NILE BASIN INITIATIVE
Initiative du Bassin du Nil

Assessment of the level of implementation of Integrated Water Resources Management In Tanzania

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1 INTEGRATED WATER RESOURCES MANAGEMENT AND THE NILE BASIN INITIATIVE

1.1 Global developments on Integrated Water Resources Management

The United Nations Conference on Water (1977) that was held in the Mar del Plata, Argentina is taken as a benchmark for the evolution of the Integrated Water Resources Management (IWRM) concept in the Global Political Agenda. The issues covered in the conference were assessment of global water resources, water use and efficiency, sanitation and drinking water. It was an effort to ensure adequate supply of quality water was available to meet the planet's socioeconomic needs; to increase water use efficiency; and to promote preparedness, nationally and internationally, so as to avoid a water crisis of global dimensions before the end of twentieth century. From this conference IWRM was recommended as a tool to cater for multiple competing uses of water resources. From this meeting, Governments agreed to include in their national plans a target to provide safe drinking water and basic sanitation to all possibly by 1990.

The Mar del Plata initiative was later supported by other efforts such as the International Conference on Water and Environment -Dublin, 1992, Second World Water Forum -The Hague, 2000, International Conference on Freshwater - Bonn, 2001 and World Summit on Sustainable Development – Johannesburg, 2002. The Dublin Conference came up with four guiding principles for IWRM implementation. The Dublin conference recommendations were later consolidated into Chapter eighteen of Agenda 21 in Rio de Janeiro, 1992 which is an outcome of United Nations Environment Meeting in Rio de Janeiro. The Second World Water Forum – The Hague 2000 discussed extensively the main challenges to IWRM implementation and developed action programs for the participating countries. This led to the birth of the Global Water Partnership. The Bonn - 2001 conference came up with *The Bonn Keys,* highlighting the key steps toward sustainable development. In this regard IWRM was suggested as the most capable tool for meeting water security needs of the poor, and promoting decentralization and new partnerships.

The World Summit on Sustainable Development (WSSD) – Johannesburg, 2002 drew a *WSSD's Plan of Implementation* which includes IWRM as one of the key components for achieving sustainable development. It provides specific targets and guidelines for implementing IWRM worldwide, including developing an IWRM and water efficiency plan by 2005 for all major river basins of the world; developing and implementing national/regional strategies, plans, and programs with regard to IWRM; improving water-use efficiency; facilitating public-private partnerships; developing gender-sensitive policies and programs; involving all concerned stakeholders in a variety of decision making, management, and implementation processes; enhancing education; and combating corruption. As a result of this conference, African countries adopted the IWRM concept and agreed to put in place mechanisms to implement IWRM principles in their water management and planning by 2005

1.2 The Nile Basin Initiative process

Nile Basin Initiative (NBI) was formally launched in February, 1999. The initiative aims to achieve sustainable socio-economic development through the equitable utilization of, and benefit from, the common Nile Basin. The primary objectives of the NBI are to develop the Nile Basin water resources in a sustainable and equitable way to ensure prosperity, security, and peace for all its peoples; to ensure efficient water management and the optimal use of the resources, to ensure cooperation and joint action between the riparian countries, seeking win-win gains; to target poverty eradication and promote economic integration; and to ensure that the program results in a move from planning to action.

1.3 Objectives of the study

The main objective of the present study was to examine the concept of IWRM and its current implementation status in the real world, critically and objectively for the countries of the Nile Basin where water is often an essential requirement for fostering regional development and poverty alleviation, and where water management and development has a long history. Specifically, this study examined the implementation status and potential of IWRM in Tanzania and later drew lessons and recommendations for policy and decision makers as a way forward.

The study identified linkages between IWRM and poverty alleviation and regional development so that IWRM could be an efficient instrument to improve water resources planning, management and development, and to improve the standard of living and quality of life of the people of the Nile Basin countries. Besides examining the level of IWRM implementation case studies on implementation of the concept in Tanzania were described. The case studied highlight successes and challenges of attempts to implementing IWRM in Tanzania. The entire study presents an objective analysis of the status of implementation of IWRM in the country and gives an assessment of its overall impacts on the people, regional development and the environment. Lessons were drawn and recommendations towards more efficient implementation of IWRM at national and regional level made.

2 STATUS OF WATER RESOURCES MANAGEMENT

2.1 Background information

Tanzania is located in East Africa between longitude 29° and 41° East, Latitude 1° and 12° South and has an area of approximately 886,100km^2. The land boundaries have a total length of about 3402km with the border countries of Kenya and Uganda in the North; Rwanda, Burundi and Democratic Republic of Congo in the West; Zambia and Malawi in the South West; Mozambique in the South and the Indian Ocean in the East (**Figure 2.1**). The main Islands of Tanzania include Mafia, Ukerewe, Unguja and Pemba.

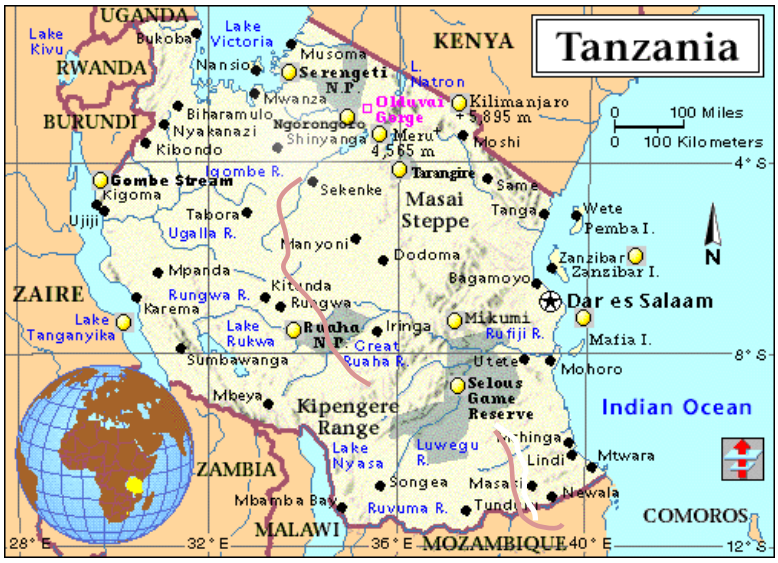

Figure 2.1: Map of Tanzania

Tanzania has the biggest land area among the East African countries (i.e. Kenya, Uganda and Tanzania). It has a spectacular landscape of mainly three physiographic regions namely the Islands and the coastal plains to the east; the inland saucer-shaped plateau; the highlands and the Great Rift Valley that runs from north east of Africa through central Tanzania. It also has pristine sandy beaches and Africa's highest and snow-capped mountain, Mt. Kilimanjaro. Tanzania is home to the world famous National Parks of Serengeti, Ruaha, Ngorongoro, Mikumi, Tarangire, Katavi, Saadani, Udzungwa, Kilimanjaro, Rubondo, Kitulo, Mahale, Lake Manyara, Arusha and Gombe Stream; and the Game Reserves of Selous, Ruangwa, Kigosi, Moyowosi, Uwanda, Burigi, Maswa, Kizigo, Umba, Biharamulo, Mkomazi, Ibanda and Saa Nane Island.

Dar es Salaam is the commercial capital and major sea port for Tanzania Mainland. The port is also a gateway into East and Central Africa serving the neighboring land-locked countries of Malawi, Zambia, Burundi, Rwanda, Uganda, as well as Eastern DRC. Other sea ports include Zanzibar, Tanga, and Mtwara.

According to the 2002 Population and Housing Census, the total population of Tanzania was 34.4Million.The national demographic average growth rate is about 3% per year while the urban growth is more than 6%, mainly due to migration from the rural areas. There are over 120 ethnic groups or tribes in Tanzania each with their own culture, language, customs and traditions. However, since independence Tanzanians have learnt to coexist despite their ethnic differences or religious affiliations. Kiswahili as a national language has helped to break the communication barrier among people of different local vernaculars.

2.2 The water resources

Tanzania is divided into five major drainage systems which are the Indian Ocean Drainage System; the Internal Drainage of Lakes Eyasi, Natron and Bubu Depression; the Internal Drainage of Lake Rukwa; the Atlantic Ocean Drainage; and the Mediterranean Sea Drainage system. In order to manage these drainage systems on a river basin basis, the country is further devided into nine (9) basins. These are: Pangani, Wami/Ruvu, Rufiji, Ruvuma and the Southern Coast, Lake Nyasa, the Internal Drainage basins of Lake Eyasi, Manyara and Bubu depression, Lake Rukwa, Lake Tanganyika and Lake Victoria as shown in **Figure 2.2** below.

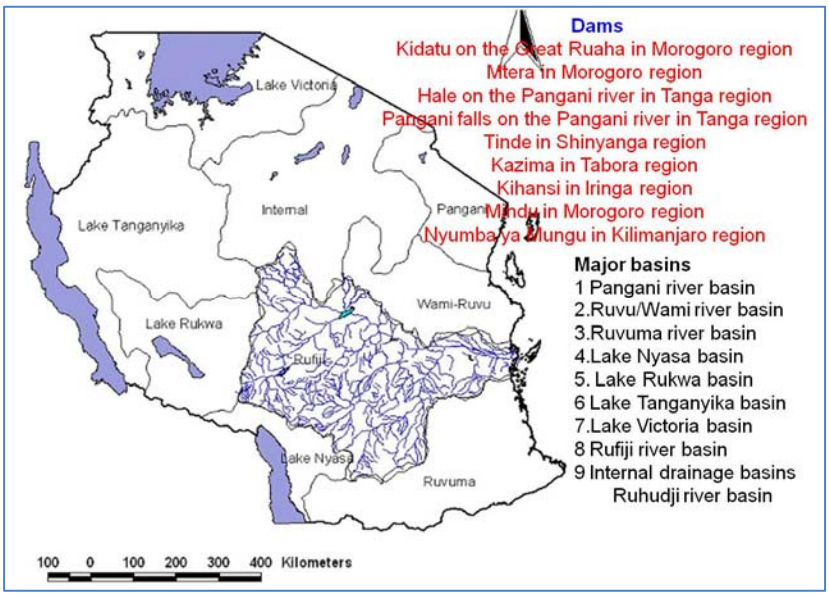

Figure 2.2: River basins and dams of Tanzania

Tanzania shares eleven international lakes and rivers with other nations including the three East African Great Lakes (Victoria, Tanganyika and Nyasa), and Lakes Chala, Jipe, and Rivers Kagera, Mara, Pangani, Umba, Ruvuma and Songwe. Each of these water bodies exhibit unique characteristics and a complex range of water resources management and development issues and challenges.More than half of the country receive on average, less than 800 mm of rainfall per year. It depends upon air circulation patterns and the movement of convergence zones in the region. The semi-arid central and northern parts of the country, including areas immediately south of Lake Victoria receive less than 700 mm of rainfall per annum and are dry for an average of seven consecutive months a year. River flows in the se areas are seasonal. In the southern,

western and northern highlands, which receive more than 1,000 mm/year of rainfall, rivers are perennial, and some of these experience frequent floods

Despite the availability of these Water Resources, frequent and intense water shortages are experienced in the country. The water shortages are a result of climate variability, poor temporal and spatial distribution of water resources resource and their inadequate management. In 1999, the availability of renewable freshwater resources, both surface and groundwater was estimated to be about 2,700m^3/capita/year but reduced to 2,300m^3/capita/year in 2002 due to increased population alone. It is projected that this availability will drop to 1,500m^3/capita/year by 2025, a figure that will put the country in the category of water stressed countries according to United Nations' classification.

2.3 Policy and legal framework for water resources management

The current National Water Policy (NAWAPO, 2002) was published in July, 2002. It was a result of a review of the first National Water Policy that was published in 1991. The main objective of this revised policy is to develop a comprehensive framework for sustainable development and management of the Nation's water resources. NAWAPO (2002) seeks to lay a foundation for sustainable development and management of water resources in the changing roles of the Government from service provider to that of coordination, policy and guidelines formulation, and regulation.

Water resources management in Tanzania is governed by the Water Utilisation (Control and Regulation) Act No. 42 of 1974. The main focus of this Act was on the administration of water rights. The Act was further amended by:

a. Water Utilisation (Control and Regulation) (Amendments) Act No. 10 of 1981 which provided for establishment of the Central Water Board and Basin Water Boards; and the Principal Water Officer and Basin Water Officer respectively. This amendment also introduced pollution control measures, water quality standards, and permissible effluent standards.
b. Written Laws (Miscellaneous Amendments) Act No.17 of 1989 which increased the penalties against water pollution which were seen to be inadequate.
c. Regulations issued in 1975, 1994, 1996 and 1997 which provide details for the granting of water rights and determining water use fees for various water uses.
d. Water Laws (Miscellaneous Amendments) Act No.8 of 1997 which created the Central Water Board and Basin Boards and made the Basin Boards financially and administratively autonomous.

Thus, the Water Utilization Act stands a tool for allocating water through water rights and preventing water from point source pollution

2.4 Institutional Framework for Water Resources Management

Before implementation of the National Water Policy (NAWAPO, 2002), the institutional framework had a number of shortcomings which led to overlapping roles and responsibilities between various institutions, inefficient use of human and financial resources, duplication of

effort, and gaps in effective management. Other constraints were inadequate cross-sectoral co-ordination among various government institutions, fragmented water resource planning and allocation leading to water conflicts.

The NAWAPO, 2002 has prescribed new roles for different players in water resources management and provision of water supply and sanitation services. Among others, the policy guide in NAWAPO is based on the principles of limiting the role of Government to coordination, policy and guideline formulation; and overall sector regulation as well as decentralizing implementation of the management and executive functions to the lowest appropriate level.

The new institutional framework for water resources management has been streamlined to meet the challenges of effective integrated water resources planning and management; and defining the roles and responsibilities of stakeholders. Furthermore, the structure and system of management has been designed to facilitate the involvement of responsible authorities at different levels and promote autonomy at the basin level as well as establishing transparent and accountable management information systems. The new institutional arrangement for water resources management in the Country is summarized in Table 2.1 below.

Table 2.1: Institutional arrangement for water resources management in Tanzania

Level	**Institution**	**Functions and responsibility**	**Nature Representation**
National	Ministry responsible for water/National water board	Policy formulation and review Formulates and reviews water law Sector coordination and integration National water assessment and planning Database management, Training Preparation of regulations Delineation of basins Ground water recharges areas and aquifers. Resolution of cross-sectoral conflicts at national level and coordination of Basin water use plans.	The National water board is planned to be a multi-sectoral financially and administratively autonomous entity. The members are appointed by the Minister responsible for water
Basin level	Basin water office (BWO)/ Basin water board (BWB)	Data collection processing and analysis, water allocation, pollution control, water utilization planning, collection of various fees and charges. Technical aspects of trans-boundary issues in the basin. Co-ordinate and approve basin WRM planning/budgets, Approve, issue and revoke water use and discharge permits, Enforce water use permits and pollution control measures, Co-operate between sectors at the local level, Resolve conflicts and co-ordinate stakeholders.	Basin water board is a multi-sectoral autonomous board. The members are appointed by the Minister responsible for water
Catchment level	Catchment water committees (CWC) or sub-catchment water	Preparation and implementation of catchment plans and resolution of conflicts within the catchment.	Representation from public and private sector and water user associations in the

	committees		catchment
District level	District council	Participates fully in BWB and CWC. Planning and development of water resources in accordance with basin plans, protection and conservation of natural resources including water, establishment of bye-laws for management of water resources and conflict resolution in accordance with existing regulations, assessment of water demands in the district and participate in preparation of basin plans	Democratically elected local government.
Community level/water user association	Water user associations/water user groups	The lowest appropriate level of management in the institutional set up. They are responsible for; local level management of allocated water resources, meditation of disputes among members and between groups, collection of operational data, protection of sources, ensuring efficient water use, enforcement of laws and conditions for water rights, control of pollution.	Democratically elected representatives fro user groups. Water user association is formed by several user groups.

