

**PARTICIPATION OF LOCAL GOVERNMENT AUTHORITIES AND
THE PERFORMANCE OF INTERGRATED WATER RESOURCES
MANAGEMENT IN TANZANIA: A CASE STUDY
OF LITTLE RUAHA RIVER, IRINGA DISTRICT**

By

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**A Dissertation submitted in Partial Fulfillment of the Requirements for the Award of
the Degree of Master of Science in Development Policy of Mzumbe University**

2013

CERTIFICATION

We, the undersigned, certify that we have read and hereby recommend for acceptance by the Mzumbe University a thesis entitled **Participation of Local Government Authorities And The Performance of Integrated Water Resources Management In Tanzania: A Case Study of Little Ruaha River, Iringa District** in partial fulfillment of the requirements for Degree of Masters of Science in Development Policy.

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DEDICATION

I would like to dedicate this work to my beloved parents Mr and Mrs Muginya. Both have been encouraging me to study hard.

ABBREVIATIONS AND ACRONYMS

| | |
|--------|--|
| BWB | Basin Water Board |
| BWO | Basin Water Office |
| CMA | Catchment Management Areas |
| GWA | Global Water Alliance |
| GWP | Global Water Partnership |
| IRBM | Integrated River Basin Management |
| IUCN | International Union for Conservation of Nature |
| IWRM | Integrated Water Resources Management |
| LGA | Local Government Authority |
| NAWAPO | National Water Policy |
| SADC | Southern African Development Cooperation |
| SPSS | Statistical Package for Social Sciences |
| UN | United Nations |
| UNDP | United Nations Development Programme |
| UNESCO | United Nations Educational, Scientific and Cultural Organization |
| URT | United Republic of Tanzania |
| WRM | Water Resources Management |
| WUA | Water user Association |

ABSTRACT

The intent of the study was to assess the participation of LGAs and the performance of integrated water resources management a case study of Little Ruaha River Iringa District. The study used a cross-sectional design to achieve its objectives. A sample size of 100 respondents was drawn using purposive sampling technique. Data collection techniques were questionnaires, in –depth interview, observation, focus group discussion [FDG] and documentary review. Quantitative data were analyzed by using statistical package for social sciences [SPSS]. For qualitative data content analysis was used to analyse the data. The findings were presented in tables, charts and figures to ease interpretations.

The study revealed that participation of LGAs in IWRM has been enhanced through establishment of District facilitation teams, water user associations in form of irrigators associations and community owned water supply organizations and village environmental committees. Further the findings indicated that local government authorities are involved in water resources management through various activities which include formation of water user associations, formation of water and environment committees, formulation of environmental and water sources protection bylaws and preparation of land use plans. The study findings also show that there is a good relationship between local government authorities and Basin water authorities. However, findings from the study revealed that local government authorities face a number of problems in managing water resources which include lack of funds, poor irrigation infrastructure, population increase, climate change. Moreover, findings from the study indicated that local government authorities are able to influence the performance of integrated water resources management in their areas of jurisdiction.

The study recommendations include: increasing technical capacity by employing more extension officers at the ward and village level, allocating sufficient resources for construction and improving irrigation infrastructures, enforcement of water and environmental conservation by-laws developed by local government authorities.

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CHAPTER ONE

INTRODUCTION

1.1 Overview

This chapter presents an overview of the problem that was researched. It has several sections, which comprise background to the problem, statement of the problem, objectives of the study, research questions, significance of the study, and the scope of the study.

1.2 Background

Water is an important natural resource without which life cannot exist (Nkonya, 2008). Fresh water is a basic natural resource, sustains life and provides for various social and economic needs. Many social and economic activities that are undertaken by human beings rely heavily on the availability of an adequate supply of fresh water (Ngana, 2002). In its natural state, water is an integral part of the environment whose quantity and quality determine how it can be used (United Republic of Tanzania [URT], 2012b). Water is fundamental for food security, domestic-urban and rural water use, livestock development, hydropower production, industrial production, fisheries and wildlife water use and for the sustenance of ecosystems (URT, 2002). Therefore, water is a public good of very high value for all competing uses and requires careful conservation and sustainable utilization must be ensured.

