002	MENR	
Strategy 3: Enforce Environmental Management and Coordination Act No. 8 of 1999.						
Develop water quality standards and ensure compliance and to ensure bio-diversity.	Standards		Minutes of meetings.	2001 and on going	MENR KBS	Cooperation
Strengthen EIA process in all water project developments as appropriate	EIA process incorporated in all water projects		EIA reports. No. of court cases.	July 2001 and continuous	Project proponents	EIA will be implemented

3.5 WATER AND INDUSTRY

3.5.1 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.

Most industries particularly agro-based industries are located outside the major urban centers and most of them are located near watercourses. Due to lack of water borne sewerage systems within the agro-industries, they often discharge their effluent directly into the nearby watercourses. The agro-based type of industries which may fall under this category 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.

Industrial activities generate a variety of types of pollutants, which include: -

- Organic effluent
- Inorganic effluent
- Leachates from solid waste dumps
- Gaseous emissions
- Mineral oils and greases
- Refractive substances
- Micro-organisms
- Solid wastes
- Liquid wastes containing various chemicals
- Etc.

A shortage of clean water in the required quantities and an absence of water borne sewerage systems are major constraints to industrial development.

Currently, in the country, the pricing of water often does not relate to the true economic cost. This has led to a situation in which industrial use of water does not take into account the true environmental and economical cost of water. There is also lack of adequate data on the amounts of water used by industries in Kenya as well as the amounts of effluent discharges, which may be treated or untreated. Some factories usually discharge their effluents into sewers or into watercourses without pre-treatment. There is a planned industrial transformation in the near future, which will involve establishment of intensive and heavy industries with high demands for clean water and higher volumes of waste water. If this plan is achieved then the water sector will have big pressure exerted on the natural resources.

The challenges facing the water sub-sector in the context of industrialization relate to the need to provide sufficient supplies of good quality water for industrial needs without

adversely affecting domestic uses of water and at the same time limiting industrial pollution of watercourses.

Policies for the development of specific socio-economic sectors related to water may need adjustment due to limitation of available water resources. For example, in locating new industrial estates, consideration should be given to the availability of water resources at the location and to the cost of developing public water supply to support the industrial development, which should be balanced against the socio-economic benefits that can be derived. Necessary measures will need to be put in place to avoid conflict between Industrial development and Water resources management. Thus a judicious balance between water resources development and the development of water-related socio-economic sectors would be necessary to achieve national socio-economic goals in the most efficient way. 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, where water demands are not likely to be met if the number of water intensive industries continues to rise without equivalent increase in water supply expansion. For existing industries, it is recommended that self-environmental audits be carried out on a yearly basis.

3.5.2 Goal and Strategies

3.5.2.1 Goal

Provision of adequate water for industrial development.

3.5.2.2 Strategies

1. To facilitate availability of water resources for industrial uses.
2. To promote water conservation, reuse and recycling measures in the industrial sector to enhance its availability.
3. To enforce the relevant Acts on effluent treatment prior to discharge.
4. To adjust water tariffs relating to water for industrial use to reflect the true economic and environmental cost of water by introducing a levy specifically on industrial effluent discharges.
5. To require industries to develop and implement environmental management systems which take into account the impact of industries on the country's water resources.

Table 3.5: Logical Framework Matrix of Water Demand for Industry

Goal: Provision of adequate water for industrial development.						
Activities	Output	Cost of input	Monitoring Indicators	Time frame	Actors	Assumptions/Risks
Strategy 1: To facilitate availability of water resources for industrial uses. Encourage industries to develop own water sources.	Private water source	10 million	No. of applications	2001 and continuous	MENR PSP MTI	Adequate incentives.
	Installation in place.	25 million	Reduced water consumption	2001 and continuous	PSP MENR MTI MoFP	Incentives present
Strategy 2: To promote water conservation, reuse and recycling measures in the industrial sector to enhance its availability. 1. Installation of water conservation structures.	Installations in place.	25 million	Reduced water consumption	2001 and continuous	PSP MENR MTI MoFP KNCAC	Incentives present
	Installations in place.	25 million	Reduced water consumption	2001 and continuous	PSP MENR MTI MoFP KNCAC	Incentives present
Strategy 3: To enforce the relevant Acts on effluent treatment prior to discharge.						
1. Monitoring adherence to effluent discharge standards.	Reports	2 million	No. of reports. No. of court cases.	2001 and continuous	MoH MENR MoL.G, KEBS Other stakeholders	PSP Corporation
2. Monitoring water quality in receiving streams.	Reports	2 million	No. of reports, Seminars, Workshops. No. of court cases.	2001 and continuous	MoH MENR MoL.G, KEBS Other stakeholders	No unexpected legal or administrative difficulties.
Strategy 4: To adjust water tariffs relating to water for industrial use to reflect the true economic and environmental cost of water by introducing a levy specifically on industrial effluent discharges.						
Determine the actual cost of water as an economic good.	Report	2 million	No. of publications	2001 and continuous	MENR MTI	P SP Corporation
Strategy 5: To require industries to develop and implement environmental management systems which take into account the impact of industries on the country's water resources.						
1. Encourage self environmental audits.	ISO 14000	3 million	No. of accreditation to ISO14000	2001 and continuous	PSP, KEBS KNCPC	Adequate incentives
2. Encourage cleaner production technology (CP) in industries.	ISO 14000	5 million	No. of accreditation to ISO14000	2001 and continuous	PSP KEBS KNCPC	Adequate incentives

Private Sector financing?

3.6 WATER FOR DOMESTIC AND PUBLIC PURPOSES

3.6.1 Background

The Water Act (Cap 372) defines water requirements for domestic purposes as provision of water; for household and sanitary purposes and watering and dipping of stock, for public purposes to municipalities, townships, villages and communities for all reasonable demands including steam rising or for other purposes connected with public undertakings but not involving the use of water for generation of power.

The Study on National Water Master Plan (1992) reports that the total potential water demand is given in 3.6 below.

Table 3.6: Potential Domestic Water Demand in Kenya

		Unit: Thousand m ³ /day		
		1990	2000	2010
Rural	Residential	376.2	560.2	932.6
	Non-residential	155.9	189.1	229.1
	Sub-total	532.1	749.3	1,161.8
Urban	Residential	491.2	1,004.5	1,642.8
	Non-residential	82.2	164.4	263.2
	Sub-total	573.4	1,168.9	1,906.0

Source: National Water Master Plan (1992)

4.0 WATER CONSERVATION

4.1 BACKGROUND

Water conservation is a water resources management tool used to ensure its availability in the right quantity and quality for sustainable use. The main water conservation methods range from construction of water conservation structures such as dams and pans to catchment and source protection including management of groundwater and wetlands. Other strategies include optimal water use. Below is a list of some key water conservation techniques: -

- Construction of dams, pans rock catchment and sub-surface dams.
- Roof rainwater harvesting
- Demand and leak management
- Water recycling

The most common water conservation structures in Kenya are the small dams and pans. There are presently about 3000 small dams and water pans in the country holding a total of about 124 million cubic metres of water.. A dam is an embankment of earth, concrete or other appropriate material suitably sited and constructed to hold back water. The dam may be a Catchment of a River Dam. A pan on the other hand consists of an excavation suitably sited and constructed to collect rainfall runoff. A small Dam is defined as one not exceeding 10m in embankment height and a useful storage of the order of 100,000m³. The upper limit of storage of pans is 20,000m³ while the maximum depth rarely exceeds 4 m. The current construction costs are about Kshs. 6m and 4m respectively.

With agriculture as the mainstay of our economy and more than 85% of the land area being ASAL, irrigation is definitely central in our fight against poverty. Water Conservation is prerequisite to comprehensive National Irrigation efforts. Equally important is the need to develop efficient water use irrigation technology as further conservative measures.

The National Water Master Plan indicates that approximately 3.4 billion cubic meters storage is required by 2010 compared to the current storage capacity in large water supply reservoirs of approximately 124 million cubic meters. This implies an urgent need of additional storage. This situation is made worse by catchment degradation and deforestation which has occurred since the estimates were made.

The available sediment data available in the MENR data base greatly underestimates sediments yields and is inadequate to manage existing schemes or plan new ones. As the volume of sediments that is deposited in the reservoir increases the storage in the dam decreases thus reducing the value of investments and overall conservation efforts.

4.2 PROBLEM STATEMENT

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

- Inadequate number of water conservation structures in ASAL areas and poor maintenance and status of the existing structures leading to reduced and unreliable water storage capacities.

ASALS?

specify

- Inadequate and unsustainable rehabilitation measures to the structures, catchments and sources.
- Inadequate community participation in water conservation activities. *WHERE?*
- Non existence and non collection of fees and levies for water utilization and hence unavailability of the same for use in water conservation activities.
- Ill-address, by regional development authorities and catchment boards, of the above water conservation measures.
- Inadequate coordination of water actors, in the area of water conservation, by the Government agencies.

4.3 POLICY DIRECTION

The Sessional Paper No.1 of 1999 states that "The Government will, therefore, make every effort to conserve water when and where it occurs and its utilization will be so regulated as to benefit as many people as possible." The underlying principle should be to remove water availability as a constraint to development.

4.4 GOAL AND STRATEGY

4.4.1 Goal

Optimally satisfied plans and needs of respective sectors.

4.4.2 Strategy

To formulate a National Water Conservation Programme to promote water conservation to meet the current and future demand.

Collect data on community support. It is understated. Non-engineers offering in community. NB ground level water staff not interested.

Table 4: Logical Framework Matrix on Water Conservation

Goal: Activities	Output	Cost of input	Monitoring Indicators	Time frame	Actors	Assumptions/Risks
Strategy 1 To formulate a National Water Conservation Programme to promote water conservation to meet the current and future demand.			No. of water conservation structures constructed.	On going and continuous	PSP, RDS NW/CPC WDD NGOs	Rehabilitation and commercialization dam rehabilitation units (DRUs) will become operational.
1. Construction of reservoirs (dams and pans), roof catchment structures, rock catchment to impound surface run-off and regulate river flows	Reservoirs structure constructed	1 billion				
2. Rehabilitation of water conservation structures.	Water conservation structures rehabilitated.	2.3 billion	No. of water conservation structures rehabilitated.	2001 and ongoing	PSP, RDS NW/CPC WDD NGOs	Rehabilitation and commercialization dam rehabilitation units will become operational.
3. Rehabilitation of dam rehabilitation units (DRU)	DRU's rehabilitated.	203 million	No. of and DRU's rehabilitated.	2002	WDD NGOs	Availability of funds
4. Promotion of awareness on proper use of water through electronic and print media (demand management).		50 million	Decreased water demand and no. of cases of water borne illnesses and child morbidity and mortality.	2002 and continuous	WDD NGOs,	Target communities have access to mt used. Amount and timing of media time sufficient for target society.
5. Promote leak management to enhance water conservation.	Reduced leakage realized.	5 billion	% reduction in unaccounted for water	2002 and continuous	PSP, WDD NW/CPC	
6. Collection of groundwater abstraction data as a means of conserving surface run-off in aquifer management and control of abstraction rates as a means of promotion of groundwater mgt.	Aquifer management	50 million	A desirable abstraction programme put in place	2002 and continuous	WDD CB Water undertakers	
7. Promotion of irrigation efficient technology.	Decreased use of irrigation water	50 million	Percentage coverage.	2002 and continuous	NIB, PSP WDD	Popularisation and acceptance of new technology
8. Construction of artificial groundwater recharge as a means of conserving surface run-off in aquifer management and carrying out of recharge of boreholes.	No. recharge reservoirs developed. No. of boreholes drilled around the recharge. No of additional Boreholes dug as a result of recharging the aquifer.	500 million	No. recharge boreholes. No. of recharge per year.	2002 and continuous	WDD	

5.0 CATCHMENT MANAGEMENT

5.1 BACKGROUND

Effective catchment management is a priority in many major watersheds as inappropriate land use management systems is not only altering the hydrology but also imposing a huge economic cost on the water infrastructure. Effective catchment management will involve formulation of harmonized policies on land, water and forests. It will also entail the development and promotion of sound soil and water conservation programs and development of funding and administrative mechanisms and the appropriate cost sharing arrangements for ensuring effective catchment protection, rehabilitation and management. Experiences from the ongoing programs will be used to develop and strengthen catchment management.