Source: National Water Sector Development Strategy, 2006 – 2025

2.5 Water resources management issues and challenges

Sustainable water development and use implies that the actions of the present generation to develop and use water resources are taken in such a way as to ensure that the present and future generations enjoy the benefits of this vital resource. This entails taking into consideration the following:-

a. A minimum water requirement is guaranteed to all humans to maintain human health, and sufficient water is guaranteed to restore and maintain the health, services and functions of ecosystems.
b. Water for food security, energy production and other economic activities is readily available.
c. Water quality is maintained to meet agreed objectives and standards and that human actions do not impair the long term availability of freshwater stocks; ensure that water resources management is financed and raw water priced to promote efficiency, sustainability and equity.
d. Integrated water resources management is instituted.
e. Effective and sustainable strategies are in place to address natural and man-made water resources problems.
f. Water resources planning and decision-making are participatory involving all users and stakeholders.
g. Water resources data are available and easily accessible to all and an effective infrastructure and information system is in place and operational.

h. Institutional mechanisms exist to resolve conflicts over water resources.
i. Adequate number of motivated and highly skilled professionals is available.

In this regard the main issues and challenges facing water resources planning and management in Tanzania include:-

a. Overlapping roles and responsibilities between various institutions leading to inefficient use of human & financial resources, duplication of effort & gaps in effective management
b. Inadequate cross-sectoral co-ordination between various government institutions
c. Fragmented water resource planning & allocation and consequent water conflicts

These issues and challenges stresses the need for integrated water resources management as a tool to ensure that water does not become a constraint to development of the nation. The target here is to achieve equitable and sustainable use and management of water resources for socio-economic development, and for maintenance of the environment. To achieve this target, it is required to move from the sector oriented approach to an approach that fully recognizes the multi-sectoral linkages in planning the use of water resources.

3 CONCEPT OF INTEGRATED WATER RESOURCES MANAGEMENT

3.1 Current Definitions and Guiding Principles

The Global Water Partnership defines IWRM as a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems. IWRM is a holistic approach to water management that links land and water development within a catchment and links social and economic development with protection of natural ecosystems. It is a concept that attempts to coordinate and balance competing demands for water (i.e. domestic, municipal, agricultural, industrial and environmental) in a way that optimizes benefits and enhances equity. IWRM calls for integrated planning so that water, land and other resources are utilised in a sustainable manner.

Integrated Water Resources Management (IWRM) is also defined as a participatory planning and implementation process, based on sound science that brings stakeholders together to determine how to meet society's long-term needs for water and coastal resources while maintaining essential ecological services and economic benefits. IWRM helps to protect the world's environment, foster economic growth and sustainable agricultural development, promote democratic participation in governance, and improve human health.

A number of IWRM definitions currently exist. However, all the definitions carry the key concepts of IWRM which in some studies have been regarded as equity, coordination, efficiency and sustainability. IWRM aims to promote more equitable access to water resources and the benefits that are derived from water in order to tackle poverty. IWRM also aim to ensure that scarce water resources are used efficiently and for the greatest benefit of the greatest number of people. It also aims to coordinate the planning of projects and activities that have both a direct and an indirect impact on water resources. Finally, IWRM aims to achieve more sustainable utilisation of water without degrading the environment. The goal of sustainability is to be achieved through coordination, equity and efficiency.

The IWRM concept is guided by four main principles which are a result of the Dublin Conference (1992). The principles are:-

a) Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment.

   Since water sustains life, effective management of water resources demands a holistic approach, linking social and economic development with protection of natural

ecosystems. Effective management links land and water uses across the whole of a catchment area or groundwater aquifer.

b. Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels;

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

c. Women play a central part in the provision, management and safeguarding of water;

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

d. Water has an economic value in all its competing uses and should be recognized as an economic good.

Within this principle, it is vital to recognize first the basic right of all human beings to have access to clean water and sanitation at an affordable price. Past failure to recognize the economic value of water has led to wasteful and environment1ally damaging uses of the resource. Managing water as an economic good is an important way of achieving efficient and equitable use, and of encouraging conservation and protection of water resources.

3.2 How the concept is understood in Tanzania

Generally, the concept of IWRM is fairly understood in the country as responded by key informants (Table 3.1). Among the community of water professionals, there is a medium to high level of understanding of the concept. However, the concept is not well understood at the local level. There is a perception among the small but widespread users of water that they are primary losers in basin management efforts, and water resources planning is urban biased and fosters rural inequity. As an example, in the Pangani and Rufiji Basins this perception is based on the fact that the production of hydroelectric power is located downstream of major irrigated areas and that water for hydropower production is subtractable from upstream water uses in irrigation fields. Other informants considers even at small scale project that they are considering IRWM concept for instance waste water treatment using wetlands, Urban water Supplies, etc

Table 3.1. Level of understanding of key principles of Integrated Water Resources Management concept by relevant Government Ministries and other institutions in Tanzania

Informant Address	Familiarity with IWRM	PART III Level of understanding of key concept in IWRM in Tanzania communities			
		Fresh water is a finite and vulnerable resource and should be protected	Water management should base on participatory approach	Women play a central part in provision, management and safeguarding of water	Water has an economic value
Forestry and beekeeping division, Ministry of natural resources and tourism	Yes, I heard about IWRM	High	High	Medium	High
Lake Nyasa Basin Water Office,	Yes, I know what is IWRM	Medium	Medium	Medium	Medium
Lake Victoria Environmental Management project, Water quality management component,	Yes, I know what is IWRM	Poor	Medium	Medium	Poor
Ministry of livestock development & fisheries,	Yes, I know what is IWRM	Poor	Poor	Medium	Poor
Ministry of water and irrigation, DSM.	.	Medium	Poor	Medium	High
Ministry of water and irrigation, Shinyanga,	Yes, I know what is IWRM	Medium	High	High	High
National Environment Management Council	Yes, I know what is IWRM	Poor	Poor	Poor	Medium
Ruvuma river basin and southern coast	Yes, I know what is IWRM	Poor	Poor	Poor	Poor
Sokoine University of Agriculture (SUA),	Yes, I know what is IWRM	Medium	Medium	Poor	Medium
University of Dar es salaam, Department of Geology	Yes, I know what is IWRM	Poor	Medium	Medium	Medium
WEMA CONSULT (T) LTD,	Yes, I know what is IWRM	High	High	High	High
AVERAGE	Yes, I know what is IWRM	Medium	Medium	Medium	Medium

3.3 The right emphasis: focus on the means or the end?

The emphasis of water planning and management needs to shift from 'means' such as IWRM to 'ends' such as poverty alleviation and environmental conservation. The focus needs to be how these "ends" can be best reached for the specific locations considering their respective set of physical, social, economic, environmental, institutional and legal conditions. This is because the opportunities and constraints for implementing a 'means' like IWRM vary with geographical locations. If IWRM can deliver the 'end' best in a specific location, then this 'means' should be used. However, in a very heterogeneous world, no one single 'means' is equally appropriate, or is the best solution, for all the countries which have widely varying climatic, physical, social, economic and environmental boundary conditions. A scientific approach requires that a solution that is most applicable and appropriate to reach the goals of a specific water management activity on a long term basis, in a specific location, should be selected. The decision that IWRM is the best means to best fulfill the objectives of water resources management may not be universally valid, especially when existing conceptual and instrumental constraints are considered. In a real world, IWRM may not be a universal solution.

In this particular case, research on tailor made means for effective water planning and management is important to cater for the different climatic, physical, social, cultural, economic and environmental conditions that are experienced even within Tanzania

3.4 Implementation challenges

Challenges in implementation of the IWRM concept can be categorized as policy, institutional and legal matters

Policy matters

a. Defining a mechanism for involvement of stakeholders in all key decisions-making (at all levels).
b. Considerations of water allocations and management and the effects of each use on the others
c. Lack of a clearly defined mechanism for water and financing water resources Management i.e. economic instruments for water resources management
d. Conflicting natural resources management policies both at national and Local level
e. Low understanding of IWRM among the communities

Institutional matters

a. Poor co-ordination, interaction and collaboration with local water users and with riparian users on international shared waters.
b. Human and institutional capacities to address complex water management challenges
c. Length process of Water User Associations (WUA) establishment as the right institution for implementing IWRM at the Local level
d. Lack of Capacity both human and financial for the institution tasked with implementing IWRM, in Tanzania it is the River Basin Water Offices

Legal matters

a. Lack of enforcement of existing laws and regulations
b. Laws either absent or inadequate - needs to be reviewed in order to address the current needs for water resources management
c. Lack of specified procedures for tackling water use related conflicts among different water users

3.5 Recommendations for improvement of the concept

Improvement of IWRM in Tanzania can be achieved by addressing the major issues leading to successful and sustainable IWRM. The success of IWRM in Tanzania hinges on Capacity Building, Public Awareness, Public Participation, to have in place an effective institutional and legal framework, recognizing the role of women and recognition of water as an economic good.

Several successful water resources management cases which ensured fully public involvement exists in Tanzania. These include Kihansi River Catchment area which is used for cultivation during dry season which result into sedimentation downstream. Through involving the local people in the problem identification, they enacted by-laws that prohibited valley cultivation and hence ensuring that their river was well taken care of, for continuous availability of water.

Public participation also helps to increase awareness of the people in water resources management. As an example, in most rural areas of Tanzania charcoal burning for selling for supporting their livelihood is quite common. This is because there is no a wide range

of alternatives from which the rural people can choose to increase their income. On the other hand, there is an increasing demand for charcoal created by the urban population. In Tanzania about 97 percent of energy is supplied from the forest. There should be other means of increasing an income and alternative sources of energy otherwise communities will continue to create water shortages and pose potential health hazards. They will also continue to pollute sources of potable water through poor sanitation, and degrade the environment through improper land usage. In order to intervene effectively, long lasting awareness needs to be created. Through awareness creation people will be able to understand for instance why integrated water resources management is employed and what is it expected from them in water resources management.

Effective institutional framework that clearly defines the roles and responsibilities of each stakeholder is critical for a successful integrated water resources management. Institutional framework that aims at effective water supply and water resources management needs to come up with good policy, regulations and operational management of both quality and quantity of water. For instance, sanitation issues are in most cases a private responsibility in Tanzania while water supply is a public issues that the government has to fulfill. Effective institutional framework needs to come up with not only clear roles and responsibilities but also taking into account what people can and cannot do.

Effective institutional framework will also allow for harmonious policies, while weak institutional management with no clear stated roles and responsibilities results in overlapping and competing mandates which lead to poor water resources management. An effective institutional framework can provide information and guidelines, for instance, on how to provide water for people while ensuring that there is enough water for ecosystem in order for it to continue providing ecosystem services, among other things. Conservation practices and protection of water resources, at times, differs from one water user to another.

There also exist different needs and interests to water use, management, conservation and protection. Proper institutional management also should involve nongovernmental organizations. The comparative advantage of NGOs is its ability to reach the local communities many of whom depend upon obtaining external funds.

Effective institutional framework can also greatly help in the advocacy campaign. Different types of media (TV, radio and newspapers) should be used to increase awareness creation to the public on water issues. The prevailing water crisis needs water issues to be high on the agenda as opposed to low priority that they have been receiving. Because there are various economic and structural changes that are at times complex and hard to comprehend, regular monitoring and evaluation of the entire process at different levels to identify factors which undermine or contribute to successful management is critical.

The institutional frame work set up for IWRM planning and implementation is elaborate and needs to be supported by well planned capacity building programmes in order to have well trained and experienced human power. Mtalo and Rutashobya, (2005) have

investigated the human resources requirement for implementing NAWAPO 2002. The study found out that there was shortage of both graduate professionals and technicians in all major fields required to implement the policy. These included hydrologists, hydro geologists, laboratory technicians, community development (sociologists), lawyers and economists.

4 IMPLEMENTATION STATUS OF IWRM

4.1 General level of recognition of linkages between IWRM and poverty reduction

Tanzania's Poverty Reduction Strategy Paper (PRSP) sets out the medium term strategy for poverty reduction and indicators for measuring progress. It defines the objectives for poverty eradication by 2010, with the following key priority areas for achieving its goal:

a. reducing poverty through equitable economic growth,
b. improving human capabilities, survival and social well being, and
c. containing extreme vulnerability among the poor.

The PRSP recognises the heavy dependence of the poor on the environment (soil, water and forests), in particular household's reliance on environmental resources for income generation. Water is considered a key factor in the socio-economic development and the fight against poverty. Deliberate efforts are therefore needed in the management of the resources in order to sustain the desired pattern of growth and consumption, and to ensure that all the socio-economic activities maximize their capacities, as articulated in the Vision 2025. This entails integrated planning, development and river basin management in support of food security and poverty reduction as well as environmental safeguards.

On the other hand the National Strategy for Growth and Reduction of Poverty (NSGRP) is derived from Vision 2025 and the Poverty Reduction Strategy Paper and identifies the close relationship between water resources management and the desired outcomes:

Growth and reduction of income poverty

a. *Sustainable growth* calls for the protection of existing water resources and the development of new resources because they are vital inputs to the nation's productive sectors.
b. *Equity.* Inequitable and unjust water allocation practices and ill-defined water rights that restrict access to and control over water resources pose a major obstacle to poverty reduction. Planning processes that alienate affected communities from decision making and from sharing benefits of water development projects foster social stratification and limit the prospects of poverty reduction through economic growth.

4.2 General level of recognition of the importance of IWRM as an important tool for water resources planning, development and management

The importance of IWRM as an important tool for water resources planning, development and management is well recognized in Tanzania. The National Water Policy explicitly identifies the need for IWRM as a tool to ensure that water does not become a

constraint to national development. IWRM is also recognized as a tool to achieve the new vision of *"A country where there is equitable and sustainable use and management of water resources for socio-economic development, and for maintenance of the environment"*.

4.3 Level of mainstreaming of IWRM principles in national policies and plans

National Water Policy (2002)
The IWRM principles as stipulated in the Dublin Statement on water and sustainable development, 1992 and United Nations Conference on Environment and Development (UNCED), Rio de Janeiro, 1992 (Agenda 21, Chapter 18) are recognized and have formed a basis for defining the guiding principles for Water Resources Management in Tanzania. The WRM guiding principles in Tanzania as stipulated in the National Water Policy address the following issues:-

a. Socio-Economic and water allocation aspects
b. Protection and conservation of water resources
c. Water and the Environment
d. Water resources planning and development
e. Information, education and communications
f. Trans-boundary waters
g. Institutional framework

National water sector development strategy (2006 -2015)
The National Water Sector Development Strategy has set out a framework for implementation of the National Water Policy. Under water resources management the strategy addresses the following issues which are relevant for IWRM :

a. Institutional framework for water resources management
b. Water resources assessment
c. Integrated water resources planning
d. Water resources development
e. Environmental protection and conservation
f. Water quality and pollution control
g. Water conservation and demand management
h. Water utilisation and allocation
i. Trans-boundary waters
j. Disaster management, and
k. Water resources management legislation

National Environmental Policy (1997)
Among the functions of the National Environmental Policy is to develop a set of principles and objectives for integrated multisectoral approaches that are necessary in addressing the totality of the environment. The policy also recognises the need of water management and involvement of stakeholders at all levels (local communities, Non-Governmental Organisations, the Private Sector, etc) in addressing environmental problems. In this regard, the Policy aims at sustainability, security and equitable use of

resources. In the water and sanitation sector the objectives of the environment policy are geared towards achieving the planning and implementation of water resources and other developments in an integrated manner and in a way that protects water catchment areas and their vegetation.

In the Environmental Policy a set of policy instruments are defined which include conducting Environment Impact Assessments (EIAs) and undertaking appropriate mitigation measures, improving management and conservation of wetlands, promoting technology for effective and safe water use, particularly for water and waste water treatment and recycling, and instituting appropriate user-charges that reflect the full value of water resources.

National Agricultural Policy (1997)
The National Agricultural Policy (1997) recognises the critical dependence of Agriculture on Water as an environmental resource. It stresses on the fact that wrong use of water for production of crops and livestock can have far-reaching effects on the environmental integrity. Thus, agricultural sector policies have been set out to fit in the environmental policy which is critical in providing guidance for the proper and balanced use of natural resources.