United Nations University [UNU] (2005) argues that water is essential to our survival. Nonetheless, over one billion people today cannot obtain enough clean water to meet their basic human needs (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2006). Water scarcity plagues 27 Nations, and an additional 16 Nations are considered water stressed in the world (Water Resource Institute [WRI], 2004). The United Nations has also identified the rising demand for water as one of four major factors that will threaten human and ecological health over the next generation (UNU, 2005). Over 2 billion people in 40 countries live in river basins that are under water stress (World Bank [WB], 2005). The global population is expected to increase

tremendously, from 6 billion to 10 billion in 50 years to come (WB,2008).This indicates that in the near future water will become significantly a scarce resource globally.

In Sub –Saharan African [SSA] countries today, the demand for water is increasing due to rapid population growth, industrialization, and urbanization. Since water supplies have not kept pace with demand, water resources have been over utilized and polluted leading to water shortage (Nkonya, 2008)

Tanzania, being among those countries has faced growing water shortage from reduced and delayed rains and increasing demand for water. Over the past 25 years, these demands have intensified with increase in population and concurrent growth of economic activities requiring water as an input such as hydropower generation, irrigated agriculture, industries, tourism, mining, livestock keeping, domestic, fisheries, wildlife and forestry activities (URT, 2012b). Water scarcity is perceived at many places due to unreliable rainfall multiplicity of competing uses, degradation of sources and catchments.

Factors contributing to stress on local water resources include reduced and delays in rains, increasing multi-sectoral demands, degradation due to pollution, over abstraction, poor land use practices, and encroachment of land for agriculture, urbanization and industrial development(URT,2002). There is growing water insecurity which is manifested through shortage of domestic supply and irrigation, growing conflicts amongst groups of water users(farmers) and between different sectoral uses of water (irrigation, power generation, industries and pastoralists), communities and individuals, water pollution, destruction/degradation of water sources-watershed, wetlands, springs, recharge area and national power crisis (URT, 2012b)

Tanzania’s annual renewable water resources are 89 cubic kilometers or 2,700 cubic meters of water per person per year and about 40 cubic kilometers ground water reserve, but the resource is evenly distributed and there are no enough water storage infrastructures to reserve the water for future use (URT, 2002). Based on projected population from estimated 33million in the year 2001 to about 59.8 million by the year 2025, annual average available water per capita which is 2,700 cubic meters, will be reduced by 45% to about 1,500 cubic meters per person per year which shows that the

country will face a water stress situation, considering that below 1,700 cubic meters per person per year signifies water scarcity (URT, 2012).

Deliberate efforts are therefore needed to protect and sustain the resource and ensure that it is used efficiently and effectively for the benefit of present and future generations (Howard, 2002). Uneven water resources distribution, which is reflected in most parts of the country by water shortage either periodically or on permanent basis calls for effective water resources management (Dungumaro, 2006). Currently, the total annual water withdrawal for various socio-economic uses is only 6 percent of the total available internal renewable water resources, indicating significant space for sustainable increase in water exploitation for the country's economic growth (URT, 2001).

Competition among different water user groups often leads to conflicts, it usually means that available water goes to the most powerful groups, leaving the poor further marginalized, a little attention is paid to the impact of one group's water use on the availability for others downstream (United Nations [UN], 2008). Conflicts arising between users are very common at the local levels especially if intervention of rehabilitated or new construction of irrigation systems take place without taking into consideration the pastoralists and their needs for infrastructure for their livestock ((Lloyd, 2005). The conflicts lead to poor crop harvest, food insecurity and poverty (Mwaluvanda, 2007). Integrated water resources management (IWRM) is seen as a way of avoiding or resolving conflicts over water resources and achieving three key goals; equity, efficiency and sustainability (International Water and Sanitation [IWS], 2003). Without good water resources management we will not be able to achieve sustainable development or reduce poverty nor will we be able to respond effectively to emerging new challenges such as climate change adaptation (Lenton, 2009). Therefore, to ensure sustainable water resource use there is a need of making sure that all water resources users collaborate effectively in planning, allocation and monitoring of proper use of water in various productive activities.