In adequate coordination by the Government agencies sometimes leads to implementation of unharmonized policies in the utilisation of natural resources in important catchment areas. This overlapping interests of various ministries is exemplified in the Chyulu Hills area. Here, there is a water source in form of Mzima Springs, a major water source for Mombasa City as well as the coastal area. The public water supply is administered by the National water Conservation and Pipeline Corporation. In the same catchment there is a settlement scheme, administered by the Ministry of Lands and Settlement; water conservation measures executed by the Ministry of Environment and Natural Resources and wildlife and tourism management by Kenya Wildlife Service.

Community involvement, in catchment management activities necessitating bringing together diverse communities from upstream and downstream to resolve problems, is essential.

5.2 PROBLEM STATEMENT

- Water catchments are degraded due to unsustainable and ineffective catchment management measures.
- Uncoordinated policies, poor land use and inadequate planning leading to excessive soil erosion affecting many rivers in the country. The notable problems are clearing of forests that serve as water catchment areas and siltation due to sedimentation in reservoirs, reduced groundwater recharge and decimated river base flows.
- Inadequate budget allocation for the sector of water shed conservation.

5.3 POLICY DIRECTION

Strengthening catchment preservation and conservation measures through effective land use management and planning practices. All the stakeholders should pool their efforts and resources to protect the catchments and avert ecological disasters like drought, famine, desertification, and floods.

5.4 GOAL AND STRATEGY

5.4.1 Goal

Effective catchment management

How is it to be ORGANISED

5.4.2 Strategy

1. To formulate harmonized policy on land, water and forests for management of catchment areas.
2. To strengthen catchment protection measures.

Table 5: Logical Framework Matrix on Catchment Management

Goal: Effective catchment management.						
Activities	Output	Cost inputs	Monitoring Indicators	Time Frame	Actors	Assumptions/Risks
Strategy 1: To formulate harmonized policy on land, water and forests for management of catchment areas.						
1. Prepare a National Land Use Policy	National land use policy.		No. of reports. No. of plans approved.	July 2001 – June 2002	MENR MLG	Co-operation. Land laws reform finalised.
2. Set up a National Standing Committee to deal with water related cross-sectoral issues	National committee in place	IWRM	Minutes of meetings.	July 2001 – June 2002	Major Actors PSP	Co-operation
3. Prepare Regional Physical Development Plans covering areas declared special under Physical Planning Act No.6 of 1996) as Riparian Reserves, Coastal, Groundwater, wetland, Conservation, Areas.	Regional physical development plans prepared		No. of reports and plans approved.	July 2001 – June 2002	RBDA ML&S CB	Co-operation among the stakeholders.
4. Preserve and conserve the gazetted catchment areas	Gazetted catchment areas preserved and conserved		Conservation activities by communities	July 2001 – June 2002	CB RBDA MENR	Communities commitment
5. Identification, survey, mapping, Gazettement of water catchment and groundwater recharge areas to enhance their protection.	Degraded recharge/ catchment areas Maps.		Reports and Maps. Inventory of Catchments.	July 2001 – June 2002	CB RBDA MENR	
6. Re-survey and map out the gazetted catchment areas	Catchment re-surveyed and mapped		Reports and Maps	July 2001 – June 2002	CB RBDA MENR	
7. Strengthen the monitoring systems of catchment areas	Effective monitoring in place		Reports	July 2001 – June 2002	CB RBDA MENR	
8. Rehabilitate the degraded catchment areas	Degraded catchment areas rehabilitated		Improved plant cover. Reduced sediment load. Improvement in base flow. Reduced pollution levels.	2001 continuous	MENR CB RBDA	
9. Enhance the capacity to enforce roles related to water resource management.	Water related statutes enforced		No. of court cases	2001 continuous	MENR CB AG	
10. Prepare catchment management plans	Catchment Management plans in place		No. of implemented projects	2002 continuous	MENR CB CBO	

Now ABOUT SEMI-PERENNIALS.

6.0 DISASTER MANAGEMENT – FLOODS, DROUGHTS AND LAND SLIDES

6.1 BACKGROUND

Disasters constitute a real threat to every sphere of human development in Kenya. It is estimated that the overall cost of disasters has increased significantly over the last decade. For example, the El Nino induced floods of 1997-1998 caused US \$ 151.4 Million in public and private property damage. (Source: Kenya National Strategy for Disaster Management and Risk Reduction Report of 6th January, 2000) This figure does not include the number of people who lost family members, savings, property and economic opportunities.

Recovery from disasters requires resources to be diverted from other important public programs and private sector activity and economic growth. In the face of poverty, conflicts, epidemics, high population growth, and high rate of urbanization, the vulnerability of large sectors of the population has increased to the point of becoming a threat to the very development prospects of the country.

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 phases of disaster management i.e. Prevention and mitigation, preparedness and 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. The center is located in the Office of the President and is manned 24 hours a day by personnel drawn from diverse sectors of government such as the Military, Police, Water, Health etc. Since its inception, the Centre has in addition to El Nino floods dealt with the terrorist bombing of the United States Embassy on the 7th August, 1998 and other minor disasters. The Centre is mandated to handle natural and man-made disasters.

6.2 PROBLEM STATEMENT

Inadequate water related disaster management capacity in terms of facilities, information, manpower and funding.

6.3 POLICY FORMULATION

Systematic national disaster management in Kenya is still in its formative stages. Since the inception of the National Disaster Operation Centre in 1998, it has been widely recognized that despite considerable resources being available within the GOK, UN Agencies, NGOs and the local communities, there is an urgent need to improve disaster coordination and promote mitigation. To address this need, the GoK in collaboration with the United Nations Disaster Management Theme Group (UNDMTG) formed the Kenya Action Network for Disaster Management (KANDM) in June, 1999.

KANDM was thus mandated to evolve disaster management strategies tailored to the Kenyan situation. Concurrently with the work by KANDM, much effort is being put into the preparation of a Disaster Management Policy Paper.

6.4 POLICY DIRECTION

Establishment and development of water related disaster management capacity in terms of facilities and manpower.

6.5 GOAL AND STRATEGY

6.5.1 Flood Disasters

6.5.1.1 Goal

Effective flood management

6.5.1.2 Strategies on Prevention and Mitigation.

1. To improve Catchment conservation and protection so as to retard surface run-off.
2. To increase public knowledge on dangers of settling in flood prone areas.
3. To develop flood control infrastructure.

6.5.1.3 Strategies on Preparedness

1. To develop flood forecasting systems at National, District and grassroots levels that allow early warning preparations.
2. To create public awareness on need for insurance so as to indemnify losses.
3. To train and build capacity for appropriate response.
4. To develop funding mechanisms.

6.5.1.4 Strategy on Response.

1. To establish institutional framework for flood management (i.e. Disaster Operation Centres (DOC)) at National District and Grassroots levels:

6.5.1.5 Strategy on Recovery and Rehabilitation

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

Table 6.1 Logical Framework Matrix on Flood Disasters

Goal: Activities	Outputs	Cost of Inputs	Monitoring Indicators	Time frame	Actors	Assumptions/Risks
Effective flood management						
Issue: Prevention and mitigation						
Strategy 1: To improve Catchment conservation and protection so as to retard surface runoff						
1. Facilitate various catchment conservation activities e.g. terracing, Aforestation, rangeland management	Improved plant cover		No. of terraces	Jul 2001 Jun. 2006	MENR MARD Other stakeholders	Cooperation. Availability of finance
Strategy 2: To increase public knowledge on dangers of settling in flood prone areas						
1. Community sensitization, mobilization and resettlement	Communities sensitized and mobilized. Rural based and settlement schemes and development of urban areas		No. of meetings and Barazas	Jul 2001 June 2006 2001 2003	MENR Provincial Administration	Cooperation
Strategy 3: To develop flood control infrastructure						
1. To identify and map the flood prone areas	Flood prone areas identified and mapped		Maps	2001 2003	MENR	
2. Construction of dykes and dams	Dykes and dams constructed		flood control infrastructure	2001 2006		
Issue: Preparedness						
Strategy 1: To develop flood forecasting systems at National, District and grassroots levels that allow early warning preparations						
1. Establish and operationalize early warning systems	Early warning systems in place		No. of early warning systems	Jul 2001 June 2006	MENR MARD	Cooperation. Availability of finance
Strategy 2: To create public awareness on need for insurance so as to identify losses						
1. Sensitization on various insurance coverage available	Insurance taken		No. of insurance policies.	2001 2002	MENR Other stakeholders	Cooperation
Strategy 3: To train and build capacity for appropriate response						
1. Training of personnel on flood management	Availability of skilled manpower		No. of people trained.	2001 2004	MENR. Provincial Admin.	Availability of finance
Strategy 4: To develop funding mechanisms.						
2. Provision of equipment and facilities for flood management	Adequate equipment and facilities		No. of successfully managed incidents	2001 2004	MENR DO centres	Availability of finance
Strategy 4: To develop funding mechanisms.						
1. Allocation of funds by the exchequer.	Printed estimates		Authority to incur expenditure (AIE)	July 2003 to June 2004	MPP MENR	Parliamentary Approval

Issue: Response						
Strategy 1: To establish institutional framework for flood management (i.e. Disaster Operation Centres (DOC) at National District and Grassroots levels.						
Activities	Outputs	Cost of Inputs	Monitoring Indicators	Time frame	Actors	Assumptions/Risks
1. Establish emergency centres e.g. search and rescue	Improved security of people and property		No. of disaster operation centres	July 2001 July 2006		Cooperation. Availability of finance.
2. Provision of essential basic needs	Reduced outbreak of water-borne diseases		No. of incidents of disaster outbreak	July 2001 June 2006		Cooperation. Availability of finance.
3. Installation of works related response teams e.g. diversion of flood waters	Sustained livelihood of affected population					
4. Undertaking inter/intra Catchment water transfer	Reduced destruction of infrastructure			2004 2006		
Issue: Recovery and Rehabilitation						
Strategy 1: To establish institutional framework for disaster management i.e. Disaster Operation Centres (DOCs).						
1. Reclamation of works on flood plains	Reclamation of works on flood plains			Immediately Jul 2001 June 2006		
2. Reconstruction of water supplies and rehabilitation of flood prevention structures	Improved/restored water structures					
Strategy 2: To establish institutional framework for disaster management i.e. Disaster Operation Centres (DOCs)						
1. Lodging of insurance claims	Compensation for losses			Immediate Jul 2001 June 2004		
2. Restoration of original waterways	Waterways restored			2001 2003		
3. Rehabilitation of environment	Water services restored/improved					
4. Mobilization of disaster teams to interact with the public	Informed public			Jul 2001 2006		

6.5.2 Drought

Drought is a recurring phenomenon in the country. So far, it has been approached in an uncoordinated manner. The established task force of National officials, to monitor and advise the government, have not acted in a timely manner. It is necessary to come up with strategies to fight the recurrent drought in a coordinated approach up to grassroots level.

6.5.2.1 Goal and Strategies on Drought

6.5.2.2 Goal

Effective drought management.

6.5.2.3 Strategies on Prevention and Mitigation

- 1 To undertake watershed management activities so as to improve on soil infiltration and groundwater storage.
- 2 To create awareness on water saving techniques.

6.5.3.4 Strategies on Preparedness

1. To advise consumers on the need for water storage for security.
2. To provide strategic water reserves.
3. To enhance appropriate water use management practices.
5. To undertake works and studies possible only during droughts.
6. To develop funding mechanism.

6.5.3.5 Strategies on Response

1. To establish institutional drought management at the National District and Grassroots levels.
2. To undertake works and studies possible only during droughts.

6.5.3.6 Strategy on Recovery and Rehabilitation.

1. To revise programmes and build capacity.

Table 6.2 Logical Framework Matrix on Drought.