4.4 Level of Mainstreaming of IWRM in the Legal Framework

There is a generally a good level of mainstreaming IWRM considerations in the Legal Framework. Issues of pollution, Quality standards for various uses, assurance of supply, efficiency level, compliance, audit, monitoring, conflict resolution, tariff and water pricing, customer protection mechanism, transboundary waters and discharge permits are well addressed in the legislative framework. The legal framework has undergone reforms among others to include the following improvements:

a. participation of stake holders in use and decision making,
b. sustainability of the resources,
c. quantity and quality of water supplied to public through a public distribution system,
d. environmental protection against possible degradation from the use of water,
e. provision of Environmental Impact assessment,
f. licensing of practitioners in rural areas,
g. equity amongst diverse stake holders, and
h. pricing and financing mechanisms for the rural water supply schemes and water funds

The summary of the extent to which the national water policy addresses a number of issues is given in Table 4.1 as responded by informant. This ranges from Good to satisfactory with limited excellent

Table 4.1. Extent to which the national water policy addresses issues of IWRM

Informant Address	Policy measures used in allocating available water resources	The extent to which the national water policy address the											
		water resource protection	priority use of water	capacity building & human resources	environmental sustainability	equity	health and sanitation	water resource assessment	private investiment	institutional strengthening	gender mainstreaming	overall resource management	efficient use of water
Forestry and beekeeping division, Ministry of natural resources and tourism, P.O. Box 9372, Dar es salaam	Water rights	Good	Excellent	Good	Good	Good	Good	Satisfactory	Satisfactory	Good	Good	Satisfactory	Good
Lake Nyasa Basin Water Office, P.O. BOX 3852 Mbeya, Tanzania	Prioritizing domestic water supplies	Good	Good	Good	Satisfactory	Good	Good	Excellent	Good	Good	Excellent	Good	Good
Lake Victoria Environmental Management project, Water quality management component, P.O. Box 211, Mwanza, Tanzania		Excellent	Excellent	Excellent	Good	Good	.	Good	Good	Good	Good	Good	Good
Mbarara district local government, natural resource department, P.O. Box 1, Mbarara, Uganda.	Water supply regulations 1999	Satisfactory	Good	Good	Satisfactory	Satisfactory	Poor	Satisfactory	Satisfactory	Satisfactory	Good	Good	Poor
Ministry of livestock development & fisheries, P.O. Box 9152, Dar es salaam, Tanzania	Priority assigned to domestic water supplies	Good	Excellent	Good	Good	Satisfactory	Satisfactory	Good	Excellent	Satisfactory	Satisfactory	Satisfactory	Satisfactory
Ministry of water and irrigation, DSM.	Increasing the availability of water resources	Good	Good	Good	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Good	Satisfactory	Satisfactory	Good
Ministry of water and irrigation, P.O. Box 147, Shinyanga, Tanzania	Human water consumption in water scarce areas, livestock, industries, etc.	Excellent	Excellent	Excellent	Excellent	Excellent	Good	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
National Environment Management Council (NEMC), P.O. BOX 63154, Dar es salaam		Good	Good	Good	Good	Good	Good	Good	.	Poor	Good	Good	Good
Ruvuma river basin and southern coast, P.O Box 141 Mtwara Tanzania	Granting water right upon request to the Basin board	Good	Good	Excellent	Good	Good	Good	Good	Satisfactory	Good	Good	Good	Excellent
Sokoine University of Agriculture (SUA), P.O. Box 3000, Morogoro, Tanzania	Issuance of water rights	Good	Excellent	Good	Good	Satisfactory	Good	Satisfactory	Satisfactory	Good	Satisfactory	Excellent	Satisfactory
University of Dar es salaam, Department of Geology, P.O. Box 35052, Dar es salaam		Excellent	Excellent	Excellent	Satisfactory	Good	Excellent	Good	Good	Satisfactory	Satisfactory	Excellent	Good
WEMA CONSULT (T) LTD, P.O. Box 67371, Dar es salaam, Tanzania	Water policy prioritize the domestic use first, environment second and agriculture third	Excellent	Excellent	Excellent	Excellent	Excellent	Good	Excellent	Poor	Good	Satisfactory	Excellent	Excellent

Most of the international conventions are fully implemented by the institutions in the management of water supply as shown in Table 4.2

Table 4.2. Awareness about international conventions by Government Institutions associated with IWRM

Address of the informant	Government/Institution incorporation of international conventions																
	the helsinki Rules on the uses of water 1966	wetland convention 1971	Stockholm declaration 1977	mar del plata declaration 1977	the world charter for nature 1982	ship pollution 1978	law of the sea 1982	cfc control 1987	rio de janeiro dublin principles	rio de janeiro agenda 21	rio de janeiro clmate change	rio de janeiro declaration biodiversity	desertification 1994	water course convention 1997	kyoto protocol 1997	millenium declaration 2000	the new delhi declaration of principles of international law relating to sustainable development
BAGAMOYO ROAD, TEGETA AREA, P.O. BOX 67371, DAR ES SALAAM	Dont know	Fully implemented	Dont know	Dont know	Dont know	Dont know	Fully implemented	Dont know	Fully implemented	Fully implemented	Fully implemented	Fully implemented	Fully implemented	Dont know	Fully implemented	Fully implemented	Dont know
FOREST AND BEE KEEOING DIVISION	Dont know	Fully implemented	moderate imple	Dont know	Fully implemented	Fully implemented	Fully implemented	Dont know	Fully implemented	Fully implemented	Fully implemented	Fully implemented	Fully implemented	Fully implemented	Fully implemented	Fully implemented	Fully implemented
MINISTRY OF LIVESTOCK DEV & FISHERIES	Dont know	average imple	Dont know	Dont know	Dont know	Dont know	Dont know	Dont know	Dont know	Dont know	Dont know	Dont know	Dont know	Dont know	Dont know	average imple	Dont know
Ministry of water and irrigation	average imple	average imple	average imple	average imple	average imple	moderate imple	average imple	moderate imple	moderate imple	poor impl	poor impl	poor impl	poor impl	poor impl	average imple	average imple	average imple
Ministry of Water and Irrigation, P.O. Box 147,	.	Fully implemented	Fully implemented	.	.	Fully implemented	Fully implemented	.	.	Fully implemented	Fully implemented	Fully implemented	Fully implemented	.	Fully implemented	Fully implemented	.
NATIONAL ENVIRONMENTAL MANAGEMENT COUNCIL (NEMC) BOX 63154 D	.	.	.	.	.	.	.	.	.	.	Fully implemented	Fully implemented	moderate imple	.	Fully implemented	.	.
Project, Water Quality Management Component, P.O. Box 211, M	average imple	moderate imple	.	.	average imple	average imple	.	average imple	average imple	average imple	average imple	average imple	average imple	.	average imple	moderate imple	average imple
RUVUMA RIVER BASIN AND SOUTHERN COAST	moderate imple	moderate imple	average imple	moderate imple	moderate imple	Dont know	Dont know	Dont know	moderate imple	moderate imple	moderate imple	moderate imple	moderate imple	moderate imple	average imple	moderate imple	Dont know
Sokoine University of Agriculture, P.O. Box	moderate imple	moderate imple	moderate imple	moderate imple	moderate imple	moderate imple	Fully implemented	Fully implemented	average imple	average imple	average imple	average imple	average imple	average imple	average imple	average imple	average imple

4.5 Level of mainstreaming of IWRM in the institutional framework and implementation mechanisms

A new institutional framework for integrated water resources management has been established. The institution framework has been designed in order to provide room for effective and efficient integrated water resources management and development. The new institutional framework is based on Basin level organizations. The major IWRM consideration in this regard is involvement of Stakeholders at all levels in the process of management of water resources. Institutions that have been established are the National Water Board, Basin Water Boards, Catchment Water Committees, and Water User Associations as detailed here under:-

National Water Board
The National Water Board (NWB) is a financially and administratively autonomous organization financed by the Basin Boards. The Board is responsible to oversee, co-ordinate and facilitate the activities of Basin Water Boards.

Basin Water Boards
The Basin Water Boards are also financially and administratively autonomous financed through water user charges. The Boards employ the staff necessary to carry out their functions and responsibilities and are accountable to the National Water Board. Water users will participate in WRM processes through representation on the Boards and appropriate stakeholder fora.

Catchment and Sub-catchment Committees
The Catchment and Sub-catchment Committees are autonomous bodies, financed from user charges, and carry out such functions as are delegated by the Basin Water Board. They may employ staff necessary to carry out these functions, or may be supported by Basin Water Board staff.

Water User Associations
Water User Associations are legally constituted bodies drawing their membership from water users in a particular locality. They can employ a few staff when necessary in order to carry out the limited functions at the local level. The costs of the Association are borne from charges levied on its members.

4.6 Challenges related to implementation of IWRM

The major challenges related to implementation of IWRM in Tanzania can be summarized as follows:

b. To have in place an institutional framework for water resources development and management that is adequate in meeting the challenges of effective management of the resources; providing an adequate mechanism for effective consultation and consensus building; and fostering participation of stakeholders in the planning, design, operations, and management decision-making

c. Inadequate assessment of the available resources in terms of quantity and quality. Lack of appropriate assessment has led to under/over-designing of projects, over-exploitation of water resources (surface and ground water) resulting into serious environmental degradation, and many different types of water and land use conflicts occurring as a result of competing demands for the same resource.

d. Fragmented planning without adequate consideration of cross-sectoral water management issues and challenges. This has led to the perception of alienation by smaller but widespread users of water that they are primary losers in basin

management efforts, and water resources planning are urban biased and fosters rural inequity.

e. Deterioration of water quality due to naturally occurring phenomena and anthropogenic activities evident in many parts of the country. Inadequate water quality management and pollution control practices, and weak enforcement due to low institutional capacity, have also led to deterioration of the quality of water resources and limited their use or made treatment costly

f. Increasing demands on limited water supplies and lack of conservation and demand management practices has led to: over-abstraction of surface water sources and over-pumping of groundwater from some of the water sources; increasing conflicts between natural uses and man-made uses, between sectors, and between upstream and downstream users of water; wastage and inefficient use of water resources; and encroachment on wetlands and sensitive ecosystems in search of more water.

g. Insufficient Government resources to initiate implementation IWRM in all the 9 river basins

h. Insufficient community participation in planning, design, implementation, operation and maintenance of water source;

4.7 Integrated Water Resources Management instruments

A range of management instruments are applied in the IWRM process. These include water resources assessment, demand management, pollution monitoring and control, social change instruments, conflict resolution, regulatory instruments, economic instruments and information management and exchange. The status of application of these instruments in Tanzania is discussed in the following sections;

Water resources assessment

The knowledge of both current and future supply and demand on water resources in the basin is an essential component of integrated water resources planning. Integrated management of water resources addresses specific water resources issues in the basin, including socio-economic, land use, infrastructure and natural resource conditions, pressures and processes. Understanding of current and future human uses of water (such as irrigation, hydro- electricity and domestic or industrial water supply) as well as the ecological needs for water within different parts of a river basin is essential for present and future holistic water resources management.

Historically water resources assessment in the country has been done under water master plans which were mainly focused on water resources development following administrative boundaries. The water master plans have comprehensive assessment of water sources including surface and ground water and their quality properties. The master plans also have an assessment of demand mainly for domestic uses which is the main

target. As the main focus of the plans was for water resources development they lack other uses of water as recognised in IWRM. The latest water master plan in Tanzania is that of Mtwara and Lindi regions conducted by JICA in 2002. In most places in Tanzania the water master plans (though very old dating back to seventies and eights) are the only form of assessment available.

Prior to 1980 the ministry of water used to publish the hydrological year book. This contained the annual statistics of river flows at all gauging stations in the country. The book also published maps of gauging stations and details of the gauge including dates of construction, the type of control section. Rapid water resources assessment in the country conducted way back in 1994 was the first form of assessment with most relevant information for integrated water resources management. The assessment was carried after formulating the basins and it collated available data basin wise, identified gaps in knowledge and priority issues for IWRM. This assessment helped to priorities critical issues by basin and lead to recommendations to improve the gauging networks in basins which was done in the small holder irrigation improvement project implemented in 1996. The small irrigation improvement project also revised the 1991 water policy to the current 2002 version. Water resources assessment has been improved to some extent in the basins by rehabilitation of the gauging stations and development of data bases but lack of capacity is still constraining the acquisition of necessary data for integrated water resources management.

More recent studies on water availability have been done in the coastal zone (Dar es Salaam and coast region), Lake Victoria zone (Mwanza, Mara and Kagera) and the central zone (internal drainage basin). These studies assessed mainly ground and surface water for water supply schemes. Groundwater is a viable source of domestic, livestock and irrigation, and industrial water, etc. for many areas in the country. In other places which have persistent water shortages such as Shinyanga, Coast, Mwanza, Arusha, Mara, Tabora, Dodoma, Singida, Mtwara and Lindi Regions, it is a better and secure alternative to surface water. The on-going groundwater resources development in the country is being carried out without sufficient knowledge of the resource potential, in terms of quantity and quality, due to lack of data and adequate regulations to monitor the activity. This has led to under utilization of the resource, and in some places overexploitation and interference in the existing groundwater sources, notably in coastal areas, may result in saltwater intrusion. The role of the private sector in groundwater development, especially in providing consultancy services and private drilling companies are involved directly in the development of this resource. However, there are no comprehensive procedures and guidelines governing the development of this resource, thus threatening its sustainability. The current status of groundwater in terms of quantity and quality is not well known and the efforts are underway to ascertain the situation.

Other development in demand assessment is the estimation of environmental flows to allow for water allocation to the environment as emphasized by water policy (NAWAPO, 2002). Some basins in Tanzania including Pangani, Kihansi Mara and Wami-Ruvu have started the process of estimating environmental flows. The extinction of Kihansi red toads in Kihansi gorge due to operation of hydropower plant upstream sent a strong

message to policy makers and the donor community who reacted positively to ensure that nature is allocated its rightful share of water.

Demand management

The policy objective with regard to water demand management is to prevent waste full usage and control water leakage. Water demand in urban areas is increasing at a rate, which is not proportional to the rate of expansion of water supply and sewerage services. This is due to high rate of urbanisation, increase of industrial activities and significant unaccounted-for-water that includes leakage, wastage and illegal connections. In agricultural sector, particularly on irrigation, the water demand management is advocating for efficient use of water by employing best irrigation practices Water demand management measures in Tanzania are undertaken to conserve and use the available water efficiently and equitably, by:

a. Measures on proper tariff setting (at an economic cost), metering, rationing, leakage control and mass education on frugal use of water and conservation are instituted.
b. Regulations on efficient use of water by using low capacity cisterns are formulated.
c. Best and appropriate irrigation practices are employed

The control of wasteful use of water starts by charging economic rate to water used. This forces the user to value and use water carefully. With regard to this urban water authorities have embarked on massive metering campaigns to have the customers metered so that they can be charged per actual amounts used. This is however a costly exercise and is bound to take sometimes before universal metering has been achieved. On the other hand the basin water office which grants water right to the urban water supply and sanitation authorities may charge the authorities according the abstracted amount. There is no consensus on this as other basins charge according to water pumped and other just based on water right.

The newly proposed legislation on water supply and sanitation has also recognized the importance of demand management and provides for penalties on damaging water supply pipes, wastage of water, tempering with fitting to avoid accurate measurement of water delivered, and using water for purpose other than for which it has been applied. The law also provides for procedures to recover unpaid bills from defaulters.

Pollution monitoring and control

The policy objective with regard to pollution control in Tanzania is to have water resources with set minimum acceptable quality. Various human activities taking place in basins threaten freshwater bodies with increasing pollution and degradation. The pollution comes from many sources, including untreated or partially treated sewage from municipalities and small towns, industrial waste discharges, leaking over and under ground tanks - for storing chemical compounds, petroleum leaks and spills, dumping in old mines and pits, gold mining (large and artisanal) operations, agricultural chemicals that are washed off or seep underground from farm fields, and atmospheric deposition. Pollution undermines the use of an important and scarce water resource. Pollution also

transfers the consequences (or cost of treatment) to downstream users. Polluted water requires costly treatment. Water pollution should therefore be avoided or minimized.