The Tanzania National Water Policy, 2002 and the Water Resources Management Act No.11 of 2009 have embraced principles for intergraded water resources management as pillars for sustainable water resources management based on the basin approach. Basin

approach is an integrated water resources management approach based on hydrological set up for effective use and management of water resources guided by the principles of Integrated River Basin Management (IRBM) including devolution of responsibility to lowest appropriate or applicable level, coordination across sectors affecting the water resource and participation of stakeholders at all levels (Dundumaro and Madulu, 2002). This is in line with the New Institutional Economic theory which primarily supports the application of the rules of the game and devolves power away from the formal governments, who are seen as often being obstructive and too slow to react to change and needs (Lloyd, 2005)

During the past two decades most sub Saharan countries have embarked on comprehensive reforms towards Integrated Water Resources Management (Southern African Development Cooperation [SADC], 2009). Most emphasis has been on institutions, water management policies, legislations, legal frameworks and organizational set-ups that have been reviewed and redesigned (Sokile, and Van Koppen, 2003).

The Dublin principles form the base for IWRM, Global Water Partnership [GWP] (2000). The Dublin Conference established four guiding principles for managing freshwater resources (International water and sanitation Centre [IWSC], 2003). Principle two states that water management and development should be based on a participatory approach involving users, planners and policy makers at all levels (International Union for Conservation of Nature [IUCN], 2007).

According to Cernea (1985) stakeholders' participation in IWRM is like in any natural resources management, is concerned with empowering people to mobilize their own capabilities to be social actors, rather than passive subject, manage the resources, make decisions and control activities that affect their lives.

IWRM has increasingly been accepted as an appropriate framework for managing water resources in river and lake basins globally and at regional level (WB, 2005). If the concept of IWRM is applied well and effectively, it can facilitate conscious development

and management of water resources in a way that ensures long term sustainable use for socio-economic development and for the future generation (UN, 2008).

IWRM brings in coordination and collaboration among individual sectors, plus fostering of stakeholder participation, transparency and cost-effective local management system (Global Water Partnership [GWP], 2005). As water is vital for human survival, health and dignity and a fundamental resource for human development, IWRM is seen to be a human system that entails mainstreaming water in national economies while ensuring existence of a cross-border and cross-sectoral coordination of water management while promoting partnership among stakeholders (GWP, 2005).

The SADC countries and Tanzania in particular have adopted stakeholder participation as means towards attainment of sustainable water resources management at basin level. The SADC Regional Water Policy 2005 states that water resources development and management at all levels shall be based on a participatory approach, with effective participation of all stakeholders. Moreover, the policy affirms that all stakeholders shall be empowered to effectively participate in the management of water resources at regional, river basin, national and community levels (SADC, 2009).

According to GWA, an effective IWRM brings about coordination and collaboration among individual sectors, plus fostering of stakeholder participation, transparency and cost-effective local management system. This is in line with the New Institutional Economic theory which primarily supports the application of the rules of the game and devolves power away from the central governments (Lloyd, 2005). Participation of LGAs is likely to promote sustainable water resources management due to being the level where water resource plans are being initiated and implemented. The poverty reduction strategy of the Government of Tanzania [GoT] for example needs a multi-sectoral approach and collaboration among Ministries and actors to achieve targets of increasing irrigated area for food security and crop production for export as well as for meeting of Millennium Development Goals [MDGs] number one (URT, 2011 a). Planning and implementation of an IWRM for a river basin bases therefore is a challenge as it depends upon effective collaboration, transparent governing institutions working together with other stakeholders in the water sector.