Goal: Activities	Out put	Cost of Inputs	Monitoring Indicators	Time Frame	Actors	Assumptions/Risks
Issue: Prevention and Mitigation.						
Strategy 1: To undertake watershed management activities so as to improve on soil infiltration and groundwater storage.						
1. Various catchment conservation activities e.g. promotion of indigenous trees, protection of springs and musses/wet lands.	Preservation of bio-diversity		Acreage under forest.	Jul 2001 Jun 2006	MENR Stakeholders	Awareness motivation
2. Strengthen fire prevention measures and encourage water harvesting and storage	Fire outbreak prevented		No. of fires successfully dealt with.	Jul 2001 Jun 2006	MENR MTTI LA	Logistics. Finance.
Strategy 2: To create awareness on water saving techniques						
1. To reduce moisture loss my mulching of plant crops.	Enhanced low flows		Higher yields	Jul 2001 Jun 2006	MENR MARD	Cooperation. Availability of finance.
2. Undertake borehole construction and rehabilitation	Improved efficiency in water supply delivery		No. of boreholes	Jul 2001 Jun 2006	MENR, MARD Stakeholders	Ditto
3. Information dissemination	Informed citizenry		Reports. Awareness	Jul 2001 Jun 2006	MENR, MARD Stakeholders	Ditto
Issue: Preparedness						
Strategy 1: To advise consumers on the need for water storage for security						
1. Provide for strategic water reserve	Improved water use efficiency		No wastage of water	2001-2006	MENR, LA Stakeholders	Availability of Finance
2. Establish proper infrastructure for water distribution	Sustained water supplies			2001-2006		Ditto
Strategy 2: To provide Strategic water reserve						
1. Construct water storage reservoirs	Reservoirs constructed		No. of reservoirs.	2001-2006	MENR, LA Stakeholders	Ditto
Strategy 3: To enhance appropriate water use management practices						
1. Promote irrigated agriculture by use of treated waste water.	Controlled losses on agricultural output		Acreage under irrigation	Jul 2001- Jun 2006	MENR BDA	Ditto
2. Promote mulching for crops.	Efficient water allocation systems in place			Jul 2001 Jun 2006	MENR MARD	Ditto
3. Review water use practices and abstraction	River flow updates		Sustainable river flows	Jul 2001 Jun 2006	MENR BDA	Ditto
Strategy 4: To undertake works and studies possible only during droughts						
1. Establishment of early warning systems	Drought situation updates		Low incidents of malnutrition	2001-2006	MENR, MARD Stakeholders	Ditto
Strategy 5: To develop Funding mechanisms.						
1. Allocation of funds by the Exchequer.	Printed Estimates.		AIE	July 2003 to June 2004.	MFP MENR.	Parliamentary Approval..

Issue: Response						
Strategy 1: To establish institutional drought management at the National District and Grassroots levels						
Activities	Out put	Cost of Inputs	Monitoring Indicators	Time Frame	Actors	Assumptions/Risks
1. Provision of emergency water.	Emergency water supply provided		Lower incidents of diseases.	Immediate	MENR LA BDA	Cooperation
2. Formation and consolidation of community based rapid response teams	Rapid response teams established at community level		Task Forces	2001 -2006	MENR Other stakeholders	Availability of finance. Cooperation
Strategy 2: Undertake works and studies possible only during droughts						
1. Undertake reservoir and lake profiles	Reservoir and lake profiles produced		No. of Reports	2001-2006	BDA Other stakeholders	Availability of finance.
2. Gauging of springs	Reports, maps, and bulletins		No. of Reports	Jul 2001 Jun.2006	BDA Other stakeholders	Availability of finance.
3. Determination of borehole groundwater levels.	Groundwater levels determined		No. of Reports	Jul 2001 Jun.2006	MENR	Availability of finance. Cooperation
Issue: Recovery and Rehabilitation						
Strategy: To revise programmes and build capacity						
1. Repair and rehabilitation of equipment	rehabilitated and improved resource base		No. of operation equipment	Immediate	MENR Other stakeholders	Availability of finance.
2. Diversification programmes	Revised programmes in place		No. of plans	Jul 2001 Jun.2003	MENR Other stakeholders	Availability of finance.

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6.5.3 Goals and Strategies on Landslides

6.5.3.1 Goal

Effective land slide management.

6.5.3.2 Strategies on Prevention and Mitigation.

1. To put in place appropriate land use management practices that protect vulnerable soils.
2. To create awareness on vulnerable areas.

6.5.3.3 Strategy on Preparedness.

1. To determine vulnerable areas so as to plan for their protection.
2. To develop funding mechanisms.

6.5.3.4 Strategy on Response.

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

6.5.3.5 Strategy on Recovery and Rehabilitation.

1. To strengthen and improve measures to protect life and property.

Table 6.3 Logical Framework Matrix on Land Slides.

Goal: Effective Land slide Management.						
Issue: Prevention and Mitigation.						
Activities	Out put	Cost of Inputs	Monitoring Indicators	Time Frame	Actors	Assumptions/Risks
Strategy 1: To put in place appropriate and use management practices that protect vulnerable soils.						
1. Enforce land use laws	Appropriate land use practices		No. of cases prosecuted.	Jul 2001 - Jun 2006	MENR MLS Other stakeholders	Cooperation
2. Undertake drainage Aforestation and land stabilization works	Slope stabilization undertaken		No. of reported land slides	2001 - 2006	MENR MARD	Availability of finance. Cooperation
Strategy 2: To create awareness on vulnerable areas						
1. Dissemination of information	Informed citizenry		No. of meetings	Immediate	MENR Provincial Admin.	Cooperation
Issue: Preparedness						
Strategy 1: To determine vulnerable areas so as to plan for their protection						
1. Undertake surveys and studies to map out vulnerable areas	Reports, maps and zoning done.		No. of Reports	2001 - 2003	MENR MLS Other stakeholders	Availability of finance.
Strategy 2: To create funding mechanisms.						
1. Allocation of funds by the Exchequer.	Printed estimates.		A/E	July 2003 to June 2004	MFP MENR	Parliamentary Approval.
Issue: Response						
Strategy 1: Establishment of a mechanism for land slide management at National, District and Grassroots levels						
1. Provide for evaluation	Evacuation undertaken		No. of Reports	2001 - 2006	MENR MLS LA	Availability of finance. Cooperation
Issue: Recovery and Rehabilitation						
Strategy 1: To strengthen and improve measures to protect life and property						
1. Planting of tree species that drain water from the sub-soils	Trees planted		Average under forest	2001 - 2003	MENR MARD Other stakeholders	Cooperation
2. Reconstruction of drains	Drains constructed		Few reported incidents	2001 - 2006	MENR MLS BDA	Availability of finance. Cooperation
3. Insurance claim	Compensation for losses		No. of insurance policies	2001 - 2006	Insurance industry	Cooperation

7.0 WATER QUALITY AND POLLUTION CONTROL

7.1 BACKGROUND

The long-term objective of the Government is to ensure that all residents in the country have access to clean and potable water. This is only possible, if the available water resources are protected from pollution. Pollution of surface and groundwater resources has become a major problem due to human activities, which have been carried out in total disregard of the need to conserve the water resources and which have also had a direct effect not only on the quantity but also the quality of water resources.

Water resources in Kenya are increasingly becoming polluted from both point and non-point sources caused by the activities of agriculture, urbanization and industry contributing to organic and inorganic and aesthetic pollution of water. Intrusions of saline water in the coastal region, leaches from garbage dumps, and infiltration of fertilizer and pesticide residues are a direct threat to surface and ground water.

All these wastes impact on water resources and are manifested in a variety of ways. Water quality deteriorates, and negative environmental and human health effects become apparent. There are also negative aesthetic effects of water pollution when there is a loss of scenic beauty and water spots become unsuitable for recreation. Because polluted water is expensive to treat, water supplies costs rise. Finally, conflicts over water rights emerge as shortages of water of suitable quality for domestic, industrial and irrigation purposes develop.

In order to 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. However, the program has been constrained by lack of funding and compounded by other logistical problems.

There are three major types of diffuse sources of water pollution: agricultural activities, mining and construction activities and urban run-off.

7.2 PROBLEM STATEMENT

There is inadequate pollution control measures and weak institutional capacity to monitor water quality. In many cases some water bodies have been treated as waste carriers or used as dumping ground for both solid and liquid wastes in total disregard of the water requirements of the people downstream.

7.3 POLICY DIRECTION

The policy direction is geared towards formulation of standards and guidelines for the disposal of undesirable elements in water and introduction of legislation to ban/regulate their discharge into water bodies with appropriate fines/tariffs. The National water quality monitoring programme is to be strengthened for monitoring performance. It will also be necessary to make water abstraction and disposal permits dynamic and economic instruments for pollution control. In addition effluent discharge levies will be introduced. The level of the levy will be commensurate with the amount and the nature of the effluent discharged and cost of treatment required based on the Polluter-Pays' principle.

7.4 GOAL AND STRATEGIES

7.4.1 Goal

Effective National Water Quality and pollution control Management.

7.4.2 Strategies

1. To establish water quality and effluent discharge standards and guidelines for water quality and pollution control.
2. To ensure that EIA is carried-out on all proposed projects as appropriate.
3. To strengthen the capacity to monitor and enforce water quality and waste water discharge standards.
4. To encourage PSP in water quality monitoring and pollution control.

Table 7: Logical Framework Matrix on Water Quality and Pollution Control

Goal: Activities	Output	Cost of inputs	Monitoring Indicators	Time Frame	Actors	Assumptions/ Risks
Strategy 1: To Establish water quality and effluent discharge standards and guidelines for water quality and pollution control						
1. Prepare standards and guidelines	standards and guidelines in place		No. times quoted/ followed	July 2002 - 2004	MENR, KeBS All stakeholders	
2. Monitor the discharge of undesirable elements into water bodies	Data and reports		No. refs. to data and reports	July 2002 - 2004	MENR, All stakeholders	
3. Enforce the standards and guidelines	Compliance with standards and guidelines		Reports, Court cases	July 2002 - 2004	MENR, All stakeholders	
Strategy 2: To strengthen the capacity to monitor and enforce water quality and effluent discharge standards and guidelines for water quality and pollution control						
1. Strengthen the National Water Testing Laboratory and its provincial branches for efficient water testing.	Efficient laboratories in place		Analytical data Reports	July 2002 -2004	MENR, All stakeholders	
2. Establish accreditation mechanisms for the analytical laboratories.	Accreditation, certificate, gazettelement		Authoritative reports	July 2002 -2004	MENR, AG	
3. Establish laboratory linkages as appropriate.	Memorandum of understanding		Minutes of meetings	July 2002 -2004	MENR All stakeholders	Co-operation
4. Develop water quality and pollution control management plans	Management plans		Plans being followed	July 2002 -2004	MENR	
5. Initiate studies on the extent and effect of pollution	Study reports		No. Refs. to reports	July 2002 -2004	MENR	
6. Formulate policies and laws on wetland conservation.	Policies and laws in place		policies and laws followed	July 2002 -2004	MENR, KWS, All stakeholders	
7. Participate in sanitary policy formulation.	Policy in place		Reduced water-borne diseases	July 2002 -2004	MENR, MOH, All stakeholders	Collaboration
8. Establish a framework for promotion of water in hygiene.	public awareness		Ditto	Ditto	Ditto	Collaboration
Strategy 3: To ensure EIA is carried out on all proposed projects as appropriate						
1. Ensure that EIA is carried out on proposed projects	EIA reports		reports	July 2002 -2004	MENR, NEMA, All stakeholders	
2. Review all EIA reports on proposed projects.	status reports		reports	July 2002 -2004	Ditto	
3. Monitor mitigation measures.	mitigation measures in place		reports	Ditto	Ditto	EIA carried out
4. Monitor environment management plans.	management plans in place		reports	Ditto	Ditto	
Strategy 4: To encourage Private Sector Participation (PSP) in a water quality and pollution control						
1. Create public awareness on the importance of water quality and pollution control.	meetings/seminars, print and electronic media programs		reduced pollution, improved health	July 2002 -2004	MENR All stakeholders	

8.0 INTERNATIONAL WATERS

8.1 BACKGROUND

Kenya shares some of her surface and ground water, including lakes and the underground aquifers respectively with her neighbours. In line with integrated water resources management, account must be taken of the effect of shared water resources among countries receiving their water resources from the same river/lake Catchment. Due to the importance of these resources possible conflict on use and development may come up and, therefore, the need to address this issue in the overall integrated water management strategy.