According to the National Water Development Strategy water resources in many parts of the country are polluted due to both naturally occurring phenomenon and anthropogenic activities. There is in adequate management of water quality and pollution control practices and weak enforcement to low institutional capacity. The strategy proposes to promote sustainable use of water resources while protecting and enhancing their quality, strengthen water quality monitoring, define standard to be maintained in water bodies according to their use, establishing effluent discharge standards, charge for effluent discharge due to the cost to the environment, promote cleaner production to avoid pollution. In short to medium term the ministry responsible for water in collaboration with basin water offices plans to:

i. set water quality targets linked to water resources classification system
ii. develop and implement water quality monitoring programs and prepare water quality maps
iii. prepare and implement system of discharge standards and permits to protect water rivers
iv. develop and operationalise procedures for monitoring and enforcing pollution control legislation
v. identify areas with naturally occurring elements in water and disseminate findings on remedial measures (MoWI, 2008)

The environmental management act (EMA, 2004) has general provision for pollution of environment water included and the newly proposed law on water resources
Management Act provides for specific provisions for water pollution. For example the proposed law binds persons prospecting for petroleum or person engaged in mining to prevent pollution of groundwater reserves should they come in contact with any during their normal activities. The law further binds them to comply with directions of the basin water officer given to protect the reserves. The proposed law (Water Resources Act) has coded very clearly polluter pays principle by requiring the polluter to pay the full cost of reinstating the quality of the water body polluted. The legislation has given enough powers to the basin water boards to protect water quality.

During budget speech for 2008/09 the minister for water and irrigation announced a plan to strengthen the water quality laboratories and establish water quality monitoring stations. The ministry has also called for expression of interest in steps to procure a consultant to develop water quality management and pollution control strategy. The ministry has also demonstrated its commitment for improving water quality laboratories by setting aside 500,000,000.00 Tsh. Local funds and 1000,000,000.00 T.sh (foreign funds) to facilitate the rehabilitation of the water quality laboratories in the 9 basins of the country.

Social change instruments

In Tanzanian, the policy and general public believe that communities in general play a major role in the water sector because they are the primary users, guardians and managers

of water sources. Participation of both men and women in decision-making, planning, management and implementation of water resources management and development are enhanced. Youth and children as the future managers of water resources have to be involved from the early stages for better management and future sustainability. Processes to engage youth and children in education on the management, protection, conservation and development of water resources as they are the facilitators for change are underway.

Conflict resolution

The water conflicts in Tanzania are of different types of conflict as follows:
Conflicts of scale – Water users of different sizes and power in the basins are often described in dichotomous terms. Hence, large-scale plantations using hundreds of litres of water a second and employing highly efficient irrigation systems differ starkly from small-scale users using far less water and employing very inefficient irrigation systems. The extremes involved in these regards are fertile grounds for conflict.

Conflicts of tenure: - Conflicts between community- level and government forestry management initiatives; between resource users of different kinds; and conflict over different management perspectives.

Conflicts of location: Users located in upstream areas are placed more favourably vis-à-vis water abstraction than are downstream users. At its most basic, these problems can be seen along irrigation furrows where users close to the water source are able to grow crops with high water demands (such as irrigated rice) and those located at the end of the furrow obliged to plant low water demand crops. The serious problems faced by downstream hydropower plants are another example. Examples of such conflicts are those between upstream and downstream water users, and conflicts between hydropower interests and small-scale irrigators.

Regulatory instruments

In Tanzanian, there is Energy and Water Regulatory Agent (EWURA) which deals with regulation and setting out of tariffs for water as one of the utilities.

Economic instruments

Economic instruments include water pricing, charges, penalties and incentives to be used to stimulate marketing mechanism, and serve as an incentive to conserve water, and reduce pollution of water sources. In Tanzania, these instruments are being used for the purpose of efficiently using water.

Information management and exchange

A sound information and knowledge base is needed for different kinds of assessment, preparation of plans, construction and operation of projects. In addition, data are required for decision making and for taking appropriate interventional measures regarding management, allocation and development of water resources. An effective integrated water resource management system must be able to provide timely and correct information on the quantity, quality and resource use. Presently data gathering networks in Tanzania, have deteriorated due to lack of resources and tools, thus affecting the

system of collecting data and information. Government and other institutions with or expected to acquire capacity to collect data relevant to IWRM are indicated in Table 4.3

Table 4 3:Government and other institutions with or expected to acquire capacity to collect data relevant to IWRM in Tanzania

Informant Address	Estimates of different sources of water	Quality of each source of water	Estimated current demand for water by various sectors	Anticipated sectoral and total demand for water in the future	Sources of water loss/leakage and estimates	Quantity and quality of wastewater and possibilities for reuse	Water monitoring units and their distribution (central and local units)	Current and projected investments in water supply projects	Legislation involved with water rights, use, recycling and reuse, delivery, charges, markets & unions	Protection dealing with conflicts among water users, etc.	Economic incentives for increasing water use efficiency(taxes, subsidies, grants, tax rebates, etc.)	Sources of water pollution, its intensity, its effects on freshwater supply and use	Different NGOs involved in water use and development	Fresh water is a finite and vulnerable resource and should be protected
Forestry and beekeeping division, Ministry of natural resources and tourism, P.O. Box 9372, Dar es salaam	.	.	.	.	.	.	.	.	.	.	.	.	.	High
Lake Nyasa Basin Water Office, P.O. BOX 3852 Mbeya, Tanzania	Included now	To be included soon	To be included later	To be included later	Included now	To be included later	Included now	Included now	To be included soon	Included now	To be included later	Included now	Included now	Medium
Lake Victoria Environmental Management project, Water quality management component, P.O. Box 211, Mwanza, Tanzania	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Poor
Ministry of livestock development & fisheries, P.O. Box 9152, Dar es salaam, Tanzania	Included now	To be included soon	To be included soon	To be included later	To be included soon	To be included later	To be included soon	To be included later	To be included soon	To be included soon	To be included later	To be included soon	To be included soon	Poor
Ministry of water and irrigation, DSM.	Included now	Included now	Included now	To be included soon	To be included soon	To be included soon	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Medium
Ministry of water and irrigation, P.O. Box 147, Shinyanga, Tanzania	Included now	Included now	To be included soon	Included now	Included now	Included now	Included now	Included now	To be included soon	To be included soon	To be included soon	To be included soon	To be included soon	Medium
National Environment Management Council (NEMC), P.O. BOX 63154, Dar es salaam	.	.	.	.	.	.	.	.	.	.	.	.	.	Poor
Ruvuma river basin and southern coast, P.O Box 141 Mtwara Tanzania	Included now	Included now	Not included	To be included soon	Included now	Not included	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Poor
Sokoine University of Agriculture (SUA), P.O. Box 3000, Morogoro, Tanzania	To be included later	To be included later	Not included	Not included	Not included	Included now	To be included later	Not included	Included now	Not included	Not included	Not included	Included now	Medium
University of Dar es salaam, Department of Geology, P.O. Box 35052, Dar es salaam	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Poor
WEMA CONSULT (T) LTD, P.O. Box 67371, Dar es salaam, Tanzania	Included now	Included now	Not included	Not included	Not included	Not included	Included now	Included now	Included now	Included now	Not included	Included now	Included now	High

4.8 Achievement against milestones

So far Tanzania has made substantial efforts in creating the enabling environment for planning and implementation of IWRM. Some of the achievements are listed below.

Legal frame work
Since 1981 the country has declared water basin as a management unit for water resources. Over the years the basins have been formed and offices established. The basin water boards have played a big role in improving water resources management and changing the way people think of water management. Tanzania laws have been streamlined to facilitate planning and implementation of water resources. The more recent revisions of the law put much emphasis on IWRM and would strengthen implementation.

Policy frame work
In keeping with the changing global trends in the Water Sector, and taking into account other national policy reforms, the Government launched a revised National Water Policy in July 2002. This sets out the future direction for the Water Sector in achieving sustainable development and management of the Nation's water resources for economy-wide benefits and an increase in the availability of water supply and sanitation services. The water resources aspects of the National Water Policy have implications for all water using key sectors of the economy, such as agriculture, energy, industry, livestock, mining, environment, tourism and fisheries, as well as for domestic supply.

The Policy embodies the principle that water basins should be the planning and management units rather than regions, and the principles of decentralisation and devolution of water supply management to the lowest appropriate level. Prior to this launching, the Water Sector had suffered from uncoordinated strategies and programmes that often resulted in unsustainable water utilisation, threats to past investments in costly infrastructure, and, ultimately, unsatisfactory services. Following the launching of the National Water Policy, which has proclaimed a new era for the Water Sector, the National Water Sector Development Strategy has been prepared in order to further develop the Policy aspiration and define an implementation framework.

National Water Sector Development Strategy 2006 to 2015
The Ministry of Water and Irrigation has started to restructure its institutions to be compatible with the requirements of the country's decentralisation and reform policies through measures that are in line with the National Water Policy of 2002, taking into account the provisions of the Local Government Reform Policy. The National Water Sector Development Strategy has been developed to support re-alignment of the water related aspects of other key sectoral policies (for example, energy, irrigation, industry, mining, and the environment) with the National Water Policy, and to provide a focus on specific roles of the various actors through clearly defining roles and responsibilities and hence the removal of duplications and omissions. Further, the institutional framework underscores separation of service delivery and regulation to ensure fair play among the various actors and sectors. This National Water Sector Development Strategy is,

therefore, a blueprint for prioritised timely and appropriate interventions to address the Water Sector challenges in the process of achieving all the targets narrated in the National Strategy for Growth and Reduction of Poverty by 2010, the Millennium Development Goals by 2015, and contribute towards achieving the Tanzania Development Vision Targets by 2025. Furthermore the Strategy leads to reshaping and increasing sector financing through a smooth and manageable institutional arrangement
Institutional frame work

The institutional frame work in the country has been streamlined to provide for more participatory approach to water resources management. All nine basins have basin water boards which oversee the day to day functions. Efforts have been made in forming grass root organizations in Pangani and Rufiji river basins to improve water resources management. There are water user groups and water user associations which are active in water resources management in these basins. More recently the process of forming water user groups and association has started in the Ruvuma and Mara river basins.

The summary of the kind of information that is included in the data system as a management instrument is given bellow as reported by a number of informats. Most of the issues are included in the data system (Table 4.3.). It can be seem that all informats reported that inventory of all data sources in included

The status of implementation of IWRM in Tanzania is summarized in Table 2 below

Table 4.4:Summary of implementation status of IWRM in Tanzania

Phase	Important questions	Indicators/condition	Tanzania situation
Enabling environment	Is there a policy stipulating IWRM as approach for water resources management	Policy with clear reference to IWRM principles in water management developed and endorsed by all stakeholders.	NAWAPO in partial operation
	Is there an institutional frame work that clearly defines responsibility for planning and implementation of IWRM?	Institutional frame work embodying the management principles of IWRM including participatory approach to management, decision making at lowest level, representation of women and multi-sectoral approach developed and supported by law.	Water Basins in place
	Is there a strategy for implementing IWRM	Strategy document with timelines, budgets and players	National strategy has been formulated
	Is there a law that can support planning and implementation of IWRM	Law enacted by parliament with enough provisions for implementing IWRM	Registrations and acts enacted
	Are the people aware of IWRM	Number of Decision makers who subscribe to the basic principles of IWRM	Water/Quality Directors Basin Water Officers
Implementation phase	Is water allocation done according to IWRM principles?	i) Existence of firstly prioritized lifeline supply for poor ii) Existence of Secondly prioritized water allocation to the to the environment ii) Existence of economically attractive allocation frame work.	Water rights and User associations in place Use prioritized first is domestic second is environment
	Is water management participatory?	i) presence and active participation in WM of water user groups, ii) water user association, iii) catchment water committees, iv) basin water boards v) national water boards, vi) multi-stake-holder platforms at all levels	User association formed Basin Boards in place National water board in place
	Are women represented in the planning and implementation?	Percentage of women in IWRM institutions.	30% Women in the parliament
	Is water used efficiently?	Allocation system with economic consideration Low level of un accounted water in supply network Level of irrigation efficiency	Private operators in place, water vendors in place
	Is water used sustainably?	Abstraction rate vs. yield Knowledge of and allocation of environmental flow Cost of water management and water development recovered Conflicts over water resources resolved	Environmental flows study conducted for Pangani and Wami-Ruvu

5 CASE STUDIES OF IWRM INITIATIVES

5.1 Case Study 1: The Pangani River Basin

Overview of Pangani River Basin
The Pangani river basin has a total area of 42,200 km^2 of which about 5% is located in Kenya while the rest is distributed across Arusha, Kilimanjaro, Manyara and Tanga administrative regions of Tanzania (Figure 5.1). The basin originates from Mt. Kilimanjaro and Mt. Meru and finally drains into the Indian Ocean. The main tributaries of the Pangani River are Kikuletwa and Ruvu. These tributaries join at Nyumba ya Mungu Dam which was constructed mainly for hydropower production.

Water Resources use in Pangani River Basin
There exists a variety of water resources use in the Pangani River Basin. These are domestic, agriculture, hydropower production, livestock and mining.

Water from Pangani River is used for domestic needs in the urban and rural areas across the basin. While it is estimated that the total population is in the basin is about 2.6million, the level of domestic water service in the urban and rural areas is quite different. Domestic water supply in the urban areas is more reliable. In the rural areas, many household rely on the river itself (directly) for drinking water and other hygienic purposes.

Irrigated agriculture stands as a significant consumer of water in the Pangani River Basin. Estimates show that 80% of Pangani River Basin's population relies on agriculture, directly or indirectly, for their livelihoods. There exist large irrigation plantations or estates growing coffee, sugar, flowers, and fruits mainly for exports. Other crops such as maize, rice, bananas, beans and vegetables are grown to serve the local markets

The installed capacity for hydropower production in Pangani River can supply up to 91.5 MW or 17% of Tanzania's power supply. Hydropower production is done from three (3) stations namely Nyumba ya Mungu, Hale and Pangani Falls. The location of the power plants implies that water can not be used for other needs upstream. As a result, water shortages in the dry season can result to hydroelectric power production to drop to 30% of capacity.

Livestock keeping is mainly found in rural areas. The most common types of livestock are cattle, goats, chicken and sheep. The average number of cattle and goats is highest in the central areas of the basin, which include a significant number of Maasai households who tend to keep larger herds of cattle and goats.

Mining activities in the basin include tin mining in Korogwe, tanzanite and phosphate mines in Arusha, limestone mines near Tanga and gold panning in the Usambara Mountains. Eighty percent (80%) of the worlds known tanzanite reserves are found at

Mererani outside of Arusha. Sand mining for construction purposes is also common along riverbanks.

There is also a variety of industrial activities in the basin which represent a significant water use. These include sisal processing, tanneries, paper products, chemicals, textiles, timber, metal works and bottled water production. Fertilizer, cement, fruit canning and saw milling, sisal rope, steel rolling, timber, production of plastic polybags and soft drinks.

Water Resources Issues and Challenges in Pangani River Basin

The key water related issues in the Pangani River Basin have been reported to be:

a. Deteriorating water quality which can be reflected from poor landuse practices and effluent and solid waste pollution;
b. Climate change as implied from a decline in precipitation and local warming trend. As a result, it is now projected that the famous glaciers from Mount Kilimanjaro which represent an important indicator for climate change locally and internationally will disappear by 2020.
c. Decreasing water availability due to climate change and degradation versus increasing demand as a result of population growth and economic growth. Conflicts among water users as a result of over allocation of water in the Pangani River among competing demands. The diversity of water uses in the Pangani River has resulted into water use conflicts. According to the *Pangani Basin Situation Analysis Report (IUCN, 2003)* the conflicts are classified as:-
    i ***Conflicts of scale*:** This refers to water users of different sizes and power in the PRB. Large-scale plantations using a lot of water and employing highly efficient irrigation systems, differ from small-scale users using far less water and employing very inefficient irrigation systems. Example of scale conflicts are between urban and rural users, and between large and small-scale mining interests.

    ii ***Conflicts of tenure***: This refers to the right to manage a resource. Throughout Tanzania, Community-based Natural Resources Management (CBNRM) has been seen as an attractive way of increasing the efficiency of the nation's Natural Resources Management (NRM) systems. Examples are provided of conflicts between community-level and government forestry management initiatives; between resource users of different kinds; and conflict over different management perspectives.

    iii ***Conflicts of location:*** users located in upstream areas are placed more favourably vis-à-vis water abstraction than are downstream users. The problems can be seen along irrigation furrows where users close to the water source are able to grow crops with high water demands (e.g irrigated rice) and those located at the end of the furrow are obliged to plant low water demand crops. The serious problems faced by downstream hydropower plants are another example. Examples of such conflicts are those between upstream and

downstream water users, and conflicts between hydropower interests and small-scale irrigators.

d. General lack of awareness about catchment and water conservation issues among stakeholders/basin inhabitants

e. Lack of enforcement of legislation pertaining to water use and wastewater treatment

IWRM in Pangani River Basin

Water Resources Management in Pangani River is under Pangani Basin Water Office (PBWO) which is under the Pangani Basin Water Board (PBWB). The PBWO and PBWB were established under the provisions of the Water Utilisation (Control and Regulation) Act No. 42 of 1974. The driving force to the establishment of PBWO was the concerns of availability of water for hydropower production from Pangani River. The functions of the PBWO include:

a. Water resource assessment;
b. Allocating water for different uses;
c. Managing and controlling water use;
d. Monitoring and controlling pollution;
e. Water-related conflict resolution;
f. Awareness creation on effective and efficient water;
g. Collection of water user and wastewater discharge fees; and
h. Participating in water conservation programmes

The PBWO has been working in partnership with the local NGO Pamoja and IUCN to address water-related conflicts. The steps taken to solve the conflicts include: awareness raising about water sector reforms, IWRM, and the likely effects of climate change; and supporting the water allocation process with technical data including the environmental, economic and social costs and benefits of different allocation scenarios. These steps have been underway in the Pangani Basin in a project that is part of the IUCN Water & Nature Initiative.