1.3 Statement of the problem

Tanzania is confronted with an assortment of water resources management issues and challenges including water scarcity due to unreliable rainfall, pollution, an array of increasing and competing uses, degradation of water sources and water catchments areas and fragmented sectoral planning (URT, 2002). Indeed, inadequate involvement and participation of stakeholders in planning, management and decision making on issues related to water resources (National Water Sector Development strategy [NWSDS], 2006-2015) further frustrates the water sector development efforts (URT, 2006). Despite the existence of various institutions, the government and development partners supporting water resources management at lower levels, management of water resources in Tanzania remains elusive, and consequently conflicts arise over water resources use (Makufura, 2011). Studies conducted by Mwaruvanda (2007) on Baseline data on hydrology, water management institutions and water resources use in the Great Ruaha catchment and Kayunze (2009) on Experiences and Guidelines for the formation of sub-catchment water user Associations in the Great Ruaha river catchment found that participation of local communities and other stakeholders in the management of water resources was significant for effective water resources management in the Rufiji basin. These studies provided a basis for stakeholders' participation at local level in the management of water resources through formation of District facilitation teams and Water User Associations (WUAs). The two studies (Kayunze, 2009; Makfura, 2011) did not clearly show if the participation of Local Government Authorities in integrated water resource management has contributed much towards sustainable water resources management in the country. The aim of this study therefore, was to assess the participation of Local Government Authorities and the performance of integrated water resources management in Tanzania, challenges faces and how best to solve them.

1.4 Research questions

1.4.1 Main research question

The main research question was: has the participation of Local Government Authorities in IWRM improved the management of water resources in Tanzania?

1.4.2 Specific research questions

The specific questions of the study were as follows:-

- (i) What are the existing structures and processes used in establishing IWRM in the area?
- (ii) What are the water resources management activities conducted by local government authorities in the area?
- (iii) Is there good relationship between local government authorities and the Basin water Offices in managing water resources in the area?
- (iv) What are the constraints faced by local government authorities in managing water resources in the area?
- (v) Are the local government authorities able to influence the performance of integrated water resources management in the area?

1.5 Objectives of the study

1.5.1 Overall objective

The overall objective of the study was to assess the participation of local government authorities and the performance of Integrated Water Resources Management in Tanzania: A case study of Little Ruaha River Iringa District.

The study generally focused on Little Ruaha sub catchment with the aim of providing an insight for the rest of the Country. However, the performance is with respect to components of IWRM relevant to stakeholders' participation and the principle of management at the lowest level.

1.5.2 Specific objectives

Specific objectives of the study were to:-

- (i) Explore the existing structures and processes used to establish IWRM at the local government level
- (ii) Find out activities conducted by local government authorities in managing water resources in their areas of jurisdiction
- (iii) Explore the cooperation between the local government authorities and the Basin water authorities in managing the water resources

- (iv) Identify constraints faced by local government authorities in managing water resources in their areas of jurisdiction.
- (v) Find out the ability of local government authorities in influencing the performance of IWRM in their areas of jurisdiction.

1.6 Justification of the study

This study is important for three major reasons. First, the government through its National Water Policy 2002 recognizes the importance of stakeholder's participation in managing water resources in the country. The study relates to New Institutional Economic theory which primarily supports taking into account the interest of all actors and stakeholders in an effort to agree to the rule of the game (Lloyd, 2005). Among the stakeholders who use the water resources include villages ,irrigator associations, livestock associations and Community water supply organizations which administratively fall under LGAs hence there is a need to assess their participation in managing water resources in their local areas.

Second, the Little Ruaha River is the only perennial river in the Great Ruaha catchment area that flows into the Mtera Hydropower system and supports irrigation farming in Kalenga and Pawaga divisions in Iringa district. Given its strategic importance to the country's hydropower it was very important at this juncture to conduct a study to find out how the river can be managed sustainably.

The study that looks into stakeholder participation in IWRM is vital as it will not only serve as a benchmark for planners, policy makers, administrators and other stakeholders to be informed about best policy and legal options for dealing with the challenges faced. Finally the study is of great importance at the practical level in informing field workers, administrators and planners on the best strategy for effective water resources management for the Little Ruaha sub catchment and in Tanzania river basin areas in general.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter presents the related literature review about participation of Local government Authorities and the performance of integrated water resources management in Tanzania. Both theoretical and empirical literature was reviewed. The theoretical review provides the definition of key terms and theories upon which the study was based. The empirical review included the perspectives on IWRM and what has been done by other researchers globally, regionally and locally in relation to the research topic.

2.2 Theoretical literature review

This section is divided into two major parts: definition of key concepts and relevant theories on IWRM.