There is a need to improve and enhance cooperation with all riparian countries in order to avoid conflict over the shared water resources by ratifying and observing international conventions and treaties.

8.2 PROBLEM STATEMENT

Non existence of ratified international conventions and treaties on shared inland waters.

8.3 POLICY DIRECTION

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

8.4 GOAL AND STRATEGIES

8.4.1 Goal

Collaboration and cooperation mechanisms allowing for Catchment wide approaches in management of resources to benefit all riparian countries.

8.4.2 Strategies

1. To improve collaborative IWRM, activities by incorporating interests of trans-national stakeholders.
2. To harmonize laws and policies that addresses the shared international waters.
3. To establish national institutional framework to address international waters.
4. To integrate relevant international conventions and treaties governing the management and administration of international waters into national legislation.

Table 8: Logical Framework Matrix on International Waters.

Goal: Collaboration and cooperation mechanisms allowing for Catchment wide approaches in management of resources to Benefit all riparian countries.		Cost of input		Monitoring Indicators		Time frame		Actors		Assumptions/Risks	
Activities		Output		Monitoring Indicators		Time frame		Actors		Assumptions/Risks	
Strategy 1: To improve collaborative IWRM activities by incorporating interests of trans-national stakeholders.		Effective fora for collaboration and coordination established		Meetings		2001 continuous		MENR MFA & IC AG		Corporation and goodwill	
1. Creation of a fora for collaboration and coordination		Treaty and joint communiqué		Policy paper		2002 continuous		MENR MFA & IC AG		Corporation and goodwill	
Strategy 2: To harmonize laws and policies that addresses the shared international waters		Enacted laws in place		Revised acts		2003 – 2005		MENR AG		Quick ratification of agreements	
Legislate and domesticate laws that pertain to governing international waters as need arises.		Institution in place.		Minutes of meetings.		2003 continuous		MENR MFA & IC AG		Goodwill	
Strategy 3: To establish national institutions framework		Appropriate requirements of international convention and treaties adopted		Treaty in place		2005		MENR MFA & IC AG		Goodwill	
Set-up new or enhance existing national institution to coordinate international waters		Conventions and treaties in place		Treaty in place		2005		MENR		Goodwill	
Strategy 4: To integrate relevant international conventions and treaties governing the management and administration of International waters into national legislation.											
Sign, ratify and comply with international conventions and treaties as appropriate.											

9.0 INSTITUTIONAL FRAMEWORK

9.1 BACKGROUND

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

Water management is currently (2001) vested in the following bodies and organizations: -

- **The Minister.** He is responsible for control over every body of water. The Water Act (Cap 372) empowers the Minister to be the custodian of all water resources in the country and to be in charge of water development to conserve and protect water sources or courses against depletion and pollution. The Minister also appoints local authorities, private organizations, and communities to become water undertakers to manage and develop water supplies on his behalf.
 - **The National Apportionment Board (WAB).** It is responsible for 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 country is divided into six (6) Catchment areas (Athi, Tana, Lake Victoria North, Lake Victoria South, Northern Ewaso Nyiro, and Rift Valley). The Boards consider the applications, for water exploitation for each Catchment, and recommend them to the Water Apportionment Board. Each Catchment Board has a Secretary, District Water Bailiffs, Divisional Water Bailiffs and Assistant Water Bailiffs and Water Guards in the Locations.
 - **The District Water Boards.** The District Water Boards is a Sub-Committee of the District Development Committee (DDC). They manage water at the district levels in accordance with the District Focus for Rural Development.
 - **The River Catchment Development Authorities.** They are special bodies established to utilize resources in each particular catchment.
 - **The National Water Conservation and Pipeline Corporation (NWPC).** The National Water Conservation and Pipeline Corporation was formed in 1988/89 to complement the efforts of the Ministry in undertaking water and sewerage development in a more economic and commercial basis. It is thus expected to ensure that costs recovery from water and sewerage projects is improved and that enough funds are generated which can be used to improve the water and sewerage provision.
1. Management and development of the specified water projects.
 2. Bulk water supply to water undertakers and persons as the Minister may designate.
 3. Assistance to the Government in formulation and execution of a national water

development policy.

4. Determination of water charges and methods of charging.

- **Water Appeals Board.** The Water Act (Cap 372) provides for the establishment of a Water Appeal Board which consists of a Chairman, appointed by the Minister on advice of the Chief Justice and two other persons appointed by the Minister. At present, the role of the Water Appeals Board is being carried out by the MENR, while the legal status of this Board is being finalised through the necessary amendments to the Water Act (Cap 372).
- **The Director of Water Development.** Is the technical body of the Government on all matters concerning exploitation and conservation of water resources. The Director of Water Development controls six Divisions, the Provincial and District Water Offices and the Kenya Water Institute.

In the Provincial Water Office, the Provincial Water Officer (PWO) is the representative of WDD and responsible to the Director of Water Development for the development, maintenance, control, and supervision of all water related matters in the province. In the District Water Office, the District Water Officer (DWO) is the representative of the WDD and responsible to the PWO for the overall planning, control, and management of all water related matters in the districts including financial management.

Finally, The Local Government Act (Cap 265) stipulates what kind of responsibilities regarding the provision of infrastructure and social services shall be vested with the declared local authorities.

The sector has undergone fundamental changes both in the approach and the roles of the players. However, the institutions charged with various roles have not been adapting themselves to these changes. The performance of the sector, therefore, has been below expectations.

An effective institutional arrangement with the capacity for implementing the national water policy, water legislation and its subsidiary regulations, as well as setting guidelines for carrying out integrated water resources management, defining water allocation principles and procedures, monitoring enforcement and setting water use fees, waste water levies is necessary. The institution framework will also have capacity for the drawing up of long term plans on all water demand as well as undertaking water resource assessment, monitoring, analysis and information sharing.

Managing water resources calls for multi-disciplinary activities at different levels, starting from the institutional and legal aspects to operation and maintenance of works, facilities and equipment. This involves both functional and operational tasks. Functional tasks include backup tasks, which contribute to the achievement of the goals of the national water policy. Operational tasks refer to all operation and maintenance tasks as relates to works, facilities and equipment, contributing directly to the achievement of the same goals. The Kenya France Development Cooperation Task Force on Human Resources Development in the Water Sector January 1997 Report identified thirty-three (33) job descriptions in Water Resources Management. The personnel involved range from Subordinate staff, Craft/Artisan, Operators, Technicians and Professionals.

9.2 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, especial cross-sectoral, leading to conflicts. 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 adequate resource base.

- Catchment Boards do not possess powers of enforcement even though they have clear mandate.

9.3 POLICY DIRECTION

The policy direction on Institutional framework as regards water resources management is that; "The decision making process in respect to water resources management will be decentralized by adopting three water resources management levels (including (National, Catchment, Sub-Catchment/Catchment levels) and setting up and or strengthening appropriate institutions clearly defining the role of each and how they relate to each other. Among the roles of these institutions will be to identify vital water catchment areas, including wetlands, and initiate action for the Gazettement for protection purposes."

9.4 GOAL AND STRATEGIES

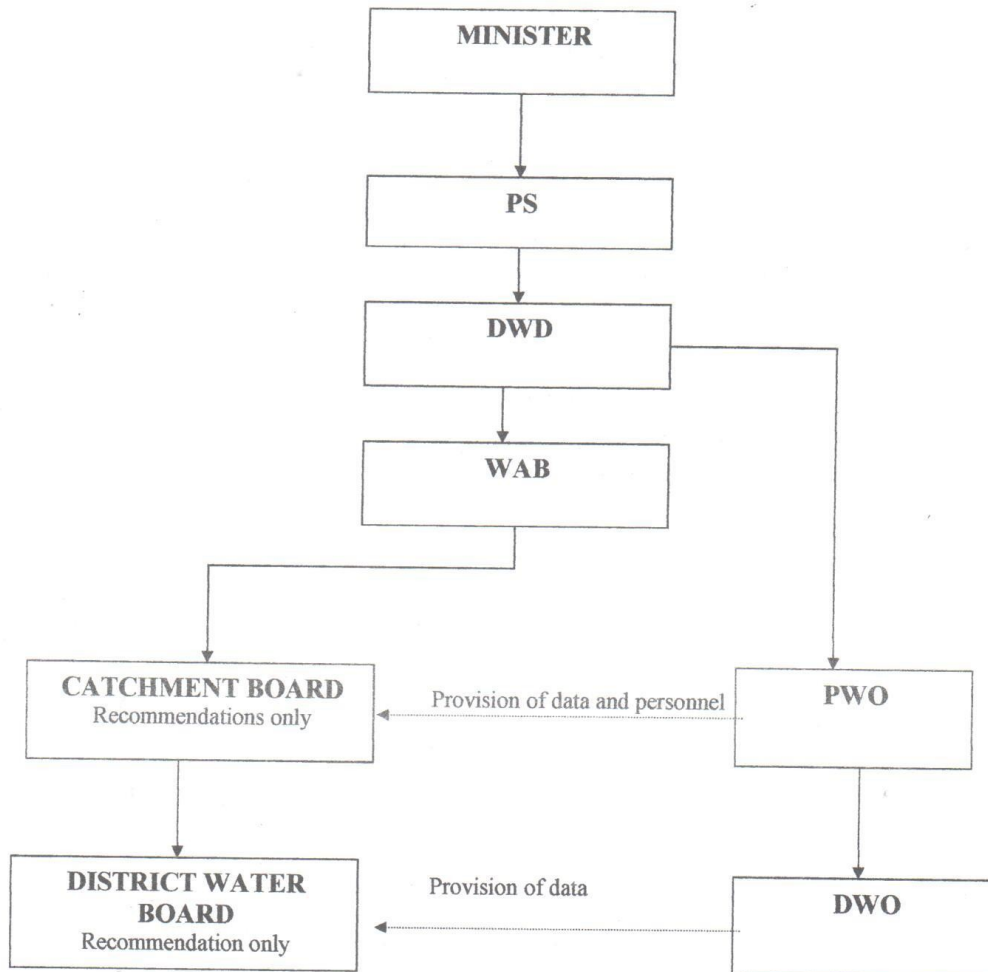
9.4.1 Goal

Enhanced performance of all actors as provided in law in a decentralized water resources management system, whose management approach incorporates and allows for; checks and balances, and decentralized management.

9.4.2 Strategies

1. To develop an appropriate and effective institutional framework with clear responsibilities for actors.
2. To see Catchments as the proper units for meaningful and effective IWRM management systems.