Project partners have been working on a Dialogue Process to address some of the conflicts in the basin. This process included a detailed situation analysis of conflicts at 5 different sites in the basin, including conflicts of scale, tenure and location. A stakeholder workshop including representatives from communities, local and national government and technical experts, was held to discuss the situation analyses and propose a way forward for resolving these conflicts.

Subsequently, dialogues platforms were established at each site to bring together actors to discuss the contentious issues and work towards consensus in resolving them. In one case this included negotiating an agreement for land-use planning that allows pastoralists access to water supplies.

Another case involved recognizing the efficacy and to some extent reinstituting traditional systems where water was managed by hydrological boundaries and not

administrative boundaries, making it easier to negotiate agreements between upstream and down stream users. In one case, a conflict between the Arusha Urban Water Supply and small-scale downstream users, the dialogue process has stalled because of political and national interests. The Dialogues Process in itself has gone far in bridging the gap between the Pangani Basin Water Office and the communities who did not understand the PBWO's role in managing and allocating the resource and thus were refusing to apply for water rights. The dialogues process, in all cases, strengthened water user associations (WUAs).

Some of the lessons learned in the phase of the Dialogues Process include:

a. *Authority:* Traditional governance systems had ways of dealing with water conflicts and these traditional arrangements should be recognized and accommodated by authorities as much as possible within water sector reforms. In such cases, the role of the basin office is as a technical advisor on policy, legislation and best practices rather than an enforcement agency.

b. *Devolving decision-making to lower levels:* People need to have a stake (ownership) in resources as an incentive to use the resource sustainably. Issues of equity, land tenure, ownership, rights and distribution of benefits must therefore also be addressed.

c. *Role of Dialogue in strengthening water resources management:* Dialogue forums strengthen Water Users Associations (WUAs) and may stimulate the formalization of WUAs and/or the formation of similar associations. Demonstrations are powerful, especially the demonstration, or threat, of a well-organized neighbor with legal rights to water.

d. *Dialogue processes:* Dialogues processes have a better chance of success if they are initiated prior to a crisis situation. Steps in the process include:
   i understanding the conflict
   ii building relationships and trust
   iii agreeing on solutions (signing memorandums of understanding with action plans)
   iv joint implementation of action plans

e. *Willingness to negotiate equitable solutions:* The co-existence of legal and illegal water users (those with and without water permits) hinders the willingness to negotiate equitable solutions. The more inclusive the process is, the more sustainable and equitable the outcome will likely be. Increased inclusion, however, does have higher transaction costs.

f. *Capacity and strength of local institutions:* Water is a cross-cutting issue and as such, many sectors have a role to play. These include the ministries of water, of agriculture, of planning, of regional and local governance, among others. Sometimes these various sectors have overlap in their mandates that causes

confusion. Institutional arrangements for water management must be clarified, harmonized and publicized at all levels (national, regional, district, local).

g. *Site specific approach:* The local, site specific variables including history (colonization, chiefdoms, centralization, decentralization), current politics and market forces, population demographics, and effects of climate change all come into play over water negotiations and must be understood in the dialogues process.

5.2 Case study 2: The Rufiji Basin

Overview of Rufiji Basin

The Rufiji basin is the largest of the nine river basins in Tanzania, draining a total area of about 177,420 km^2. It is made up of several river systems, the largest and most important (in terms of water utilization) of which is the Great Ruaha River (GRR) system. The Great Ruaha River is draining an area of about 83,979km^2. The Great Ruaha River spills onto the Usangu plains, forming the Usangu wetlands (Western-*Utengule* and Eastern-Utengule) and feeding a perennial swamp (*Ihefu*) within the Eastern wetland. It then flows through Ng'iriama (an exit to the Eastern Wetland) on to the Ruaha National Park providing the main water source to the park, and to the Mtera dam, which is the main electricity generation source in Tanzania, accounting for 56% of the runoff to Mtera dam.

Water use in the Rufiji Basin includes irrigation, hydropower generation, livestock, domestic uses, fisheries and aquatic flora and fauna. Irrigation is the major activity and largest water user; it is practiced all year round with supplementary irrigation in the rainy season. Other water related livelihoods include fishing, livestock keeping and brick making.

Problems arise in the dry season when conflicts and disputes over access to water become common. As much water is diverted to the fields for irrigation and brick making, the reduced river flows fail to supply full requirements downstream. This has also brought environmental concerns after the massive mortality and stresses to aquatic ecosystem. Downstream of the Ruaha National Park there are two hydropower stations (Mtera and Kidatu) depending much on the basin for their water for power generation, contributing about 50% of the Tanzania national grid.

IWRM in the Rufiji Basin

In order to manage water resource in the Rufiji Basin, the Rufiji Basin Water Office was established after the inauguration of the Basin Water Board in 1993. The main objectives of the office are firstly, to act as principal executors of the water Utilisation Act No. 42 of 1974 and its subsequent amendments (namely of 1981, 1989 and 1997) on water allocation and water pollution; and to carry out research pertaining to water resources management in the Rufiji River Basin. The RBWO has been implementing IWRM plans which include:-

a. To update and establish a water rights and water abstractions register as per existing situation.
b. To establish and maintain a water resources data bank for water management purposes.
c. To carry out awareness creation activities and education to raise the communities' social and political will and commitment towards water resources management problems.
d. To involve stakeholders in water resources management issues particularly those related to equitable utilization, allocation and conservation of water resources.
e. To establish Water Users Association or Water User Groups as legal institutions linking the Office with stakeholders in all matters related to the management of water resources.
f. To continue with water pollution monitoring and control and water apportioning in the basin and
g. To continue with monitoring, regulation and control of water resources in collaboration with other institutions, to facilitate environmental and water resources management issues in the basin.

Water resources issues and challenges in Rufiji River basin

Within the Rufiji basin, the greatest water use occurs in the Great Ruaha sub-basin, where water shortages and water use conflicts are being experienced. Competition is mainly between downstream hydropower generation and upstream irrigation, due mainly to the design of hydropower schemes that did not take increasing irrigation demand into account. Significant water wastage is experienced as small scale irrigators have neither infrastructure nor incentives to facilitate efficient use of water.

Similar to Pangani basin, water scarcity has resulted in conflicts between different groups in the Rufiji basin water scarcity has resulted in conflicts between farmers and pastoralists, especially during the dry season. The rising number of cattle has increased the requirement for water during the dry season, while at the same time the expansion of areas under irrigation by farmers has reduced the land area available for grazing. Pastoralists in turn drive their cattle on cultivated fields to access water sources during the dry season, causing damage to crops and cultivated fields. Furthermore, farmers in the basin view basin management suspiciously, and consider it as an effort to safeguard the interests of Tanzania Electric Supply Company (TANESCO) in reserving sufficient water for hydropower production. This negative perception is reinforced by the fact that TANESCO is providing most of the financial and material support for managing water resources in the basin. There has been an impression of inequitable use of water resources and inequitable sharing of benefits derived from using the basin water resources.

As per the Water Utilisation Act requirement, each water user must have a water right that allows abstraction of water via a pump or irrigation furrow. However, in general most smallholder irrigators don't hold water rights. There has been resistance from the communities in acquiring and paying for water rights. This problem can be attributed to the Tanzania's long history of indigenous irrigation and *free water era*. It

has been difficult for people especially in the rural areas to understand why they must now pay for a permit for something their ancestors have always seen as a right.

5.3 Case study 3: The Wami-Ruvu Basin

Overview of Wami-Ruvu Basin

The Wami Ruvu basin covers the catchment areas of two major rivers – the Wami and Ruvu river systems and the coastal rivers within Dar es Salaam including: Mpiji, Sinza, Msimbazi and Kizinga. All rivers and groundwater drains into the Indian Ocean. The total area of the basin is 66,820 km2. The Wami river system is 43,946 km2, the Ruvu river system is 18,078 km2 and coastal rivers cover 4,796 km2. The basin is important due to its diversified use which benefits a multi-diversity of stakeholders. Some of these include large scale irrigated sugar production in the upstream, biodiversity and environmental conservation (i.e. Sadani National Park and Wami-Mbiki Wildlife Management Area), domestic and industrial water supply (i.e. the Chalinze water supply project in the downstream of Wami River, the Upper and lower Ruvu water supply projects for Dar es Salaam and Coastal areas), livestock water needs and fishing. The basin is a major source of water supply for inhabitants in Dar es Salaam – the Tanzania business city. The government's effort has been to ensure sufficient water supply in the city and presently a new dam (Kidunda dam) has been proposed. However, there are increased concerns on its environmental effects particularly on the Selous Game Reserve. In total about 4.5 million people get water from surface and groundwater sources within the basin. Considering the increased demand for water and rapid development, the basin has experienced rampant water shortages, severe water pollution and conflicts. Water use efficiency is very low both within urban/industrial areas and irrigation. The basin has a large number of unlicensed water abstractions (abstractions without water rights) mainly for irrigation and there is increased encroachment of water sources. A large community has limited awareness of water conservation issues. The miss conceivement of water conservation efforts is attributable to poor links between water resource management and development decisions. Urban wastewater is in most cases discharged untreated into streams and in some cases infiltrated into the groundwater aquifers. Catchment degradation as a result of overgrazing, deforestation for agricultural expansion, timber and charcoal making; bush fires and poor farming practices have continued threatening water resources in the basin.

IWRM in the Wami-Ruvu Basin

The actual implementation of IWRM in the Wami-Ruvu basin is at an initial stage but some progresses have been made despite the low level of IWRM awareness within the basin. Under the funding by INWENT – a German NGO for capacity building, a workshop has been conducted in 2005 to build capacity on IWRM. Following the workshop, the basin management had planned to have IWRM plans by the year 2005, but this could not materialize due to limited financial and human resources. Presently under the World Bank funding through the Water and Sanitation Sector Development Programme, the basin is planning to commission a consultancy to develop IWRM plans for the basin. Initial environmental flow studies have been conducted to ascertain water for the environment. The basin management is working collaboratively with the districts

municipalities towards the realization of IWRM in the basin. Meetings between the district municipalities and the basin management have been conducted to build consensus on issues pertaining to hydrological boundaries versus political/ administrative boundaries in the management of water resources. Following this, seven sub-catchments in accordance of hydrological boundaries have been delineated. District Facilitation Teams (DFTs) have been formed and these will collaboratively work with the basin management to form Water User Associations (WUAs) which will later form catchment committees and catchment apex bodies. According to the National Water Policy of 2002, there are six levels of water resources management namely National, Basin, River Catchment/sub-catchment, District and Water User Association. The basin management foresee an improved management of water resources based on IWRM principles provided there will be sufficient cooperation among decision makers and politicians.

Tangible impacts: It is too early to for the basin to register any benefit from IWRM as the implementation is still at an infant state. However, there is recorded success in the process which reflects on the future benefits to be realized after the IWRM implementation. It is expected that there will be reduction in pollution loads and improvement in quality of river water. The upstream-downstream conflicts are expected to be reduced and deforestation practices halted. Drinking water within the basin will be safeguarded and ecosystems in several river stretches restored follow environmental flow allocation. Groundwater pollution and pollution risks will be reduced and public awareness of demand management improved.

5.4 Lessons learnt from IWRM initiatives in the Country

Despite the challenges of IWRM implementation in Tanzania, the initiatives that have so far been implemented have shown that IWRM is a holistic approach towards water resources management in the country. The lessons learnt from these initiatives include:

a. Public participation is crucial in order to register successful IWRM implementation especially in the rural areas. In order to ensure this, awareness campaigns are essential. This awareness campaigns have to be designed in manner that they will address particular local conditions.
b. Conflicts on Water Resources can be resolved through dialogue processes. These dialogues can be successful if they are planed prior to occurrence of any crisis
c. The entrenched attitude of *free water* is still prominent in Tanzania. This is mainly due to the history of water supply in Tanzania where water supply has been free up to the 1980s. There is much to be done in order to have the communities understand that water is an economic good and people have to pay for their water supply/water right
d. Political will has also proved to be an important component for success in IWRM. There have been cases in for example in Pangani Basin, where politicians have differed with the Basin Authorities on the issues of water use and water rights. In this case if politicians do not appreciate the need and importance of IWRM initiatives it is likely that public participation will be affected and hence failure in IWRM.

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions on the level of implementation of IWRM

Generally, implementation of IWRM in Tanzania is at its infant stage. Significant progress has been realized in only two (Pangani and Rufiji) of the nine basins in Tanzania. Like for other developing countries, there is a lot to be done in order to achieve successful implementation of IWRM Tanzania. However, a good foundation for successful implementation of IWRM in Tanzania has been laid. As discussed earlier, the linkages of between IWRM and poverty reduction are well recognized in the policy environment. IWRM is also recognized as the most promising approach in water resources planning, development and management and has been mainstreamed into the relevant National Policies and Plans. The new Water Policy (NAWAPO, 2002) has significantly acknowledged and addressed the need and importance for IWRM in Tanzania. Other related sectoral policies directly or indirectly recognize the need for IWRM. Since water resources management and water supply and sanitation are multidisciplinary and multi-sectoral activities, the individual health, environmental, local government reform, rural development, land and settlement, and forestry policies, etc. provide strategic linkages to the NAWAPO, and supplement the aims and objectives of NAWAPO.

Furthermore, the National Water Sector Development Strategy (NWSDS-2006) has been prepared. The NWSDS sets out the strategy for NAWAPO implementation and in turn guides the formulation of sub-sectoral investment programmes. Following this strategy, the Water Sector Development Programme –WSDP(2006-2025) has been prepared and will implemented all over Tanzania. The programme contains three sub programs namely Water Resources Management, Urban Water Supply and Sewerage (UWSS) and Rural Water Supply and Sanitation (RWSS). The objectives of the WRM component are to

a. develop a sound water resources management and development framework in all nine water basins, and
b. promote good governance of water resources through empowering the water users, encouraging participatory and transparent decision making, developing ownership to the user level, and granting secure water rights with responsibilities to the water users, community groups, local government and Basin Boards.

The targets for water resource management include: reduction of water-related environmental pollution levels from 20% in 2003 to 10% in 2010; and integrated water resources management operational in all basins by 2010.

Basin-level implementation is the most extensive aspect of the WRM subprogramme, focussing on establishing and strengthening of nine BWOs. In addition to support for the staffing and physical infrastructure of the BWOs, considerable attention is given to strengthening their capacity in water resources monitoring, assessment and enforcement. Other activities include protection of important water sources; water demand

management; strengthening legislation and enforcement; integrated water resources planning and water security including dam construction; trans-boundary water body management; and a variety of cross-cutting activities including disaster management, public awareness, inter-agency networking and establishing a water resources management information system.

At the national level, the Ministry of Water will be strengthened through recruitment and training of staff, provision of equipment, creation of a national water resources information centre, and technical collaboration on research, dialogue and information exchange with co-riparian states. Drought, flood and manmade disaster (chemical or petroleum spills) management capabilities will be strengthened. Early warning systems will also be established.