2.2.1 Definition of key concepts

This part presents definition on key concepts in regard to water resources management which include Local government Authorities, Water resources management, Integrated Water resources management, Basin management approach, Catchment and presents also a discussion on water resources management in Africa, Water resources management in Tanzania, Stakeholders participation in water resources management and the participation of Local government Authorities in integrated water resources management specifically in the Rufiji Basin.

2.2.1.1 Participation

Nabeel(1987) defines participation as a powerful idea which refers to the process by which professionals, families, community groups, government officials and others get together to work something out preferably in a formal or informal partnership. Arnstein (1969) defines participation as a collective effort to increase exercise and control over resources and institutions on the part of groups and movements of those hitherto excluded from control. The World Bank (1995) defines participation as a process through which stakeholders influence and share control over development initiatives and the decisions and resources that affect them. It is argued that development programmes/initiatives are likely to be sustainable if beneficiaries or local communities are given the opportunity to

analyze their own situation, identify the solutions that best suit them and carry out their own development work using their own resources (Smith, 1996). It is by mobilizing people's initiative recognition of the need to safeguard precious water resources for all their benefit that progress can be made up the chain to manage resources more efficiently (UN,2008)

2.2.1.2 Local Government Authorities

According to the Local government Act (1982a) Local government authorities [LGAs] refers to a sub national or semi-autonomous level of government discharging its function in a specified area within a nation. It is the level of government that is closest to the people and therefore responsible for serving the political and material needs of people and communities at specific local area. Such areas could be a rural setting or an urban setting, a village or town, a suburb in a city or a city depending on the size. The Local government (District Authorities) Act, No 7 established the Local government district authorities in rural areas and the Local government authorities (Urban Authorities) Act, No 8 established the Local government in urban areas.

2.2.1.3 Water resources Management

According to The African Development Bank (2000) Water resources management refers to institutionalized activities of water resources development utilization, allocation, conservation and control. Water resources management is also defined as the management of surface and ground water and water based ecosystem such as lakes, rivers and wetlands that are essential for the sustenance and health of all human, animal and plant species (URT, 2006). In a nutshell, water resources management refers to the activities of analyzing, monitoring, developing and implementing measures to provide water related services and keeping the state of a resource within desirable bounds (URT, 2002)

2.2.1.4 Integrated water resources management [IWRM]

Integrated Water Resources Management is defined as a process which promotes the co-ordinate 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 (GWP, 2000).IWRM is also defined

as the coordinated management of land and water resources within a Basin, with the objective of controlling and /or conserving the water resources ensuring biodiversity, minimizing land and water management for socio-economic objectives (URT, 2002). Integrated management means that all the different uses of water resources are considered together. Water allocations and management decisions consider the effects of each use on the others. They are able to take account of overall social and economic goals, including the achievement of sustainable development.

The thinking here is that an integrated approach to water resources management recognizes the inter-linkages between water sector problems and can fully exploit both the inter-linkages and synergies among institutions. Consequently, with an integrated approach one can begin taking into account all water related problems within a given area and then get the key institutions to work together to find solutions (Lloyd,2005). As water becomes scarce, it is becoming increasingly inefficient to manage water without recognizing the interdependence between agencies, jurisdictions, sectors and geographical area (World Bank Institute [WBI], 2006).

According to the International water and sanitation centre [IWSC] (2003) there are four guiding principles for managing freshwater resources. These are as follows:(i) Fresh water is a finite and vulnerable resource, essential to sustain life and environment, (ii) Water development and management should be based on a participatory approach, involving users, planners and policy makers at all levels (iii) Women play a central part in the provision, management and safeguarding of water (iv) water has an economic value in all its competing uses and economic good. The four principle principles are known as Dublin principles. These principles form the bases for integrated water resources management (GWP, 2000).

Implied in the four principles is the need for humankind to use the water resources in a sustainable manner to cater for the needs of future generations. This means that a holistic approach that focuses on the connection between social, economic and environmental dimension's in decision making that the water resources issues represent, needs to be

adopted (Essaw, 2008). In this regard, a participatory framework involving all who have a stake in the management of water resources would seem to be most appropriate.