CHART 9.5 CURRENT INSTITUTIONAL SET-UP IN WRM

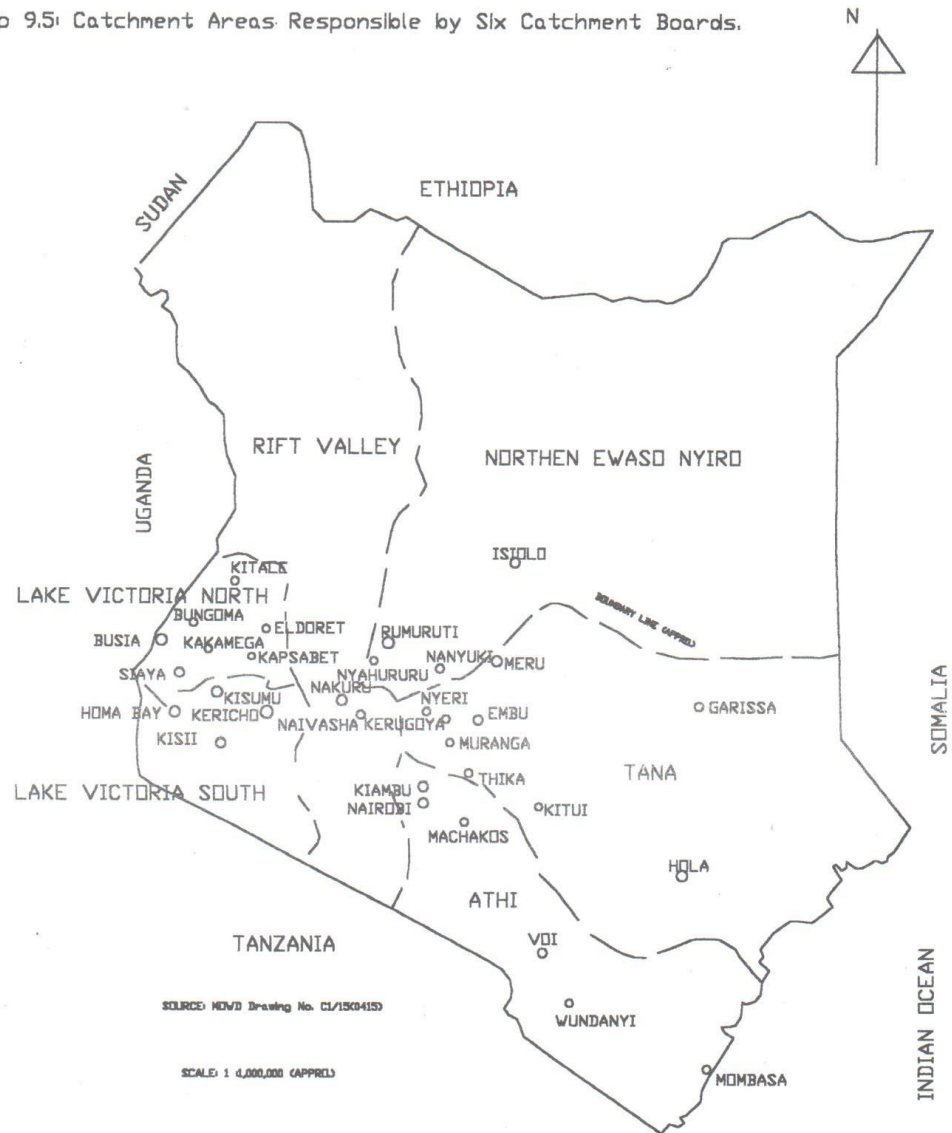


9.5 SUMMARY OF INSTITUTIONAL ARRANGEMENT – WATER RESOURCES MANAGEMENT

Table 9.5.1: Current Roles of Various Actor in the Sector

ACTOR	LAW (Chapter)	ROLES
Ministry of Environment and Natural Resources (MENR)	Water Act (Cap 372)	<ul style="list-style-type: none"> Policy development, direction and management of Water Resources. Formulation of long and short term plans for National Water Resources and Conservation and Development. Development and application of standards for design, construction, operation and maintenance of all hydraulic systems. Identification, development, operation and maintenance of WR and WS systems. Minor irrigation and drainage systems, sewerage and other hydraulic systems. Provision of consultancy services to local authorities and other public institutions on design, implementation and maintenance of water and waste water systems.
Water Resources Authority	Water Act (Cap 372)	<ul style="list-style-type: none"> 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).	<ul style="list-style-type: none"> The conservation and rehabilitation of water catchment areas to ensure proper management and conservation of the environment. Development of water resources to create employment and to improve the economic situation of the local population. This includes the development of water-specific and multi-purpose projects for domestic purposes, livestock, irrigation, hydro-power and small scale industries. The rehabilitation of existing water projects with the participation of beneficiary communities. These include communal wells, water ponds and dams. 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)	<ul style="list-style-type: none"> The conservation and rehabilitation of water catchment areas to ensure proper management and conservation of the environment. Development of water resources to create employment and to improve the economic situation of the local population. This includes the development of water-specific and multi-purpose projects for domestic purposes, livestock, irrigation, hydro-power and small scale industries. The rehabilitation of existing water projects with the participation of beneficiary communities. These include communal wells, water ponds and dams. The promotion of integrated planning for water resources within the various river Catchments.
Ministry of Agriculture	Agriculture Act (Cap. 318)	<ul style="list-style-type: none"> 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).	<ul style="list-style-type: none"> Powers dealing with water supplies, waste water, sewerage and water pollution. Control standards of treated effluents. Control industries liable to pollute water courses.
Ministry of Local Government	Local Government Act (Cap. 265).	<ul style="list-style-type: none"> Establish, maintain and regulate sewerage and drainage works. Construct drains and connections to sewers. Fix charges for use of sewerage and drainage facilities. Undertake water supply services.
KEWI		<ul style="list-style-type: none"> Manpower training and development for the sector.
Water Sector NGO		<ul style="list-style-type: none"> Provide services. Financing.
Religious Organizations		<ul style="list-style-type: none"> Discretionary powers to provide services.
Self-help Groups and Water Associations.		<ul style="list-style-type: none"> Discretionary powers to provide services. Set by-laws and regulations.
Consultants in Water (PSP).		<ul style="list-style-type: none"> Contracted in development.
Water Appeal Board		<ul style="list-style-type: none"> Settle conflicts.

Map 9.5: Catchment Areas Responsible by Six Catchment Boards.



9.6 ROLES AND COMPOSITION OF INSTITUTIONS FOR INTEGRATED WATER RESOURCES MANAGEMENT

The proposed Institutional framework involves a range of agencies the main ones being the minister in charge of water, the director general of water affairs, a water resources management authority, Catchment Boards and water appeals board. The institutional framework is illustrated in chart 9.6, while Table 9.6 provides the roles for the various actors in the institutional framework.

Chart 9.6 Proposed Institutional Framework for IWRM

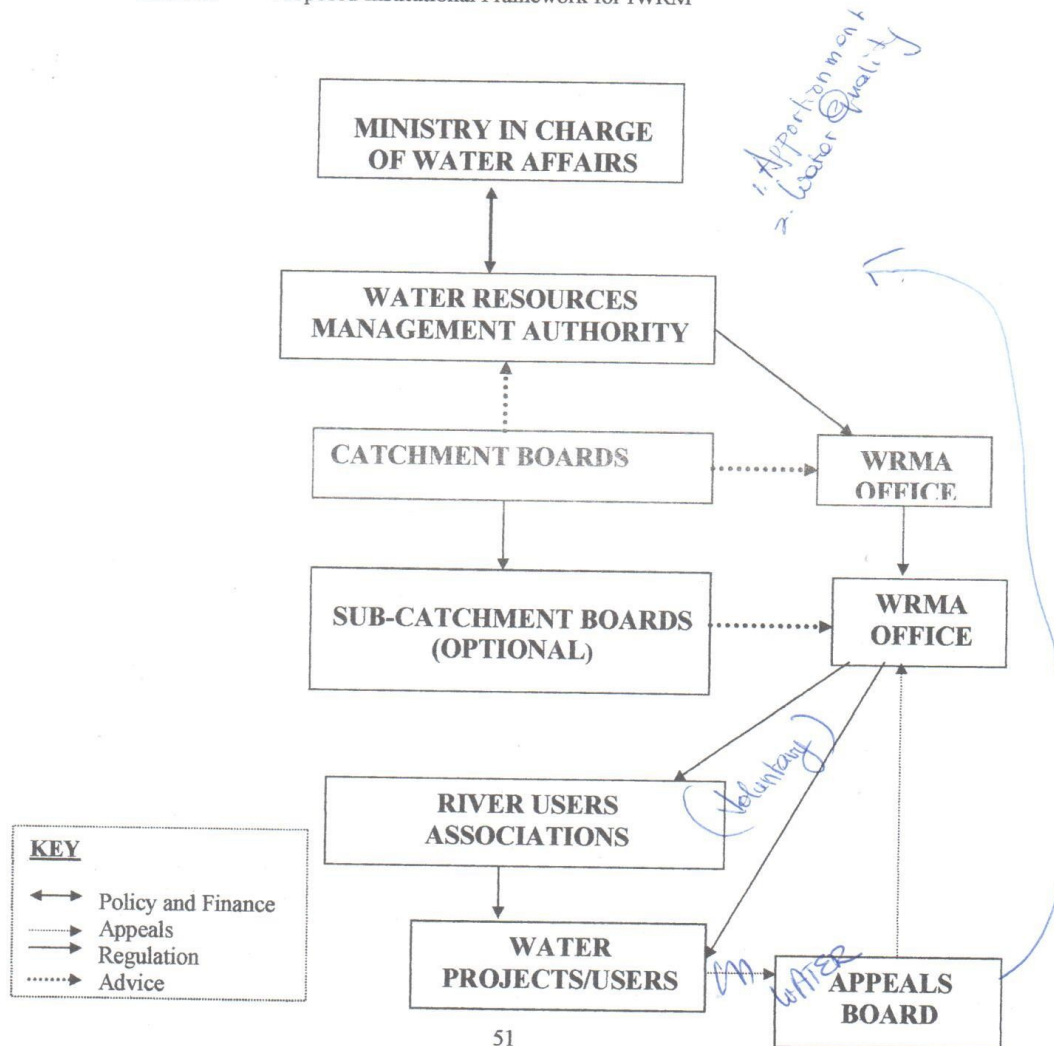


Table 9.6 Proposed Roles for the Actors in the Institution Frame work

REF.	ACTOR	LAW (Chapter)	ROLES
1	Ministry of Environment and Natural Resources (MENR)	New Water Act	<ul style="list-style-type: none"> Exercise the control of every 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. 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)
2	National Water Resources Authority (NWRA)	New Water Act	<ul style="list-style-type: none"> Lead agency for management and protection of water catchments Develop principles, guidelines and procedures for the allocation of water resources Allocate water resources Receive and determine applications for permits for water use Monitor and enforce permits for water use and institute criminal proceedings as necessary Regulate and protect water resources quality Determine fees, levies, premiums, and other water resources charges Coordination, collection, analysis and maintenance of water resources data and make periodic publications on forecasts and projections. Furnish the minister with information related to water resources Liaise with other bodies for better regulation of water resources Undertake assessment of water resources. Policy direction. 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.
3	Catchment/Sub-Catchment Boards.	New Water Act	<ul style="list-style-type: none"> 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		<ul style="list-style-type: none"> Create a forum 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	<ul style="list-style-type: none"> Comply with water quality standards. Obtain operation permit.
6	Water Appeals Board		<ul style="list-style-type: none"> Receive and resolve complaints from resources users
7	Ministry of Health		<ul style="list-style-type: none"> Policy formulation on Environmental Sanitation/Public Health Act; Environmental Bill (MENR).
8	Kenya Forest Service	Forest Act	<ul style="list-style-type: none"> Manage forests on water catchment areas for purposes of water and soil conservation.
9	National Environmental management Authority		<ul style="list-style-type: none"> Advise the minister on declaration of Provisional and Local Authority forests. 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

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 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. The minister may delegate his powers and roles to the Director General of water affairs whose role is to provide advice to the Minister on policy and technical issues.

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 chairman of the Authority is to be appointed by the President while the Minister will appoint the members of the Board.

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. 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, travelling expenses and other out of pocket expenses.

The Authority will prescribe the purposes for which permit may be required 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 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 speed up its operations.

The governing Board of the Authority will appoint its chief executive officer following consultation with the Ministers. 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 members of the Board shall be not more than 15 members. 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 as a for a for the resolution of conflicts and cooperative management of the water resources in the Catchments. The association will be voluntary.