Also, a national communications and awareness programme will be developed as a cross sectoral activity to strengthen harmonisation and coordination of water resources plans and policies among key related sectors and stakeholders. A National Water Board to be established under the framework of NAWAPO, will provide sectoral integration in key decisions about water resources management in the country. Through the programme, it is anticipated that significant improvement of IWRM status in the country will be realized.

6.2 Recommendations for improving IWRM implementation

The above discussion has shown the availability of a good direction for IWRM implementation in the Country. Policies, strategies, plans and programmes are in place. The challenge ahead is to take the next step of implementation. In this regard, it is important to emphasize/highlight some of the important aspects in these plans and programmes so that finally successfully IWRM implementation can be registered

Public participation
Public participation which is also one of the Dublin principles for IWRM has to be given enough attention at all relevant stages of IWRM in Tanzania. Through public participation people will not only realize the need and importance of IWRM but it will also assist the communities to own the IWRM initiatives. Strategic and tailor made public awareness programmes are important, taking into consideration the cultural diversity that exist in Tanzania. Through public participation the local communities can provide indigeneous knowledge that can lead to practical, relevant, achievable and acceptable solutions to water resources management.

The role of women
The role of women as key stakeholders in water resources management can not be over emphasized. It is documented that women are not adequately involved in water issues in Tanzania. Attempts to involve women especially at decision-making, management and technical levels are still inadequate. It is recommended to have a fair representation of both women and men in water user committees, urban water supply and sewerage boards,

district water boards and other water sector decision making bodies. Much emphasis is required in empowerment of women to actively participate in decision-making, planning, supervision of implementation and management of operations and maintenance of water supply schemes.

Learning from the past

As mentioned earlier, there are case studies of successful IWRM implementation in Tanzania exist. This is basically in the Pangani and Rufiji Basins. The lessons learnt from IWRM initiatives in these basins are important for further advancement of IWRM in the respective basins as well as implementation in other basins in Tanzania.

Monitoring and evaluation strategy

For successful implementation of any programme an effective monitoring and evaluation strategy has to be in place. The WRM initiative under WSDP has to be monitored and evaluated strategically so as to ensure that we are advancing towards the proposed targets. Through monitoring and evaluation programmes lessons can be drawn and therefore strategies can be reviewed in order to register successful outcomes.

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APPENDICES

Minutes of Consultative Workshop

Findings discussion

1. Dr. Mngodo from the Ministry of Water and Irrigation

Dr. Mgodo started by congratulating the Consultant for a good job he had presented. He then supported the recommendation which was documented by the consultant on role of Woman in the implementation of IWRM in Tanzania. He pointed out that the attempts to involve woman especially at decision-making and management in IWRM are still inadequate. He gave an example of some communities where woman are not allowed to challenge men in any case and therefore a big challenge in the implementation of IWRM in Tanzania.

2. Dr. Kimwaga from the University of Dar es Salaam

Dr. Kimwaga congratulated consultant for a good job done. When contributing to the report, he insisted on the following;

- With regards to proper definition of IWRM he said that reference can be made to a definition given by Global Water Partnership and then customized to the situation in Tanzania. He added that Annual Basin General meetings documents can also be referred for better definition of IWRM
- With regards to enabling environment, he seconded what was presented by the consultant
- With regards to enabling environment in implementing IWRM, he agrees with the consultant that something has been done. But he said he was worried if there are good plans in place to deal with the issue. He therefore asked consultant to look at the status of IWRM implementation plans.
- He also insisted on the importance of having indicators to be used in monitoring water resources management. He said that the Global water experts partnership have documented some indicators and therefore asked consultant to refers to them and see whether we can customize some of them to Tanzania.

In response to the issue of indicators,

Dr. Mngodo from the Ministry of water and Irrigation told participants that the Government is seriously working on the matter. He added saying that the work of establishing indicators is in progress.

Mr. Florence from WAMI/RUVU Basin Water Office told participants that RUBADA is preparing TOR for employing a consultant to work on establishing the indicators.

Mr Kamukuru from Vice president's office – Division of Environment insisted on the importance of making sure that whatever is done in the basin level is communicated to the River basins office in the Ministry of water and Irrigation for effectiveness of IWRM implementation.

3. Florence from WAMI/RUVU Basin Water Office

He insisted that ground water should also be considered in implementation of IWRM. The Consultant seconded the idea.

4. Dr. Kashaigili from SUA

He Congratulated the Consultant for a good job done. He contributed as follows:

- With regards to IWRM plans, he suggested we better have common or national plans instead of basin wide plans to avoid unnecessary conflicts.
- He suggested that economic value of water be done for better water allocation. He also said it is important to know how much water is available before we can think of allocation

Responding to what was pointed out by Kashaigili,

Dr. Kimwaga from UDSM said it is not easy to have national or common IWRM because water basins differ in many aspects. He gave an example of the Lake Victoria basin which is shared by three countries that it is difficulty to have common IWRM. He also said that most of the water basins do neither have water demand management no

pollution monitoring. He asked consultant to refer the Annual water basins conference proceedings to draw what is necessary to improve the report

5. Ms. Anna Macha from the Ministry of Lands and human settlement development

She congratulated consultant for a good job. She contributed as follows:

- She asked how we know the amount of water in our country? How do we measure it? How much is the ground water?
- She also pointed out that there is a need to think about ocean water. How can we benefit out of ocean water?

In response to the issue of ocean water,

Dr. Mngodo from the Ministry of water and Irrigation said when we talk of IWRM we normally talk about fresh water. Sea water is excluded. He said how to measure the amount of water is not a problem but the problem is how to allocate it.

6. Prof. Mtalo from UDSM

Mtalo discussed about the economic value of water. He said this can be focused in two different ways. **Firstly,** Let us think how much it cost to bring a cubic metre of water to a consumer. **Secondly**, Let us think of costs/ benefits to draw a cubic metre of water from a river to either produce power or carryout irrigation. So, when we talk of economic value of water it all depends on which angle we are talking about.

7. Prof. Mashauri from UDSM

He supported what was said by Prof. Mtalo by giving an example in Moshi Municipal where there was a time some people needed water to be used for power production while others needed to be used for irrigation. Hence, said the issue here is economic value and nothing else. He urged the consultant to look at what is done at urban water and sewerage authorities in terms of plans and management as far as IWRM is concerned.

8. Prof. Mtalo from UDSM again

- Said the issue of ground water is not documented. Because we do not know where aquifers are and to what extent. He urged the Ministry to work on this matter and not surface water only as it is in many cases. In case of investors, he suggested they should be asked to go for ground water as this is very important in implementing IWRM in our country.
- Concerning rainwater harvesting, he said there is a need to harvest rain water not only for domestic use but also for irrigation.

In response to the issues raised by Mtalo

Dr Kimwaga said that rain water harvesting is for sure part of IWRM and that the only problem is implementation.

9. Dr. Mdemu from WEMA Consult (T) Ltd

Dr. Mdemu congratulated the Consultant for a good job he had presented.

He supported the idea of having good plans for better implementation of IWRM. He said we better have national guidelines to be followed by water basins in implementing IWRM. He added on saying some of the constraints in implementing IWRM was policy.

10. Dr. Kimaro from UDSM

- Said the issue of IWRM in the environmental conservation Act is made very clear but the problem is follow up. He was worried whether the water basins officers do consider environmental management act in their conduct.
- He also said the budget constrain is one of the limiting factors in implementing IWRM in the country.

11. Ms. Anna Macha from the Ministry of Lands and human settlement development

Concerning the role of woman in implementing IWRM, she insisted that it should be stated clearly that woman participation should be exactly 50%. Woman should be given

equal chances to share the ideas. She added on saying that the treasurers should be woman for better implementation of IWRM.

12. Dr. Kahaigili from SUA again

He insisted that we should look at the status of information/data management and exchange. He said there is a problem of data access. He also said we need to have central data base so that what ever is reported in the basin level is stored there.

Responding to the issue of data base,

DR. Mngodo said that in the Ministry of water and irrigation there is a section which deals with information/ data control and therefore he urged all water basins offices to deposit all the information/ data in the Ministry. He also admitted that the data from the basins were not promptly reported to the Ministry. He added saying data from the water basins should be reported to the Ministry weakly.

SUMMARY

1. The attempts to involve woman especially at decision-making and management in IWRM are still inadequate.
2. The proper definition IWRM be referred from Global Water Partnership and Annual Basin General meetings proceedings.
3. Look at the status of IWRM implementation plans and Policy
4. The government is working on indicators to be used in monitoring water resources management.
5. RUBADA is preparing TOR for employing a consultant to work on establishing the indicators IWRM Plans
6. Ground water be considered in implement ting IWRM.
7. Whether or not to have common/ national IWRM plans/policy instead of basin wide to avoid unnecessary conflicts.
8. What is the amount of fresh water in our country? How do we measure it? How much is the ground water?
9. A need to seriously harvest rainwater not only for domestic use but also for irrigation

10. How can we benefit out of ocean/ Sea water?
11. Consideration on the economic value of water
12. Have National guidelines to be followed by water basins in implementing IWRM
13. The environmental conservation Act and its application
14. The budget constrain as a limiting factors in implementing IWRM in the country.
15. The woman participation should be exactly 50%. Treasurers be woman for better implementation of IWRM.
16. The information/ data from the water basins offices should be reported to the Ministry weakly.

Consultative meeting attendance

REGISTRATION FORM

S/N	Name	Institution	Designation	E-mail	Mobile
1	Prof. D.A Mashauri	UDSM, Box 35131 DSM	Professor IWRM Expert	dmashauri@yahoo.com	+255754283707
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10	Onesphory Kamukuru	Vice President's office – Division of Environment, Box 5380 DSM	Senior Environmental Engineer	Okamukuru@yahoo.com	+255717572389
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Contacted by correspondences and visits and served with questionnaires

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2 Other Water Experts

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4. Ministries and Institutions

Permanent Secretary, Ministry of Agriculture
Permanent Secretary, Ministry of water and Irrigation
Permanent Secretary, Ministry of Infrastructure
Director General, National Management Council
Director Division of Environment, Vice President Office
Director of Planning, Tanzania Power Supply Company
Permanent Secretary, Ministry of Natural Resources
Permanent Secretary, Ministry of Health and Social alfare
Permanent Secretary, Ministry of Lands and Human Settlements
Permanent Secretary, Ministry of Local Government
Permanent Secretary, Ministry of Livestock and Fisheries

Consultative Workshop Photos

Additional questionnaire analysis

Informant Address	Policy measures used in allocating available water resources	The extent to which the national water policy address the											
		water resource protection	priority use of water	capacity building & human resources	environmental sustainability	equity	health and sanitation	water resource assessment	private investiment	institutional strengthening	gender mainstreaming	overall resource management	efficient use of water
Forestry and beekeeping division, Ministry of natural resources and tourism, P.O. Box 9372, Dar es salaam	Water rights	Good	Excellent	Good	Good	Good	Good	Satisfactory	Satisfactory	Good	Good	Satisfactory	Good
Lake Nyasa Basin Water Office, P.O. BOX 3852 Mbeya, Tanzania	Prioritizing domestic water supplies	Good	Good	Good	Satisfactory	Good	Good	Excellent	Good	Good	Excellent	Good	Good
Lake Victoria Environmental Management project, Water quality management component, P.O. Box 211, Mwanza, Tanzania		Excellent	Excellent	Excellent	Good	Good	.	Good	Good	Good	Good	Good	Good
Ministry of livestock development & fisheries, P.O. Box 9152, Dar es salaam, Tanzania	Priority assigned to domestic water supplies	Good	Excellent	Good	Good	Satisfactory	Satisfactory	Good	Excellent	Satisfactory	Satisfactory	Satisfactory	Satisfactory
Ministry of water and irrigation, DSM.	Increasing the availability of water resources	Good	Good	Good	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Good	Satisfactory	Satisfactory	Good
Ministry of water and irrigation, P.O. Box 147, Shinyanga, Tanzania	Human water consumption in water scarce areas, livestock, industries, etc.	Excellent	Excellent	Excellent	Excellent	Excellent	Good	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
National Environment Management Council (NEMC), P.O. BOX 63154, Dar es salaam		Good	Good	Good	Good	Good	Good	Good	.	Poor	Good	Good	Good
Ruvuma river basin and southern coast, P.O Box 141 Mtwara Tanzania	Granting water right upon request to the Basin board	Good	Good	Excellent	Good	Good	Good	Good	Satisfactory	Good	Good	Good	Excellent
Sokoine University of Agriculture (SUA), P.O. Box 3000, Morogoro, Tanzania	Issuance of water rights	Good	Excellent	Good	Good	Satisfactory	Good	Satisfactory	Satisfactory	Good	Satisfactory	Excellent	Satisfactory
University of Dar es salaam, Department of Geology, P.O. Box 35052, Dar es salaam		Excellent	Excellent	Excellent	Satisfactory	Good	Excellent	Good	Good	Satisfactory	Satisfactory	Excellent	Good
WEMA CONSULT (T) LTD, P.O. Box 67371, Dar es salaam, Tanzania	Water policy prioritize the domestic use first, environment second and agriculture third	Excellent	Excellent	Excellent	Excellent	Excellent	Good	Excellent	Poor	Good	Satisfactory	Excellent	Excellent

Informant Address	Estimates of different sources of water	Quality of each source of water	Estimated current demand for water by various sectors	Anticipated sectoral and total demand for water in the future	Sources of water loss/leakage and estimates	Quantity and quality of wastewater and possibilities for reuse	Water monitoring units and their distribution (central and local units)	Current and projected investments in water supply projects	Legislation involved with water rights, use, recycling and reuse, delivery, charges, markets & unions	Protection, dealing with conflicts among water users, etc.	Economic incentives for increasing water use efficiency(taxes, subsidies, grants, tax rebates, etc.)	Sources of water pollution, its intensity, its effects on freshwater supply and use	Different NGOs involved in water use and development	Fresh water is a finite and vulnerable resource and should be protected
Forestry and beekeeping division, Ministry of natural resources and tourism, P.O. Box 9372, Dar es salaam	.	.	.	.	.	.	.	.	.	.	.	.	.	High
Lake Nyasa Basin Water Office, P.O. BOX 3852 Mbeya, Tanzania	Included now	To be included soon	To be included later	To be included later	Included now	To be included later	Included now	Included now	To be included soon	Included now	To be included later	Included now	Included now	Medium
Lake Victoria Environmental Management project, Water quality management component, P.O. Box 211, Mwanza, Tanzania	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Poor
Ministry of livestock development & fisheries, P.O. Box 9152, Dar es salaam, Tanzania	Included now	To be included soon	To be included soon	To be included later	To be included soon	To be included later	To be included soon	To be included later	To be included soon	To be included soon	To be included later	To be included soon	To be included soon	Poor
Ministry of water and irrigation, DSM.	Included now	Included now	Included now	To be included soon	To be included soon	To be included soon	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Medium
Ministry of water and irrigation, P.O. Box 147, Shinyanga, Tanzania	Included now	Included now	To be included soon	Included now	Included now	Included now	Included now	Included now	To be included soon	To be included soon	To be included soon	To be included soon	To be included soon	Medium
National Environment Management Council (NEMC), P.O. BOX 63154, Dar es salaam	.	.	.	.	.	.	.	.	.	.	.	.	.	Poor
Ruvuma river basin and southern coast, P.O Box 141 Mtwara Tanzania	Included now	Included now	Not included	To be included soon	Included now	Not included	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Poor
Sokoine University of Agriculture (SUA), P.O. Box 3000, Morogoro, Tanzania	To be included later	To be included later	Not included	Not included	Not included	Included now	To be included later	Not included	Included now	Not included	Not included	Not included	Included now	Medium
University of Dar es salaam, Department of Geology, P.O. Box 35052, Dar es salaam	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Included now	Poor
WEMA CONSULT (T) LTD, P.O. Box 67371, Dar es salaam, Tanzania	Included now	Included now	Not included	Not included	Not included	Not included	Included now	Included now	Included now	Included now	Not included	Included now	Included now	High