The IWRM framework as developed by the GWP consists of three 3'E, Economic, Social equity and Ecosystem sustainability. Economic efficiency in water use, because of increasing scarcity of water and financial resources, the finite and vulnerable nature of water as a resource and the increasing demand upon it, water must be used with maximum possible efficiency. Social equity, the basic right for all people to have access to water of adequate quantity and quality for the sustenance of human well-being must be universally recognized. Environmental and Ecological sustainability, that means the present use of the resources should be managed in such a way that does not compromising use of the same resource by future generations.

Figure 2.1 General framework for integrated water resources management



Source: Global Water partnership, 2000

According to Llyod (2005) IWRM aims to promote more equitable access to water resources, ensure that scarce water resources is used efficiently, coordinate the planning of projects and activities that have impact on water resources and to achieve a more sustainable utilization of water, for a better environment.

2.2.1.5 Basin management approach

Basin refers to an entire geographical area drained by a river and its tributaries (URT, 2006). According to Makawia (2002) a basin can be regarded as a natural hydrological

unit which contains the water system within its borders and has different users that are all dependent on the same water resources. Basin management approach refers to the water resources management approach based on hydrological set up or boundary (URT, 2002).

According to Dungumaro and Madulu (2002), the river basin model was more widely introduced during the 1970s both as a consequence of the increased awareness of the relationship between nature and society, and the complexity of river management. Managing rivers was in many ways different from managing other resources, since rivers do not always follow the line of administrative borders. A river basin management is defined as the coordinated management of land and water resources within a basin, with the objective of controlling and /or conserving the water resources, ensuring biodiversity, minimizing land degradation and achieving specified and agreed land and water management for socio-economic objectives (URT, 2002)

2.2.1.6 The catchment

Catchment refers to condition and land use of the drainage basin itself as a major influence, affecting river health through the sediments, chemicals and fertilizers that may drain into the river, and through structures that can modify its flow patterns (Pangani Basin Water Office /International Union for Conservation of Nature, 2007).

2.2.1.7 Policies related to Water Resources Management in Tanzania

Tanzania has various national policies and institutions which have a direct link on water resources use and management. These policies include National Water Policy 2002, National Environmental Policy 1997, Land Policy 1997, and National Forest Policy 1998. All these Policies are vital in water resources management and reduced water use conflicts. They also provide a framework for sustainable water resources management and stakeholder's participation.

2.2.1.7.1 National Water Policy 2002

The Policy aims at conservation, protection and development of water resources with balanced community's socio-economic needs. The Policy seeks to address cross-sectoral interest in watershed management, integration and participatory approaches for water resources planning, development and management (URT, 2002). According to the Policy water resources planning should be carried out on a river basin basis following an

integrated multi-sectoral approach. It also calls for full participation of beneficiary communities in planning, implementation and management of water supply facilities and water sources protection (URT, 2002).

2.2.1.7.2 National Environmental Policy, 1997

The National Environmental Policy (1997a) promotes sustainable and equitable natural resource use for present and future generations without compromising environmental and ecosystem health. The policy provides a comprehensive framework for; prevention and control of environmental degradation; restoration of degraded ecosystems; and conservation of unique biodiversity. Specific to the water sector, the policy emphasizes an integrated water resources management approach; protection of water catchment areas; conservation and restoration of degraded wetland areas; promotion of technologies for efficient water use and wastewater treatment and recycling; and adoption of user-charges that reflect the true economic value of water. The important role played by wetlands in environmental protection and water resources sustainability is also recognized.

2.2.1.7.3 National Forest Policy, 1998

The overall goal of the National Forest Policy (1998) is to enhance the forest sector contribution to sustainable development, conservation and management of natural resources. The policy recognizes the important role of forests as water sources and highlights the inherent relationship between forest degradation and deterioration in river water quantity and quality. The policy provides watershed protection through forest conservation and reforestation of degraded areas in critical watersheds. It also requires that specific measures for watershed management and soil conservation be included in all forest management plans. The need for local communities and other stakeholders to participate in forest management, watershed management and soil conservation through joint management agreements is also recognized.