Table 9: Logical Framework Matrix on Institutional Framework

Goal: Enhanced performance of all actors as provided in law in a decentralized water resources management system, whose management approach incorporates and allows for, checks and balances, and decentralized management.						
Activities	Output	Cost of input	Monitoring Indicators	Time frame	Actors	Assumptions/Risks
Strategy 1: To develop an appropriate and effective institutional framework with clear responsibilities for actors.						
1. Review the Water Act						
2. Strengthen all bodies as provided in law.	Re-organize and strengthened institutions capable of implementing own activities in management, planning and budgeting.		Legal notice Organogram	2001 continuous	MENR AG MFP	
3. Enhance capacity to enforce provisions of the act.	Decentralised implementation responsibilities		Cases prosecuted. Wider use of existing powers.	2001 continuous	MENR AG MFP	
4. Undertake affirmative action to accommodate women representation in IWRM	Gender balanced boards		Minutes of meetings	2001 continuous	MENR NGOs	
5. Strengthen catchments boards to have the capacity to perform IWRM tasks effectively	Increased participation of other stakeholders		Legal Notices	2001 continuous	MENR AG	
6. Restructured Ministry's role to fit policy formulation, legislation, and monitoring	Establishment of new implementing agencies.		Operational institutional structures.	2002 continuous	MENR OP	
7. Re-organize institutions involved in IWRM to be in line with new law.	Up-to-date inventories		Work plans of institutions.	2001 continuous	MENR OP MFP	
Strategy 2: To see Catchments as the proper units for meaningful and effective units for IWRM management.						
1. Operationalise the NWRA and its subsidiary boards	Business plans		Work plans and permits issues.	2001 continuous	MENR OP MFP AG	

10.0 LEGISLATION, REGULATION AND ENFORCEMENT

10.1 BACKGROUND

The management of water resources in the country is currently regulated through the Water Act (Cap 372) of the Laws of Kenya. This Act provides for: -

- Ownership and Control of water to be vested in the Government of the Republic of Kenya
- Control of Water by the Minister in accordance with the provisions the Act
- Water Resources Management by the Water Resources Authority
- Local Planning by Catchment Boards and Regional Water Committees
- Water Apportionment by Water Apportionment Board and Local Water Authorities
- Gazettement and Execution of Works on State Schemes
- Acquisition of Water Permits and projects classification
- Abstraction of Groundwater and permits therefore
- Procedure on issue of Permits
- Dams planning and construction
- Execution and Maintenance of Works
- Variation and Cancellation of Permits
- Easements
- Water Supply Undertaking
- Miscellaneous and General aspects of Water Legislation

There are, however, other statutes that touch on water sector affairs. These include the Public Health Act, the Agriculture Act, the Forest Act, the Registered Land Act, Physical Planning Act No. 6 of 1996, Environmental Management and Coordination Act No. 8 of 1999, among others.

The Water Act (Cap372) is a fairly effective, even its present form, in many aspects such as terms of 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. For the institutions that exist, they have been very weak, lacked funding and have been 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.

10.2 PROBLEM STATEMENT

- The Acts provisions on the penalties, have been overtaken by inflation, and cannot deter 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.
- Inadequate policies
- Inadequate legislative framework and enforcement capability
- Arising demand on limited water supplies
- Poor network and data base of the time series

- Inadequate resources within the institutions and lack of motivation in officers mandated to perform these tasks.

10.3 POLICY DIRECTION

Institutionally, it is policy for the Ministry responsible in the sector to divest from direct service provision (to autonomous departments within local authorities, for example) and retain regulatory and enabling functions, supporting private sector participation and community management of services, strengthening local institutions. MENR should define roles for, and coordinate all actors in the sector. New legislation should support this policy as far as possible.

In the National Water Policy, it is stated that “The Water Act will be reviewed and updated to comprehensively address all the legislative water issues. Of major attention will be the legislation to enable added benefit during the transfer of roles to new actors and water facilities from one institution to another. The new legislation will be introduced to give various institutions legal mandate to perform certain specific roles in water development and also provide mechanisms for regulating their performance.”

10.4 GOAL AND STRATEGIES

10.4.1 Goal

Responsive and effective provision for conservation, control, apportionment and use of Kenya's water resources for purposes incidental thereto and connected therewith.

10.4.2 Strategies:

1. To build sustainability in conservation, control, apportionment and use of water resources.
2. To revise the sub-division of country into major Catchments, sub-Catchments, catchments, and stream units for ease of administration.
3. To ensure legislation have provision for water user charge to support the concept of water resource being both a social and an economic good.

Table 10: Logical Framework on Legislation, Regulation and Enforcement

Goal: Sustainability in conservation, control apportionment and use of water resources						
Strategy 1: To streamline the administration of IWRM by creating all bodies as provided in law						
Activities	Output	Cost of input	Monitoring Indicators	Time frame	Actors	Assumptions/Risks
1. Finalise legislation (Cap. 372) to clearly define roles and responsibilities of newly reorganized institutions.	An appropriate institutional and legislative framework with clear definition of responsibilities of all actors in place.		Approved Acts. Legal notices.	2001 – 2003	MENR AG	Government to support reform process.
2. Establish inter-ministerial committee to over see IWRM Strategy and Policy.	Transition plans to guide reform process		Minutes of meetings. Studies reports.	2001 – 2003	MENR Other relevant ministries	Cooperation
3. Carry out comprehensive assessment through studies on needs for IWRM policy formulation	Reports		No. of Reports	2001 – 2003	MENR Other relevant ministries	Availability of funds
Gazettement of bodies	All bodies in place		Legal Notice	2001 continuous	MENR OP AG	
Staggered appointment of members	Functional boards through out.		Legal notices.	2001 continuous	MENR OP AG	
Strategy 2: To revise the sub-division of country into major Catchments, sub-Catchments, catchments, and stream units for ease of Administration						
Revision of Catchment map	Map		Map	2002	MENR	

11.0 CAPACITY BUILDING

11.1 BACKGROUND

The public sector, composed of the Ministry, the National Water Conservation and Pipeline Corporation, the Catchment Development Authorities and Local Authorities currently are the main employer of the technical personnel working in water resources management. A few other technical people work in private sector and with NGOs. Community groups tend to employ very few technical personnel.

11.2 HUMAN RESOURCE DEVELOPMENT AND MANAGEMENT

The on going overall Government staff rationalization and right sizing is part of the general economic restructuring of the public sector aimed at increasing efficiency in service delivery. The Ministry has reduced its staff with a view of focusing more on supervision, regulation and back stopping services.

On the one hand, staff, even though qualified, may not be in the right place, as will happen when operational responsibility is transferred to local authorities. This may call for a redeployment of staff. On the other hand, the changing nature of the sector calls for skills of a different kind, which, hitherto, have not been cultivated and nurtured in the sector. For instance, with the involvement of the private sector in service provision, business acumen as well as public relations skills, in addition to technical ability, will be required. This may necessitate a retraining of staff, and further capacity building. Automation to improve efficiency and cut costs may render certain categories of personnel redundant.

11.2.1 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 Economic Survey for the year 2000 reports that the Kenyan economic has been in recession for the last three years. The continued slow down in the economic performance has reflected in virtually all the key sectors in the economy. This has, therefore, affected the sector in relation to capacity building on the job training programs in that not many projects have been implemented lately thereby leading to a situation where most personnel lack 'hand 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.

11.2.2 Policy Direction

Further relevant factor is the overall Government staff rationalization and right sizing going on as part of the general economic restructuring. The Ministry will be required to reduce staff

and focus more on supervision, regulation and backstopping services to other water operators than on its traditional role of water supply provision. This may call for redeployment and retraining of staff.

11.2.3 Goal and Strategies

11.2.3.1 Goal

Efficient and productive workforce who are well trained and motivated and with adequate physical infrastructure and financial resources to work.

11.2.3.2 Strategies

1. To provide for an enabling environment for efficient delivery of services.
2. To provide an enabling environment to attract and allow for private sector participation in the sector.

Table 11.1: Logical Framework Matrix on Human Resources Development and Management

Goal: Efficient and productive workforce who are well trained and motivated and with adequate physical infrastructure and financial resources to work.						
Strategy 1: To provide for an enabling environment for efficient delivery of services.						
Activities	Output	Cost of Input	Monitoring Indicators	Time frame	Actors	Assumptions/Risks
1. Develop a system that recognizes human skills as a pre-requisite for achieving the objectives of the sector	Human resource tracking system		Mobility of staff.	2001 and continuous	MENR OP PSP BDA	Vibrancy in economy
2. Each institution to determine its staffing norms	Rationalized staffing levels		Staff profiles	2001 and continuous	MENR PSP	Inclusion of PSP in IWRM
3. Identification of training needs and training of staff for necessary skills through collaboration with training institutions	Appropriate training given		Workshops / seminars held.	2002 and continuous	MENR OP PSP	
4. Carry out training needs assessment with emphasis on IWRM.	Improved linkages in various aspects on IWRM		Training needs assessment reports.	2002 and continuous	MENR OP PSP BDA	
5. Rationalization of capacity requirements for efficiency in water resources management	Staff equitably distributed		Review report	2002 and continuous	MENR PSP	Reactivation of activities
6. Create an official directory of training institutions.	Directory published		National distribution report.	2002 continuous	MENR	
7. Establish data bases on available technical manpower in IWRM	Database in place		Database in place.	2002 continuous	MENR	
8. Reinforcing performance appraisal based on objective assessment	Effective mechanism for attracting and retention of staff implemented		Redesigned appraisal forms.	2002 continuous	MENR OP PSP	Objectivity maintained in assessment.
9. Develop a national manpower plan for IWRM	National manpower plan drawn		Report	2002 continuous	MENR BDA PSP	
Strategy 2: Provide an enabling environment to attract and allow for private sector participation in the sector.						
Source needed capacity from private sector on short term contracts or consultancy	Awards of contracts and consultancies		Contracts	2001 continuous	MENR BDA PSP	Encouragement of PSP in IWRM

11.3 INFRASTRUCTURE (TRANSPORT, BUILDINGS, LABORATORIES AND EQUIPMENT)

11.3.1 Background

The water supply and sanitation infrastructure has expanded so rapidly since independence thereby 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 up keep of facilities such as gauging stations, laboratories, surface 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.

11.3.2 Problem statement

- Most facilities are in need of repair, rehabilitation and replacement of the basic capital equipment essential for the effective and efficient provision of services.
- There is also an inadequacy in the networking and of spatial coverage.
- The expansion of the infrastructure and networks has not been undertaken due to budget restriction.

11.3.3 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."

11.3.4 Goal and Strategies

11.3.4.1 Goal

Adequate and well maintained facilities and equipment.

11.3.4.2 Strategies

1. To build capacity at national and Catchment level to carry out water quality analysis and quantity determination.
2. To provide efficient and appropriate field support services.

Table 11.2 Logical Framework Matrix on Infrastructure

Goal: Adequate and well maintained facilities and equipment						
Strategy 1: To build capacity at national and Catchment level to carry out water quality analysis and quantify determination						
Activities	Output	Cost of input	Monitoring Indicators	Time frame	Actors	Assumptions/Risks
1. Revitalize the existing laboratories	Laboratories in place		Analysis reports	2001 continuous	MENR	Availability of funds.
2. Refurbish and install IWRM facilities and equipment.	Facilities and equipment in place		No. of new data.	2002 continuous	MENR RBDA	Availability of funds.
3. Develop comprehensive maintenance packages including preventive, repair and user training instructions	Established maintenance system in place		No. of rehabilitated equipment.	2002 continuous	MENR RBDA PSP	Availability of funds.
Strategy 2: To provide efficient and appropriate field support services.						
1. Rehabilitation of vehicles and computers	Transport in place		No. of rehabilitated equipment.	2002 continuous	MENR RBDA	Availability of funds.
2. Provide modern communication tools	Communication equipment in place		No. of newly acquired equipment.	2001 continuous	MENR RBDA	Availability of funds.

12.0 PRIVATE SECTOR PARTICIPATION

12.1 BACKGROUND

Like many other African countries, after independence Kenya embarked on a strategy of provision of services across all sectors of the economy. This strategy systematically pre-empted rather than promoted the private sector i.e. there was minimal consultation.

Evidence collected by Dr. Ernest Wilson in his paper entitled 'Towards a More Effective Private-Public Sector Dialogue in Africa', indicates that there is a new pattern of private-public sector. The pattern is that of consultation and coordination with Government Officials more than has been the case in the past.

Lessons from Asia indicate that in the early 1970's they were faced with growing economic uncertainty. To reverse this trend the Government realised the need for more private sector participation in support, information and advice. This resulted in the formation of joint public and private sector consultative committees that brought together all major players in the economy to discuss issues of common concerns.

A number of lessons can be borrowed from East Asia's experiences, one of them is that the Government can promote public/private relations to secure new sources of revenue by diversifying the production base. This can only be achieved through regular communication and coordination with private sector entrepreneurs. A second lesson is that foreign and domestic investors cannot be attracted unless the regulatory, institutional and legal environments become competitive like those elsewhere in the world.

Improving private sector dialogue with public officials is essential both in the design and implementation of growth oriented public policy. Deliberate exclusion of society's principal economic actors from decision making on reforming and revitalizing the economy is demeaning particularly when they are expected to invest.