Address of the informant	Government/Institution incorporation of international conventions															
	the helsinki Rules on the uses of water 1966	wetland convention 1971	Stockholm declaration 1977	mar del plata declaration 1977	the world charter for nature 1982	ship pollution 1978	law of the sea 1982	efc control 1987	rio de janeiro dublin principles	rio de janeiro agenda 21	rio de janeiro clmate change	rio de janeiro declaration biodiversity	desertification 1994	water course convention 1997	kyoto protocol 1997	millenium declaration 2000	the new delhi declaration of principles of international law relating to sustainable development
BAGAMOYO ROAD, TEGETA AREA, P.O. BOX 67371, DAR ES SALAAM	Dont know	Fully implemented	Dont know	Dont know	Dont know	Dont know	Fully implemented	Dont know	Fully implemented	Fully implemented	Fully implemented	Fully implemented	Fully implemented	Dont know	Fully implemented	Fully implemented	Dont know
FOREST AND BEE KEEOING DIVISION	Dont know	Fully implemented	moderate imple	Dont know	Fully implemented	Fully implemented	Fully implemented	Dont know	Fully implemented	Fully implemented	Fully implemented	Fully implemented	Fully implemented	Fully implemented	Fully implemented	Fully implemented	Fully implemented
MINISTRY OF LIVESTOCK DEV & FISHERIES	Dont know	average imple	Dont know	Dont know	Dont know	Dont know	Dont know	Dont know	Dont know	Dont know	Dont know	Dont know	Dont know	Dont know	Dont know	average imple	Dont know
Ministry of water and irrigation	average imple	average imple	average imple	average imple	average imple	moderate imple	average imple	moderate imple	moderate imple	poor impl	poor impl	poor impl	poor impl	poor impl	average imple	average imple	average imple

Ministry of Water and Irrigation, P.O. Box 147,	.	Fully implemented	Fully implemented	.	.	Fully implemented	Fully implemented	.	.	Fully implemented	Fully implemented	Fully implemented	Fully implemented	.	Fully implemented	Fully implemented	.
NATIONAL ENVIRONMENTAL MANAGEMENT COUNCIL (NEMC) BOX 63154 D	.	.	.	.	.	.	.	.	.	.	Fully implemented	Fully implemented	moderate imple	.	Fully implemented	.	.
Project, Water Quality Management Component, P.O. Box 211, M	average imple	moderate imple	.	.	average imple	average imple	.	average imple	average imple	average imple	average imple	average imple	average imple	.	average imple	moderate imple	average imple
RUVUMA RIVER BASIN AND SOUTHERN COAST	moderate imple	moderate imple	average imple	moderate imple	moderate imple	Dont know	Dont know	Dont know	moderate imple	moderate imple	moderate imple	moderate imple	moderate imple	moderate imple	average imple	moderate imple	Dont know
Sokoine University of Agriculture, P.O. Box	moderate imple	moderate imple	moderate imple	moderate imple	moderate imple	moderate imple	Fully implemented	Fully implemented	average imple	average imple	average imple	average imple	average imple	average imple	average imple	average imple	average imple

		Institutional framework for water resources management
Informant Address	Forestry and beekeeping division, Ministry of natural resources and tourism	Vice president office, Ministry of water and irrigation, Energy-water utility and authority, Dar es salaam water and sanitation authority (DAWASA) and River basins authority
	Lake Nyasa Basin Water Office,	Ministries of water and irrigation, agriculture, environment, energy and industries
	Lake Victoria Environmental Management project, Water quality management component,	Ministry of water and irrigation, and local government
	Ministry of livestock development & fisheries,	Local government authorities in collaboration with the Ministry of water and irrigation (basin water offices)
	Ministry of water and irrigation, DSM.	Dept. of water resources, water supply and policy and planning
	Ministry of water and irrigation, Shinyanga,	Ministry of water and irrigation through directorate of water resources management
	National Environment Management Council	
	Ruvuma river basin and southern coast	Basin water offices
	Sokoine University of Agriculture (SUA),	Provided in the water policy of 2002 and the water sector development strategy of 2006
	University of Dar es salaam, Department of Geology	Ministry of water and irrigation, basin authorities, district authorities, community levels and EWURA
	WEMA CONSULT (T) LTD,	Ministry of water and irrigation

Informant Address	Familiarity with IWRM	PART III Level of understanding of key concept in IWRM in Tanzania communities			
		Fresh water is a finite and vulnerable resource and should be protected	Water management should base on participatory approach	Women play a central part in provision, management and safeguarding of water	Water has an economic value
Forestry and beekeeping division, Ministry of natural resources and tourism	Yes, I heard about IWRM	High	High	Medium	High
Lake Nyasa Basin Water Office,	Yes, I know what is IWRM	Medium	Medium	Medium	Medium
Lake Victoria Environmental Management project, Water quality management component,	Yes, I know what is IWRM	Poor	Medium	Medium	Poor
Ministry of livestock development & fisheries,	Yes, I know what is IWRM	Poor	Poor	Medium	Poor
Ministry of water and irrigation, DSM.	.	Medium	Poor	Medium	High
Ministry of water and irrigation, Shinyanga,	Yes, I know what is IWRM	Medium	High	High	High
National Environment Management Council	Yes, I know what is IWRM	Poor	Poor	Poor	Medium
Ruvuma river basin and southern coast	Yes, I know what is IWRM	Poor	Poor	Poor	Poor
Sokoine University of Agriculture (SUA),	Yes, I know what is IWRM	Medium	Medium	Poor	Medium
University of Dar es salaam, Department of Geology	Yes, I know what is IWRM	Poor	Medium	Medium	Medium
WEMA CONSULT (T) LTD,	Yes, I know what is IWRM	High	High	High	High
AVERAGE	Yes, I know what is IWRM	Medium	Medium	Medium	Medium

Informant Address	How pertinent is the enabling environment of the legislative framework for					
	poverty reduction plans	water efficiencies plans	national development & investment plans	regional/sub-regional water management plans	transboundary pla	reforms
Forestry and beekeeping division, Ministry of natural resources and tourism	To high extent	To high extent	To high extent	To high extent	To high extent	To high extent
Lake Nyasa Basin Water Office,	To a certain extent	To a certain extent	To high extent	To a certain extent	To a certain extent	To high extent
Lake Victoria Environmental	To high extent	.	To a certain extent	To a certain extent	To a certain extent	To a certain extent

Management project, Water quality management component,						
Ministry of livestock development & fisheries,	To a certain extent	Not at all	To a certain extent	To a certain extent	To a certain extent	To a certain extent
Ministry of water and irrigation, DSM.	To a certain extent	To a certain extent	To a certain extent	To a certain extent	To a certain extent	To a certain extent
Ministry of water and irrigation, Shinyanga,	To high extent	To high extent	To high extent	To high extent	To high extent	To high extent
National Environment Management Council	To a certain extent	To a certain extent	To a certain extent	To a certain extent	To a certain extent	To a certain extent
Ruvuma river basin and southern coast	To a certain extent	To a certain extent	To a certain extent	To a certain extent	To a certain extent	To a certain extent
Sokoine University of Agriculture (SUA),	To a certain extent	To a certain extent	To a certain extent	To a certain extent	To a certain extent	To a certain extent
University of Dar es salaam, Department of Geology	To high extent	To high extent	To a certain extent	To a certain extent	To a certain extent	To a certain extent
WEMA CONSULT (T) LTD,	To high extent	.	To a certain extent	To high extent	To high extent	To high extent
AVERAGE	**To high extent**	**To a certain extent**	**To a certain extent**	**To a certain extent**	**To a certain extent**	**To a certain extent**

Constraints to implementation of IWRM attributable to issues related to		
policy matters	institutional matters	legal matters
Coordination of water related issues, protection and management of water sources, management of cross-boarder water resources	Conflicts arising from utilization of water resources as well as distribution and allocation of water rights	Definition of water catchment and protection of river banks
The concept that water is a right of everybody and should be obtained free of charge	Lack of opportunity for all stakeholders to participate	Policy changes not reflected in the water laws
Limited dissemination to community and linkages to different policies	Capacity of basin water offices and weak linkages among IWRM players	Weak enforcement capacity
Projects design and over exploitation of surface water resources	Poor planning	Lack of clarity in the legislative provisions and contradiction with the policy
Corruption, overlaping of legislation, ignorance, political issues	Weak institutional framework/arrangements and inadequate institutional capacity	Corruption and inadequate capacity
Minimal community awareness on IWRM and minimal sector awareness on IWRM	Poor coordination among institutions and sectoral planning	Uncoordinated legal matters concerning IWRM and Different legal matters for each ministry dealing with IWRM
Lack of coordinated and harmonized policies	Limited institutional capacity and understanding of IWRM concepts among the implementing institutions	The water law of 1974 and its subsequent amendments is currently not addressing IWRM until when the draft water bill has been assented
Stakeholder involvement in decision making, water allocations and management, or water and financing WR management, lack of coordination, lack of priorities and customary system of managing WR	Poor coordination and human and institution capacities to address complex water management	Lack of enforcement of existing laws and regulations
Conflicting policies, outdated policies for some ministries and low understanding of IWRM among communities	Length process of WUA establishment and lack of human and financial resources	Ambiguity in water right issuance and lack of specified procedures for tackling water conflicts

Informant Address	The major challenges when					
	water is being used equitably	there is environmental sustainability in the way water is being used	water is used with economic efficiency	all categories of users participate in formulation of water policy	regard to poverty alleviation	regard to employment generation
Forestry and beekeeping division, Ministry of natural resources and tourism	Poorly distribution of water	Pollution of water and illegal abstraction for irrigation upstream	Wastage of water during the undertake of irrigation, industry and domestic activities	Level of participation in policy formulation is high but few benefits	Poor implementation of poverty issues addressed in policy and strategy	Poor technology and capital investment in irrigation
Lake Nyasa Basin Water Office,	Outdated water law	The water policy and environmental law are not known to water users	Water tarrifs are too low to water users	The theory of IWRM is new, not understood by many	The economics of water resources is not known to water users, they regard it as a free good	Many water users do not regard water as an economic good
Lake Victoria Environmental Management project, Water quality management component,						
Ministry of livestock development & fisheries,	Priorities among sectors not established	Environmental flows hardly established	Low irrigation efficiency common	Not yet attained	Not yet attained	Not optimized against existing potential
Ministry of water and irrigation, DSM.	Effective utilization and allocation of water resources	Incerasing degradation	Provision of strong, vibrant, well organized large and small scale	The role of government will change from that of service provider	Increase access to reliable water	Efficiency human resources

			mining industry.			
Ministry of water and irrigation, Shinyanga,	Uncertainity in actual water demand and consumption	No environmental assessment is carried out after the water source is in use	Community willingness and ability to pay for water services	High costs for involving all categories of water users	Availability of constant reliable and sustainable water supply systems and sources	Development of new sources to create employment opportunities
National Environment Management Council		Pollution and land degradation	Inefficient water systems	Top down planning and decision making practices	Insufficient funds and unrealistic planning	
Ruvuma river basin and southern coast	Poverty and unevenly distribution of water	Environmental degradation and low community awareness as far as environment protection is concerned	Low community awareness on the economic value of water and IWRM concept	Poor community participation in policy formulation	Long distances in search for water, poor quality water and low capacity of the government to provide safe and clean water to its people	Low community awareness on the economic value of water, unwillingness for the community to pay for water & allocation of water projects in urban areas
Sokoine University of Agriculture (SUA),	The concept of equitable water allocation/distribution, self indulgence and limited financial resources	Limited financial resources, human resources and understanding on the concept of environmental sustainability	Limited information on water values for different water uses	Sectoral biasness and lack of inclussiveness	Lack of extension services	Lack of extention services
University of Dar es salaam, Department of Geology	Apportionment and management of water resources	Protection of water sources, overexploitation and environmental awareness	Accessibility to adequate and good quality water resources	Increase empowerment and involvement of water users to plan and manage water	Availability of safe drinking water	Inadequate education on water related issues and expert database
WEMA CONSULT (T) LTD,	Presence of right institution and infrastructures for equitable water allocation and distribution	Effective implementation of IWRM	Lack of studies on economic values of water for different uses	Non participatory approaches to water resources management	Poor management of water resources	Absence of employment with regard to water use
AVERAGE						

Questionnaire

NILE BASIN INITIATIVE
APPLIED TRAINING PROJECT
QUESTIONNAIRE FOR THE STUDY OF THE LEVEL OF IWRM IMPLEMENTATION IN THE NILE BASIN COUNTRIES

PART I: INFORMATION ON THE RESPONDENT

1. Name----------
2. Name and address of Institution----------
3. Designation ----------
4. Profession ----------
5. Years of service with the organization----------

PART II: Status of Water resources management in the country

1. What are the main sources of water in your country for the following uses?
Agriculture----------
Domestic use----------
Industry----------
2. What are the demands and consumption rates for the above uses? (In the check list)
3. What are the potential amounts of water resources in your country?(in the check list)
4. What is the institutional framework for water resources management (which institutions are in one way or another deal with water issues)?
5. Which institution(s) is/are responsible for water resources planning in the country?
6. Is there a water resources strategy in the country? YES/NO_____
7. What are the main characteristics of that strategy? Does it address any of the following issues? (Please tick)
   - o Water supply
   - o Demand management
   - o Agriculture
   - o Water pricing
   - o Irrigation
   - o Private water management
   - o Economic instruments

8 Who develops that strategy? And who is in-charge of its implementation?
9. What are the major water programs in your country?
10. What do you consider as the main issues and challenges facing water resources planning and management in your country?

DATA AND INFORMATION

1. Does your country possess a water-related data base?
   1□ Yes 2□ No 3□ In the process of creating one
2. What are the institutions involved in creating/developing the data system necessary for formulating and implementing a water strategy? And to whom do they report directly?

Name of Institution	Reporting to

3. Is the process of data collection central or local?
4. Are the available information and data sufficient to formulate a comprehensive water strategy?
   □ Not at all □ To a limited extent □ To a high extent
5. Are there enough studies on the problem to help in suggesting solutions and choosing appropriate options?
   Economic studies: 1□ Adequate 2□ Not adequate
   Social studies: 1□ Adequate 2□ Not adequate
   Environmental studies: 1□ Adequate 2□ Not adequate
   Technical studies: 1□ Adequate 2□ Not adequate Agricultural studies:
   1□ Adequate 2□ Not adequate
6. What are the major areas of deficiency in the current system of water data and information
7. How soon do you expect such difficulties to be overcome?
   □ Some deficiencies will be addressed in the near future, such as:
   □ Other deficiencies will need longer time to address, such as:
   □ Other sorts of information and data will be difficult to secure even after a while, such as:
8. Indicate whether the current (or planned) data system includes (or plans to include) the following kinds of data or information:

Type of data/information	**Included now**	**Not included**	**To be included**	
			soon	**later**
Estimates of different sources of water				
Quality of each source of water				
Intensity of water use in various sectors, sub-sectors, crops				
Future options for water supply				
Estimated current demand for water by various sectors				
Anticipated sectoral and total demand for water in the future				
Current and future water demand-supply imbalances				
Adequacy and quality of water supplied to each sector and sub-sector				
Frequency of water shortages, breakdown in water-treatment facilities, suspension of normal services or rationing episodes				
Household precautions to ensure a safe supply of drinking water, and its expenses				
Supplementary sources of water to the industrial sector and the cost				
Sources of water loss/leakage and estimates				
Quantity and quality of wastewater and possibilities for re-use				
Number of working and dried-up groundwater wells				

Type of data/information	Included now	Not included	To be included	
			soon	later
Water monitoring units and their distribution (central and local units)				
Institutions involved in water supply, distribution, management, control, etc. and their interrelationships				
Institutions involved in water data collection, verification, analysis, organization, dissemination, etc.				
Users of the generated water data				
Current and projected investment in water supply projects				
Current and future availability of different manpower skills in water-related institutions				
Size of budgets allocated to training and education in various levels of manpower in all sectors				
Legislation involved with water rights, water use, water recycling and re-use, water delivery, water charges, water markets, water unions				
Protection, dealing with conflicts among water users, etc.				
Debt services of water projects				
Estimates of various types of cost of water supply to each sector or sub-sector: ▪ Operation and maintenance cost ▪ Capital cost ▪ Capital replacement cost ▪ Full cost				
Estimates of wastewater treatment quantities and cost				
Cost of operating wells and pumping cost				
Cost of water re-cycling and its channels				
Subsidies of water supply to every sector (including energy subsidies)				
Water tariffs and charges for the various uses				
Economic incentives for increasing water use efficiency (taxes, subsidies, grants, tax rebates, etc.)				
Privatization trend and its prospects in sectors of water supply and distribution				
Size of water market, its domain, its structure, its prices, and its limitations				
Sources of water pollution, its intensity, its effects on fresh water supply and use				
Incidences of water-related illness and health deterioration				
Positive externalities of water use and development: ▪ recharging groundwater aquifers ▪ increase in productivity of livestock, ▪ social benefits (increase in employment, savings of women's efforts and time,				
Various water negative externalities: ▪ effects on downstream water users ▪ effects on navigation ▪ effects on hydropower generation ▪ effects on fisheries and ecosystems ▪ effects on habitats and fauna-flora				
Different NGOs involved in water use and development				
Current and anticipated reforms and changes in: ▪ Technical efficiency of water delivery and water use ▪ Organizations of water institutions ▪ Manpower capacity and skills ▪ Water legislation and regulations ▪ Water charges ▪ Economic incentives for enhancing water ▪ Agricultural crop patterns				

PART III. THE INTERGRATED WATER RESOURCES MANAGEMENT (IWRM) CONCEPT

Level of understanding of the concept

1. Are you familiar with IWRM?
   1=Yes, I Know what is IWRM
   2=Yes, I heard about IWRM
   3=No, I don't kwon anything about IWRM
2. How do you rate the level of understanding of the following key concepts of IWRM in your community? 0= Null, 1= Poor, 2= Medium, 3= High.