In the Sessional Paper No. 2 of 1997 on Industrial transformation to the year 2020, the role of the private sector is recognized as that of partnership with government in seizing opportunities and initiative to provide the investments in processing, manufacturing and service industries, provide appropriate technologies for efficient production. As emphasized through the Sessional Paper, partnership is the key to development

Efforts towards the development of the water sector have in the past been based on the fact that water is a basic need and an important catalyst in the economic and social development in the country. Driven by the element of provision, the Ministry since 1974 embarked on intensive water supply programs in urban and rural areas. Despite the developments of these water supplies, the dwindling of funds and increasing demand for water has made the operations and maintenance of the supplies unmanageable.

In recognition of the operation and maintenance processes, the role of the Ministry will gradually shift from that of provision of water to that of giving policy and regulation guidelines in the sector.

From the background explanation, it is clear that the private sector participation is being incorporated in areas that have traditionally been considered as public sector domain. In the

water sector, the challenge is on how best to assimilate this new phenomenon without compromising on water quality and quantity.

The current situation in the sector is that the prevailing policy (Session Paper No. of 1999) is not in harmony with the current water Act Cap.372. This, therefore, calls for an inclusive policy that has clear institutional and regulatory framework backed by law.

In general water analysis predicts a decreasing per capital water availability. With the currently rising demand, water crises are looming. In light of this prediction, there is urgent need to address the present water crisis to avert the future conflicts.

12.2 PROBLEM STATEMENT

- Lack of well defined regulation, criteria and guidelines for PSP entry
- Lack of public awareness on PSP concepts
- 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
- Local financial institutions are not familiar with water services as commercial operations.
- Limited capacity in, financial, technical and management in local PSP.
- Poor state of infrastructure

12.3 POLICY DIRECTION

In Sessional Paper No. 1 of 1986, the Government laid out a series of policies to redefine the role of Government. A number of reforms have been instituted to make the economy market oriented with fewer subsidies and encourage the private sector to play a pivotal role in the economy. The Government will continue to move away from interventionist measures to that of creating an environment supportive of the efficient operation of the private sector. To this end regulations, controls and laws governing the operations of private sector will be streamlined and bureaucratic procedures made more transparent. Direct public sector participation in production activities will be minimised.

The water sector policy direction as mentioned in the Sessional Paper No. 1 of 1999 gives the main policy change that the Government will gradually move away from provision of water to being a regulator and policy formulator. The Sessional Paper recognizes the challenge of bringing private sector on board in management and provision of water. Towards this 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. In order to ensure sustainable water supplies 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 participatory of the community and private sector.

Further to this, the Government will collaborate with relevant training institutions to build the necessary capacity for the sector. Other measures to further attract the private sector and wide stakeholder participation are: -

- i) Reviewing of the Water Act (Cap 372). This is aimed at conforming to new policy direction in the Ministry.
- ii) Defining the roles of the various actors and their mandates.
- iii) Building capacity in the private sector and community by strengthening local institutions.
- iv) Considering water as an economic good, therefore, consumers need to appreciate the user / polluter pays principle.
- v) Open and competitive tendering system has been encouraged to attract a wide private sector participation.

12.4 GOAL AND STRATEGIES.

12.4.1 Goal

The goal is to shift PSP in the sector from being a passive and reactive observer to becoming a proactive and fully engaged participant.

12.4.2 Strategies

This will be achieved through the following strategies: -

1. To establish joint consultative committees consisting of Senior Government Officials and their private sector counter parts. Similar committees should be established up to working levels where PSP should attend meetings.
2. To appoint private sector people to senior positions in the Government.
3. To appoint private sector people to Boards.
4. To listen to the private sectors and include their comments in Government planning and actions.
5. To enhance regulatory, institutional and legal reforms to give private sector more authority to participate fully in areas prior dominated by public sector.
6. Promote commercialization of dam construction, drilling, survey among other technical services.

13.0 APPLIED RESEARCH & TECHNOLOGY

13.1 BACKGROUND

Research is necessary if we have to achieve the objectives of transforming Kenya into an industrialized country by the year 2020. However, industries pose serious threats to the environment and more specifically to the state of the water resources. One major area that would require research is in the efficient use of water and the promotion of recycling of water for some specific uses. Equally important is the need to develop mechanisms for groundwater recharge through surface water.

Research should be demand driven towards the development of technologies that will enhance sustainable development and integrated management of water resources within the framework of sound environmental conservation practices. Several areas of applied research need to be explored among them being the following:

- Efficient use of available water resources and promotion of its recycling for specific uses. Explore the current water apportionment procedures and methods and monitoring and evaluation procedures and available equipment.
- Comprehensive quantification of groundwater potential in the Country through conventional and modern techniques and artificial recharge of identified aquifers.
- Assessment and improvement of available appropriate technology in the Country and adoption of new technology based on the local needs.
- Comprehensive assessment of water conservation structures in the areas of construction, maintenance, management, utilization and the funding mechanism. A lot of water is wasted through surface runoff and considering the fact that 67% of our Country is Arid and Semi-arid, this water needs to be harnessed through a concerted approach to develop those areas.
- Effective and efficient methods of catchment protection, conservation and management.
- Efficient methods of disaster Preparedness, Intervention and Recovery, and the creation of mechanism of disbursing disaster contingency fund to the focal points (The fund should be created for rapid response).
- Drawing of a comprehensive programme covering public education and information system based on environmental protection, particularly on water and pollution control.
- Carry out a comprehensive human resources planning that will take into account the needs of the sector with a view to attract, ring-fence and retain the qualified staff with the necessary facilities.
- Identify all areas that have not been covered by the current legislation with a view of strengthening integrated management of water resources.

- Carry out social-cultural, political and economic study on integrated water resources management covering all the sectors of the economy with a view to improving the same.
- Examine the best financing mechanisms of integrated water resources management.

13.2 PROBLEM STATEMENT

Inadequate Research and Development capacity to carry out effective research programmes in the sector for sustainable development and water resources management.

13.3 POLICY DIRECTION

Research will be promoted as a basis for sustainable management of water resources by initiating collaboration with relevant research institutions and also endeavor to establish a full-fledged Water Research Institute. Financial support will be increased, particularly for problem oriented research programs aimed at the development of improved water resources according to the priorities based on the sector needs.

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. Particularly emphasis will be given to the protection and development of Sea/Blackish/Saline/Non-Conventional sources."

13.4 GOAL AND STRATEGIES

13.4.1 Goal

Research and development for adoption of appropriate technologies in sound management of water resources.

13.4.2 Strategies:

1. To determine the research needs for the water sector.
2. To develop a fully-fledged Water Training and Research Institute.
3. To develop collaboration with relevant Research Institutes both locally and abroad as a means of sharing research experiences and results.
4. To ensure utilization of data for forecasts and process them to make information available to potential users.
5. To ensure proper record of all databases for efficient research of data.
6. To adopt appropriate techniques for the processing of data.
7. To modernize data gathering, processing, analysis, archiving and dissemination of techniques.

Table 13: Logical Framework Matrix on Applied Research and Technology

Goal: Activities	Output	Cost of input	Monitoring Indicators	Time frame	Actors	Assumptions/Risks
Strategy 1: To determine the research needs for the water sector Identification of research needs.	Rationalization report/results available		Research papers.	2002 continuous	MENR	
Strategy 2: To develop a fully-fledged Water Training and Research Institute Upgrading/establishing and bringing together research institutions working on water	Functional research institute/s established		Memorandum of understanding.	2002 continuous	MENR	Corporation
Strategy 3: To develop collaboration with relevant Research Institutes both locally and abroad as a means of sharing Research experiences and results Establishment of networks with other research institutes	Networks established		Memorandum of understanding.	2002 continuous	MENR	Corporation
Strategy 4: To ensure utilization of data for forecasts and process them to make information available to potential Users Analyze, process and disseminate researched data.	Data and report available		No. of research papers.	2003 continuous	MENR	Availability of funds and infrastructure
Strategy 5: To ensure proper record of all databases for efficient research of data.	Historical data available		Directory of data.	2001 continuous	MENR	Availability of funds
1. Complete directory of databases available for purposes of dissemination	Historical data available		Directory of data.	2002 continuous	MENR	Availability of funds
2. Undertake "data rescue" operations	Historical data available		Micro film and zip coded data.	2002 continuous	MENR	Availability of funds
3. Undertake archiving of data						
Strategy 6: To adopt appropriate techniques for the processing of data Set-up pilots and trials on selected technologies	Appropriate technology available		Models	2002 continuous	MENR	
Strategy 7: To modernize data gathering, processing, analysis, archiving and dissemination of techniques. Acquire state of the art technology.	GIS centres available		Computer hard and soft ware	2002 continuous	MENR	Availability of funds

14.0 NATIONAL WATER CAMPAIGN

14.1 BACKGROUND

Several factors related to dissemination of inadequate information contribute to environmental degradation. These factors include existing different policies that govern the exploitation of resources in general and water resources in particular. Another major contributory factor is the lack of awareness among the users and managers of resources within a given catchment.

A number of key activities have been undertaken by the Government of Kenya (GOK) in recent years to address critical water resources management problems and to bring the country back from the current unsustainable and rapidly deteriorating situation. The details of the current critical situation are provided in a number of recent documents which have been prepared by the GOK and the World Bank and are not expanded upon here apart from emphasizing that they are of such gravity and seriousness as to effect the future development and security of the country.

The Key activities which have been undertaken are:-

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

The central challenge is now to ensure that the strategy and the new legislation is implemented. Without implementation 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- every person who uses water, every industry, every farmer, public official needs to play their part. A campaign is a method to spread the message and get everybody involved.

In recent years the country has been affected by crippling floods and droughts which have had a devastating impact on all aspects of Kenyan society and economy. These events are likely to occur with increasing frequency and each time they happen they are likely to cause more damage and the ability to recover will be reduced. But people's memories are short-priorities move on, political imperatives change. Although the Strategy was prepared to an advanced draft stage by March, 2001, no progress has been made towards implementing it. A Campaign as a mechanism through which to create a 'Window of Opportunity' to get things done, is therefore very necessary to highlight the issue and create political and institutional commitment, and to generate public awareness.

A Campaign is a methodology to raise the profile of an issue and to establish and maintain a process of sustained action. A process is a series of carefully designed activities which involve a wide range of different stakeholders at appropriate points. A campaign therefore needs to be sensitive to a wide range of other issues and activities in the life of the nation, some of which have nothing to do with water. A campaign program will need to be flexible

so that it can take maximum advantage of its context- it needs to have a rhythm related to achievements and externalities.

14.2 PROBLEM STATEMENT

Lack of harmonization of policies and insufficient information flow to the people has led to environmental degradation. This has led to unsustainable water resources management thereby giving rise to socio-economic problems especially widespread poverty. The problem can be singled out as below;

- Uncoordinated Government policies
- Lack of sufficient awareness
- Inadequate information flow

14.3 POLICY DIRECTION

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 and public participation.

14.4 GOAL AND STRATEGIES

14.4.1 Goal

Informed public with effective participation in the national water campaign for sustainable water resources management.

14.4.2 Strategies

1. To provide water consultative fora for policy harmonization.
2. To establish information dissemination networks.

Table 14: Logical Framework Matrix on National Water Campaign

Goal: Informed public, with effective participation in the national water campaign for sustainable water resources management						
Activities	Output	Cost input	Monitoring Indicators	Time frame	Actors	Assumptions /Risks
Strategy 1: To provide water consultative fora for policy harmonization.						
1. Establish Water Campaign Committees at National, Provincial and District Levels.	Committees Established as appropriate.		Level of public awareness			
2. Develop committee action plans.	Action Plan Report		Progress reports. Minutes			
Strategy 2: To establish information dissemination network.						
1. Collect, collate and process WRM information for public consumption.	Availability of WRM information for dissemination.					
2. Dissemination of WRM information.	Identify established and radio web-site, programmes, magazines, journals and public Barazas.					

15.0 FINANCIAL MECHANISMS

15.1 BACKGROUND

Immediately after independence the Government decided that provision of water was to be promoted. It, therefore, committed itself wholly to water supply services so as to ensure that water availability does not become a constraint to the country's development. Guided by this realization, the departments' resources were made available to the service sub-sector thereby stifling resources for IWRM. However, as time went by, financial resources for development and management of the water resources have been getting scarce due to decrease in donor funding, inadequate and declining development budget allocation by the Central Government and increasing costs due to global economic recession. This has constrained the development and operations and maintenance of water supplies while at the same time the demand for water has been increasing. Traditionally, funds have been geared to water supply and sanitation. This has constrained water resources management.