	0	1	2	3
Fresh water is a finite and vulnerable resource and should be protected				
Water management should be based on participatory approach involving users, planners, policy makers and all concerned parties				
Women play a central part in the provision, management and safeguarding of water				
Water has an economic value				

Legislation related to IWRM

1. What are the main legislative documents addressing water issues in your country
2. What are the institutions responsible for initiating laws and setting water standards and regulations?

	Name of responsible institution

Initiating laws	
Setting water standards	
Setting water regulations	

3. How pertinent is the enabling environment of the legislative framework for the following areas of IWRM in your country?

	Not at all	To a certain extent	To High extent
Poverty reduction plans			
Water efficiency plans			
National development and investment plans			
Regional/sub-regional water resources management plans			
Transboundary water plans			
Reforms			

Implementation challenges

1. Outline constraints to implementation of IWRM attributable to issues related to policy matters ----------
2. Outline constraints to implementation of IWRM attributable to issues related to institutional matters----------
3. Outline constraints to implementation of IWRM attributable to issues related to legal matters ----------
4. What have been the major challenges with regard to the following goals of IWRM? Please provide your text for every goal below.
   a. Water is being used equitably.
   b. There is environmental sustainability in the way water is being used
   c. Water is used with economic efficiency.
   d. All categories of users can participate in the formulation of water policy and objectives in the basin.
   e. Poverty alleviation
   f. Employment generation

PART III STATUS OF IMPLEMENTATION OF IWRM
POLICIES

1. Does the country follow a comprehensive water policy?
   1□ Not yet 2□ In the process of formulating a strategy
   3□ Currently implementing a comprehensive water strategy
2. What policy measures are usually used in allocating available water resources among the various sectors and various users?
3. To what extent does the national water policy address the following issues of IWRM?

"0= Not addressed, 1 poor, …, 4 Excellent"

	0	**1**	**2**	**3**	**4**	**I don't Know**
Water resources protection						
Priority use of water						
Rural water supply						
Urban water supply						
Capacity Building and Human Resources Development in water sector						
Institutional strengthening						
Environmental Sustainability						
Efficient use of water						
Equity						
Gender mainstreaming						
Climate changes						
Food security						
Health and sanitation						
Overall resource management, conservation and protection of water resources						
Water resources assessment						
Service delivery						
Investments to balance out supply and demand in terms of both space and time						
The protection of people against extreme events (floods, droughts).						
The availability of funds and funding strategies for water supply and sanitation						
Public investment						
Private investment						
Research						
Decentralization						

4. What are the main elements of the water resources management policies with respect IWRM? Please give your assessment by filling in the table below.

Water Management Programs/Policies/Strategies/Measures	Not relevant	Under consideration	In place but not yet implemented	In place and partially implemented	Fully implemented
Water Resources Development					
Assessment of water resources.					
Regulatory norms and guidelines for sustainable development of water resources.					
Basin studies for long-term development and management of water resources.					
Rainwater harvesting programs.					
Initiatives on water harvesting from coastal fogs.					
Supply augmentation programs to meet increasing demand of water.					
Programs and policies for recycling of water, wastewater treatment and reuse.					
Water Resources Management					
Programs and policies for watershed management.					
Program for improving efficiency of water infrastructure to curtail water losses.					
Programs and policies on protection and rehabilitation of catchment areas.					
Groundwater management program.					
Programs/policies to reverse ecosystem degradation and restore their functions.					
Programs and policies to avoid floods and to overcome flood related disasters.					
Programs and policies to combat drought and desertification.					
Policies for efficient allocation of water resources among competing uses.					
Legislative mechanisms to protect water resources from all types of pollution.					
Demand management measures to improve water use efficiency in all sectors.					
Integration of drainage facilities in irrigated agricultural development schemes.					
Mechanisms to promote conjunctive use of ground- and surface water.					
Norms and guidelines to evaluate environmental impacts of water projects.					
Cooperative programs for joint management of shared water resources.					
Water Use					
Water demands survey in different water using sectors.					
Programs and policies for managing agricultural water use.					
Programs and policies for managing municipal water use.					
Programs and policies for managing industrial water use.					
Programs and policies for managing other water uses.					
Monitoring, Information Management and Dissemination					
Functional hydrological and hydro-meteorological monitoring networks.					
Standardized procedures for data compilation, processing and analysis.					
A reliable integrated water resources management information system.					
Programs for information exchange and knowledge sharing about good practices.					
Monitoring and reporting system to determine impact of IWRM reforms.					
Capacity Building and Enabling Environment					
Assessment of capacity building needs/ gaps in the water sector					
Capacity building programs on different aspects of water resources management.					
Establishment of river basin management institutions.					
Institutional reforms to enhance the effectiveness/accountability of institutions.					
Institutional co-ordination mechanisms for water resources management.					
Mechanisms to link water resources management to other economic sectors.					
Assessment of water management research needs and gaps.					
Mechanisms to enforce water legislation.					
Programs for providing advisory (extension) services on WM issues to end users.					
Programs for transferring improved and cost effective water saving technologies.					
Pro-poor policies and programs in the water sector.					
Stakeholders Participation					
Processes for stakeholders' participation in water management decisions making.					
Decentralized water resources management structures.					
Programs for involving minority groups in all aspects of WRM.					
Programs for gender mainstreaming in all aspects of WRM.					
Public awareness campaigns to educate people about water-health-poverty links.					
Mechanisms to discuss/resolve trans-boundary issues with the riparian countries.					
Partnerships for water resources management					
Financing					
Water sector investment plan					
Strategy for mobilizing financial resources in the water sector.					
Norms and procedures for financial sustainability and viability of water schemes.					
Gradual cost recovery mechanisms/progressive tariff structures in all water uses.					
Subsidies/micro credit programs for promoting water conservation technologies.					
Water sector investment plan.					

5. How the government and your institution have incorporated the general international conventions? "0= Not implemented, 1= poor,…, 4= Fully implemented"

	0	1	2	3	4	I don't Know

The Helsinki Rules on the Uses of the Waters of International Rivers,1966						
Wetland convention, 1971						
Stockholm declaration, 1972						
Mar del Plata Declaration, 1977						
The World Charter for Nature,1982						
Ship pollution, 1978						
Law of the Sea, 1982						
CFC control, 1987						
Rio de Janeiro Declaration, 1992						
-Dublin principles						
-Agenda 21						
-Climate change						
-Biodiversity						
Desertification, 1994						
Watercourse convention, 1997						
Kyoto protocol,1997						
Millennium Declaration, 2000						
The New Delhi Declaration of Principles of International Law Relating to Sustainable Development,2002						

6. Are current water policies efficiently translated into appropriate laws?
   1□ To a great extent 2□ To a certain extent 3□ Not at all

Legislative Framework - Water policy translated into law

7. How does the water laws support the national water policies?
   ("0= does not support, 1= poor,…, 4= Excellent")
   0_____ 1_____ 2_____3_____4_____ I don't know_____
8. How effective are the water laws in controlling water use and its allocation among various users?
   □ Very effective □ Somewhat effective □ Not effective
9. To what extent are various laws enforced?
   □ Limited enforcement □ Reasonable enforcement □ High enforcement
10. What are the major problems that lower the level of law enforcement?
11. What steps have been taken recently towards reforming the legal framework concerned with water issues?
12. What kinds of new laws or law modifications are expected in the foreseeable future to implement IWRM?
13. Is there a mechanism in place for settling conflicts among different water users?
14. How effective is the mechanism?
    □ Very effective □ Somewhat effective □ Not effective
15. To what regime belongs the framework of water right?
    Public domain_____ Private domain_____
16. Does the water law provide the rank of water use at time of scarcity or competition?
    Yes_____ No_____
17. If yes can you provide this rank for the following utilizations?

	Rank
Domestic use	
Agricultural use	
Environmental use	
Industrial use	
Commercial use	

18. How does the general legislative framework address the following issues?
    "0= Not addressed, 1= poor, …, 4= Excellent"

	0	**1**	**2**	**3**	**4**	**I don't Know**
Pollution						
Quality standards for various uses						
Assurance of supply						
Efficiency level						
Compliance						
Audit						
Monitoring						
Conflict resolution						
Tariff and water pricing						
Customer protections mechanism						
Transboundary waters						
Discharge permit						

19. Did the legislative framework undergo reform with regard to IWRM for the last decade?
    1=Yes_____ 2=No_____
20. If yes can you outline some key improvements?

Organizational Framework

1. What is the institutional framework for implementing IWRM in your organization? If your organization is in the stage of implementation, please indicate institutional arrangement such as e.g. national implementation body, cross-sectoral coordination mechanisms, stakeholder fora, river basin committees etc.
2. Capacity Building in the Institution with respect to IWRM.
   Rating:
   1. Not relevant;

2. Under consideration;
3. In place but not yet implemented;
4. In place and partially implemented;
5. Fully implemented.

	Capacity Building Issues	1	2	3	4	5
2.1	Establishment of Management Institutions					
2.2	International reforms to enhance the effectiveness/accountability of institutions					
2.3	Institutional co-ordination mechanisms for WRM					
2.4	Mechanisms to link WRM to other economic sectors					
2.5	Mechanisms to enforce water legislation					
2.6	Programs for providing advisory (extension) services on WM issues to end users					
2.7	Programs for transferring improved and cost effective water saving technologies					
2.8	Pro-poor policies and programs in the water sector					

3. How do you rate the following performances of your institution with respect to IWRM ?

"0= Not implemented, 1= poor, 2 = fair, 3 = good, 4= Excellent"

	0	**1**	**2**	**3**	**4**	**Not Relevant**
Empowerment to carry out duties						
Fiscal adequacy						
Staffing adequacy						
Administrative adequacy						
Accountability and transparency						
Knowledge sharing and human resources development						
Conflict resolution mechanisms						
Equity						
Individual Performance						

4. Are there decentralized organizations affiliated to your institution? (Please tick)

	Tick
River Basin Organizations	
National Apex bodies	
NGOs	
Community based Organizations	
Farmer groups	
Water user associations	

5. Are these organizations empowered enough ?
6. Is there mechanism of knowledge sharing between your own institution and other institutions at national level?

□ Yes □ No

If yes please list those institutions

7. Is there mechanism of knowledge sharing between your own institution and other institutions at international level?

1□ Yes 2□ No

If yes please list those institutions

8. Which of the related IWRM training have you beneficiated from in your institution?
9. In which area of IWRM do you want to be strengthened?
10. Is there difference between the institutional framework in the colonial and past colonial period?

1□Yes 2□ No

If yes, can you mark some areas of improvement?

11. Do you have any National institution or specialized center of education, training and research with regard to IWRM?

□Yes □ No

If yes how do you rank its performances?

"0= Not implemented, 1= poor,…, 4= Excellent"

	0	**1**	**2**	**3**	**4**	**I don't Know**
IWRM Curricula						
Staff						
Equipment						
Contribution to the national water policies and awareness rising Research and publication Seminar delivery in IWRM to public audience						

12. What can you suggest for the Implementation of IWRM with regard to training institutions?
13. Is there a central council (agency) responsible for coordination of decisions and actions among various users of water (municipalities, industries, farmers, hydropower generation, navigation, tourism, etc.)?

1□ Yes 2□ No

If yes, what is this agency? .....

What are its main responsibilities?

14. What other institutions are working under that central water council? And what are their responsibilities? Authorities? Caliber of its operators? And to whom do they report?
15. Do authorities match assigned responsibilities?

□ To a high extent □ To a certain extent □ Not at all

16. What sorts of reform could improve the performance of these institutions?
17. To what extent is water pumping/extraction actually controlled?

□ Not at all □ To a limited extent □ Very much under control

18. What departments or institutions are involved in enforcing the water law?

Level	Name of department(s) and Affiliation
Central	
Local	

19. What are the prospects for the development of organizations such as "water users associations" ?
.....

a) Are such organizations legally permitted?

1□ Yes 2□ No

b) What kinds of obstacles delay their formulation and development ?

20. If IWRM is implemented, how is the assessment before and after its application?
21. Considering a world where specialization, fragmentation and reductionism is the norm, how far and practical can coordination ("integration") of all water-related activities be achieved?

Financing

22. How do you see the financing of water sector in your institution? Please rate.

Please respond to the status of financing of IWRM related activities by filling in the following table:

Rating:

1. Not relevant ; 2. Under consideration; 3. In place but not yet implemented;
4. In place and partially implemented; 5. Fully implemented.

	Financing Issues	1	2	3	4	5
1.1	Water Sector Investment Plan					
1.2	Strategy for mobilizing financial resources in the water sector					
1.3	Norms and procedures for financial sustainability and viability of water schemes					
1.4	Gradual cost recovery mechanisms/progressive tariff structures in all water uses					
1.5	Subsidies/Micro-credit programs for promoting water conservation technologies					

23. Are there a move towards privatization in the water sector?

□ Not yet

□ To a certain extent in the form of..... and in the sectors of .....

□ Highly expected in the areas of..... and in the form of .....

24. What is the role of water-pricing in the comprehensive water strategy?
25. Is it foreseeable that charging water use for irrigation purposes will occur?
26. How much is the charge for issuing a well-drilling permit?
27. How often is the license for well-abstraction renewed? And under what conditions?
28. Are there other charges for the use of underground water?
29. What could be the obstacles preventing installation of a metering system for underground water use?
30. What kind of charges are being implemented for the use of surface water in irrigation?
31. What is the possibility of introducing or increasing charges for irrigation from surface water?
32. What obstacles face the introduction or the increase of charges for irrigation from surface water?
33. Would it be easy to charge for irrigation water according to the type of cultivated product?
34. Is there a move towards changing crop patterns in order to conserve water use?
35. What instruments should be used to implement such changes?

a) Economic instruments (tariffs, subsidies, taxes, tax rebate, etc.):

b) Legislation:

36. How would you charge for industrial effluent discharges?
37. Would these charges be effective in protecting water sources from pollution?
38. In what way could the system of effluent discharges be improved?
39. What incentives are/or could be used to minimize waste and conserve water for all uses?

a) In case of farming:

b) In case of households: In case of industries:

40. How often are water tariffs, subsidies, taxes and other charges reviewed? And who initiates the need for their revision?
41. s special legislation needed to impose or to change such water charges?
42. To what extent is the "polluter pays principle" applied in cases of water pollution?

a) In what sectors/ sub-sectors?

b) What are the problems facing the implementation of this principle?

43. To what extent is the private sector involved in the provision/distribution of water services?

□ Not at all

□ Expected to be involved in:

44. Who finance the water supply? Administration or the community?
45. Are private investment in water supply or Hydropower production allowed?