15.2 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 what the 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.

To bridge the financing gap, the Government is now making attempts to bring in more actors as outlines 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 development and management. This requires the introduction of appropriate incentives together with enabling policies such as flexibility in tariff setting. Other problems that have affected the sector include the following:

- Currently MENR apply very low level of levies and fees which are unsustainable
- WRM departments currently lack sufficient autonomy to collect and use revenue at source. The departments transfer cash generated to headquarters, typically headquarters cover salaries and other costs. However, operations, which generate a cash surplus seldom, receive it back and therefore cannot fund badly needed maintenance expenses.
- Due to lack of autonomy, WRM managers cannot be held accountable for misuse of scarce resources.
- 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 apply the existing management systems
- Use of inappropriate technology has resulted in higher unit water costs, which may not be covered by the provided tariff structures.

15.3 POLICY DIRECTION

Therefore necessary efforts, 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.

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."

15.4 GOAL AND STRATEGIES

15.4.1 Goal

A sustainable financing mechanism.

15.4.2 Strategies

1. To devise a sector financing system to support IWRM activities.
2. To create an enabling environment for effective and efficient revenue collection.
3. To implement the polluter-pays-principle.
4. To ensure legislation have provision for water user charge to be varied to reflect the concept of water both as a social as well as economic good.

Table 15: Logical Framework Matrix on Financial Mechanism

Goal: A sustainable financing mechanism.						
Activities	Output	Cost of input	Monitoring Indicators	Time frame	Actors	Assumptions/Risks
Strategy 1: To devise a sector financing system to support IWRM activities						
1. Seek for increased disbursement of funds by GOK towards IWRM activities	Improved disbursement		Sanctioned expenditure books.	2002 continuous	MENR MFP	
2. Creation of a water resources management fund	Procedures for operating IWRM fund		Bank Account.	2002 continuous	MENR Donors	
3. Prepare project proposals that development partners can support	Sensitization workshops organized and held to assist officers in project formulation		Project proposals accepted	2002 continuous	MENR BDA	Target institutions act accordingly.
Strategy 2: To create an enabling environment for effective and efficient revenue collection						
1. Review IWRM data pricing and promote data sales	Legal Notices on water users charges		Legal notice	2002 continuous	MENR PSP	
2. Collection of water charges and professional fees.	Legal Notice revised data sale pricing		Increased budgetary allocations.	2002 continuous	MENR MFP	Necessary awareness in place.
3. Gazette water user charges	Improved revenue collection		Legal notice	2002 continuous	MENR AG	Necessary awareness in place.
	Re-gazettement of Part D of water resources charges		Legal notice	2002 continuous	MENR AG	Necessary awareness in place.
Strategy 3: To implement the polluter-pays-principle.						
Institute effluent discharge levy	Reduced water treatment and management costs		Legal notice	2002 continuous	MENR AG	Necessary awareness in place.
Strategy 4: To ensure legislation have provision for water user charge to be varied to reflect the concept of water both as a Social as well as economic good.						
Revised subsidiary legislation of the water act	Revised subsidiary legislation in place		Legal notices on Part D of Water Charges.	2001	MENR AG PSP	

16.0 PILOT CATCHMENTS

16.1 BACKGROUND

One key element of the WRMS will be the development of a 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 are proposed;

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

Profiles (write ups) to cover location and area coverage, existing works, problems, constraints to IWRM, framework to address the problems including financial mechanisms will be established.

17.0 ACTION PLAN

The immediate requirement 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. Adequately addressing the water crisis, however, will require firm political will, support and commitment as well as bold and innovative actions that, on the one hand, mobilizes Kenya's high-caliber scientific and engineering expertise, respects law and order, and on the other hand harnesses and facilitates the desire and ability of communities and organizations to help themselves. The following specific actions will form the basis for developing the political support and for formulating the IWRMS that will establish an operationally effective and efficient WRMA.

- Develop internal consensus and cohesion within the 3 ministries of the MENR on the water resources management agenda of the MENR,
- Stakeholder workshop on the IWRM Draft Strategy Paper
- Meeting with Parliamentary Committee on Agriculture, Water and Natural Resources
- Donor Information meeting
- Prepare for and launch a Cabinet level National Conference on water resources management in Kenya 22 March 2002
- Form a high level advisory group comprising of a multi-sectoral team, including the academia and the private sector to:
 - 5. Advise the MENR on the transition to the new WRMA,
 - 6. Assess specific training needs in financial and team management for building a cohesive team within the new WRMA,
 - 7. Ensure effective linkage with the NEMA, and,
 - 8. Guide the IWRMS process,
- Strengthen the Inter-ministerial steering committee to include PSs of the relevant line ministries (energy, agriculture and rural development, lands and settlement, finance and planning, trade and industries, etc.)
- Establish as a priority National development plan and sector policy and strategy linkages. This will be done through the preparation of water resources management chapters for and ensure a high level and effective participation in 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; hold further donor support meetings..
- Initiate the various action items of the IWRMS process, including:
 - 4. Recruit chief executive of WRMA and necessary staff.
 - 5. A communications- public awareness and education- strategy
 - 6. Mobilize the teams for the 11 components of the IWRMS that will support the operationalization of the WRMA, including:
 - a) Water Resources Assessment
 - b) Water supply, Demand and Infrastructure
 - c) Water conservation
 - d) Catchment management

- e) Disaster management – floods, droughts and landslides
- f) Water Quality and pollution control
- g) International waters
- h) Institutions and Legislation
- i) Economics and Financing of Water Resources Management
- j) International Waters
- k) Human Resources Development

- Identify pilot projects for possible investment under the IWRMS.

The proposed Action Plan summary is given in Table 17.0

TABLE 17.0 ACTION PLAN (Page 1 of 3)

REF.	ACTIVITY	TIMING	ACTOR	COST (MILLION KSHS)
1	Develop internal consensus and cohesion		MENR	
2	Stakeholder workshop on the IWRM Draft Strategy Paper	7-8 February 2002	TASK FORCE	
3	Meeting with Parliamentary Committee on Agriculture, Water and Natural Resources	FEB 2002	TASK FORCE	
4	Donor Information meeting	FEB 2002	TASK FORCE	
5	Launch a Cabinet level National Conference on WRM	22 March 2002	MENR	
6	Form a high level multi-sectoral advisory group	FEB 2002	MENR	
7	Inter-ministerial steering committee (IMSC)	March 2002	MENR	
8	National development plan and sector policy and strategy linkages	APR 2002	IMSC	
9	Financial support for the IWRMS		GoK, DONORS	
10a	Establishment of WRMA	MAR 2002	REVISED ACT	
10	Recruit chief executive of WRMA and necessary staff.	APR - DEC 2002	WRMA BOARD	
	IWRM NATIONAL CAMPAIGN			
11	Establish Water Campaign Committees at National, Provincial and District Levels.	APR-JUN 2002	IMSC	
12	Develop committee action plans.	JUL 2002	IMSC	
13	Establish information dissemination network.	AUG-OCT 2002	IMSC	
14	Collect, collate and process WRM information for public consumption.	AUG-OCT 2002	IMSC	
15	Dissemination of WRM information.	NOV 2002 ONWARDS	WRMA/MEDIA	
	OTHER ACTIVITIES TO SUPPORT OPERATIONALISATION OF WRMA			
	WATER RESOURCES ASSESSMENT			
16	Establish IWRM data base.	APR -DEC 2002	IMSC	
17	Regular annual/seasonal publication of key water resources data and information for public consumption.	JAN 2003 ONWARDS	WRMA	
18	Rehabilitate and rehabilitate water resources monitoring systems	2003	WRMA	
19	Catchment-wide Water Master Plans.	APR -DEC 2002	IMSC	
20	Upgrade the technology in data collection processing.	2003	WRMA	
	WATER DEMAND			
21	Review the National Water Master Plan water requirements	APR -DEC 2002	IMSC	
22	Develop inter and intra water Catchment transfer plans	APR -DEC 2002	IMSC	
23	Review current status of water abstraction and use priorities.	APR-DEC 2002	IMSC	
	WATER CONSERVATION			
24	Construction of new reservoirs	2004 ONWARDS	WRMA	
25	Rehabilitation of water conservation structures.	2003-2004	WRMA	
26	Construction of artificial groundwater recharges facilities.	2004 ONWARDS	WRMA	
	CATCHMENT MANAGEMENT			
27	Identification, survey, mapping, gazettement of water catchment and groundwater recharge areas.	APR -DEC 2002	IMSC	
28	Prepare water resources Regional Physical Development Plans	APR -DEC 2002	IMSC	
29	Rehabilitate the degraded catchment areas	2004 ONWARDS	WRMA	
30	Prepare catchment management plans	APR -DEC 2002	IMSC	
31	Preserve and conserve the gazetted catchment areas	2004 ONWARDS	WRMA	

TABLE 17.0 ACTION PLAN (Page 2 of 3)

[illegible]

TABLE 17.0 ACTION PLAN (Page 3 of 3)

	CAPACITY BUILDING			
59	Establish data bases on available technical manpower in IWRM		APR – DEC 2002	IMSC
60	Determine staffing norms		APR – DEC 2002	IMSC
61	Identification of training needs		APR – DEC 2002	IMSC
62	Carryout training		APR – DEC 2002	IMSC
	APPLIED RESEARCH AND TECHNOLOGY			
63	Identification of research needs		APR –DEC 2002	IMSC
64	Develop a fully-fledged Water Training and Research Institute		2003	WRMA
65	Establishment of networks with other research institutes		2004 ONWARDS	WRMA

APPENDICES

APPENDIX A STRATEGY PREPARATION TEAM**A. Coordinator**

Mr. S. C. M. Ochieng MENR – Water Development Department

B. Members of the Task Force

- | | | | |
|-----|--------------------|---|---|
| 1. | Mr. P. O. Hayombe | - | MLS |
| 2. | Mr. J. K. Munyasya | - | MTTI |
| 3. | Mr. P. W. Munialo | - | MTTI |
| 4. | Mr. W. O. Nyandega | - | MARD |
| 5. | Mr. M. K. Murgor | - | KENGEN |
| 6. | Mr. O. K. Bobotti | - | TARDA |
| 7. | Mr. F. Asunah | - | LBDA |
| 8. | Mr. M. M. Musyoki | - | CDA |
| 9. | Mr. Philip Gichuki | - | ENNDA |
| 10. | Ms. Janet Mutiso | - | MENR-National Environmental Secretariat |
| 11. | Mr. F. K. Mwango | - | MENR – Water Development Department |
| 12. | Mr. F. J. Edalia | - | MENR – Water Development Department |
| 13. | Mr. S. K. Kiptorus | - | MENR – Economic Division |

C. Co-opted Members to the Task Force

- | | | | |
|----|-----------------------|---|-------------------------------------|
| 1. | Mr. A. M. K. Gachanja | - | MENR – Water Development Department |
| 2. | Mr. J. M. Omwenga | - | MENR – Water Development Department |
| 3. | Mr. S. P. M. Kiai | - | MENR – Water Development Department |
| 4. | Mr. C. O. Juma | - | MENR – Water Development Department |
| 5. | Mr. S. K. Ragu | - | MENR – Water Development Department |

D. Secretariat Team

- | | | | |
|----|---------------------|---|-------------------------------------|
| 1. | Mr. P. O. Oloo | - | MENR – Water Development Department |
| 2. | Mr. J. M. Kanyanjua | - | MENR – Water Development Department |
| 3. | Mr. Z. K. Mukiri | - | MENR – Water Development Department |
| 4. | Ms. A. Wawira | - | MENR – Water Development Department |
| 5. | Ms. C. Ngengi | - | MENR – Water Development Department |
| 6. | Ms. R. Mwaura | - | MENR – Water Development Department |
| 7. | Ms. J. Ruguru | - | MENR – Water Development Department |
| 8. | Mr. M. Malumbe | - | MENR – Water Development Department |

APPENDIX B LIST OF REFERENCE DOCUMENTS

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