2.2.1.7.4 National Land Policy, 1997

The overall aim of the National Land Policy (1997 b) is to promote a secure land tenure system and encourage optimal land use without compromising the ecological balance.

The policy governs land tenure, land use management, and administration. It provides protection of sensitive areas including water catchments, rivers, lakes, river banks, lake shores, beaches, forests, wetlands, mountains, national heritage and fragile biodiversity areas, and seasonal wildlife migration routes. The policy requires that such areas (or parts of them) should not be allocated to individuals.

2.2.1.7.5 The Wildlife and Wetland Policy 2007

The National Wildlife Policy (2007) promotes effective stakeholder participation, especially local communities and the private sector, in wildlife management and conservation. The policy outlines: water catchment protection for wildlife water supply; biodiversity conservation; fragile ecosystems protection; and restoration of degraded flora and fauna habitats. The wildlife policy also has provisions for managing wetlands, most of which are located in game reserves or adjacent to game reserves. The policy recognizes the implication of human and development activities on wildlife resources inside and outside protected areas, and calls for environmental assessments for proposed development in order to minimize negative impacts on both sides. The policy promotes sustainable wetlands management and use, and it recognizes the important role wetlands play in the ecological and socio-economic development.

2.2.1.8. Water resources management related legislation

The water resources management is governed by number of legislation including Environmental Management Act 200, Village Land Act No 5 of 1999 and The Water resources management Act No 11 of 2009 which is the principle legislation. However, the Local Government Authority Act No.7 of 1982 empowers District Councils and Villages to formulate by laws for management of Natural resources including water.

2.2.1.8.1 Water Resources Management Act 2009

Water resources in Tanzania are managed by the Ministry of Water under the Water Resources management Act No. 11 of 2009. The Act provides the institutional and legal framework for the management and development of water resources from the lowest to the highest level. It recognizes water resources as an inter-dependent resource with other natural resources including forests, wildlife, and the land. The Act also provides for a

basin based water resources management approach with the participation of all relevant stakeholders.

2.2.1.8.2 Environmental Management Act 2004

The overall objective the Act is to promote environmental enhancement, protection and sustainable management. The Act provides coordination among agencies whose mandates involve environmental protection and management. The Act also provides specific legal instruments which are included in most national environmental legislations. These include: environmental management plans; ecosystem management plans; economic instruments; environmental impact assessments (EIA); environmental audits; social, health, biotechnological and risk impact assessments; strategic environmental assessments; pollution prevention and control; waste management (covering solid waste, litter, liquid waste, gaseous waste and hazardous waste); and environmental quality standards (catering for water, air, noise and vibration pollution, radiation and soil quality standards).

2.2.1.8.3 Village Land Act No. 5 of 1999

The Village Land Act No. 5 of 1999 governs village land and all matters related to land tenure under the village councils. Most project activities that are developed in villages and take place on village land. For the village land, the act empowers the village council to manage all village lands (Section 8 (1-3) in accordance with the principles of a trustee with the villagers being the beneficiaries. In the exercise of these functions, the Village Council is required to regard the principles of Sustainable development and the relationship between land use, other natural resources, and the environment in and contiguous to the village and village land.

2.2.1.9 Water resources management institutional framework

Tanzania is divided into nine basins that do not follow administrative boundaries such as regions and districts. To this end the management of water resources in Tanzania has been clustered into five levels; national level, basin level, catchment level, district level and community or water user association level which is the lowest level (URT, 2002) This is illustrated in Figure 2.2.

2.2.1.9.1 National level

The ministry with the mandate for water is responsible for managing the nation's water resources. According to the Water policy 2002, the Ministry determines Policy orientation, development and time-to-time review of policy and legislation, preparation of conducive environment, sectoral coordination and integration, and sectoral planning, National water assessment and planning, data collection and dissemination, monitoring and evaluation, establishment and maintenance of water resources database and information management systems.

2.2.1.9.2 Basin level

The Basin level is responsible for data collection, processing and analysis, water allocation, pollution control, preparation of water utilization plans and resolution of various water related conflicts (URT, 2002).

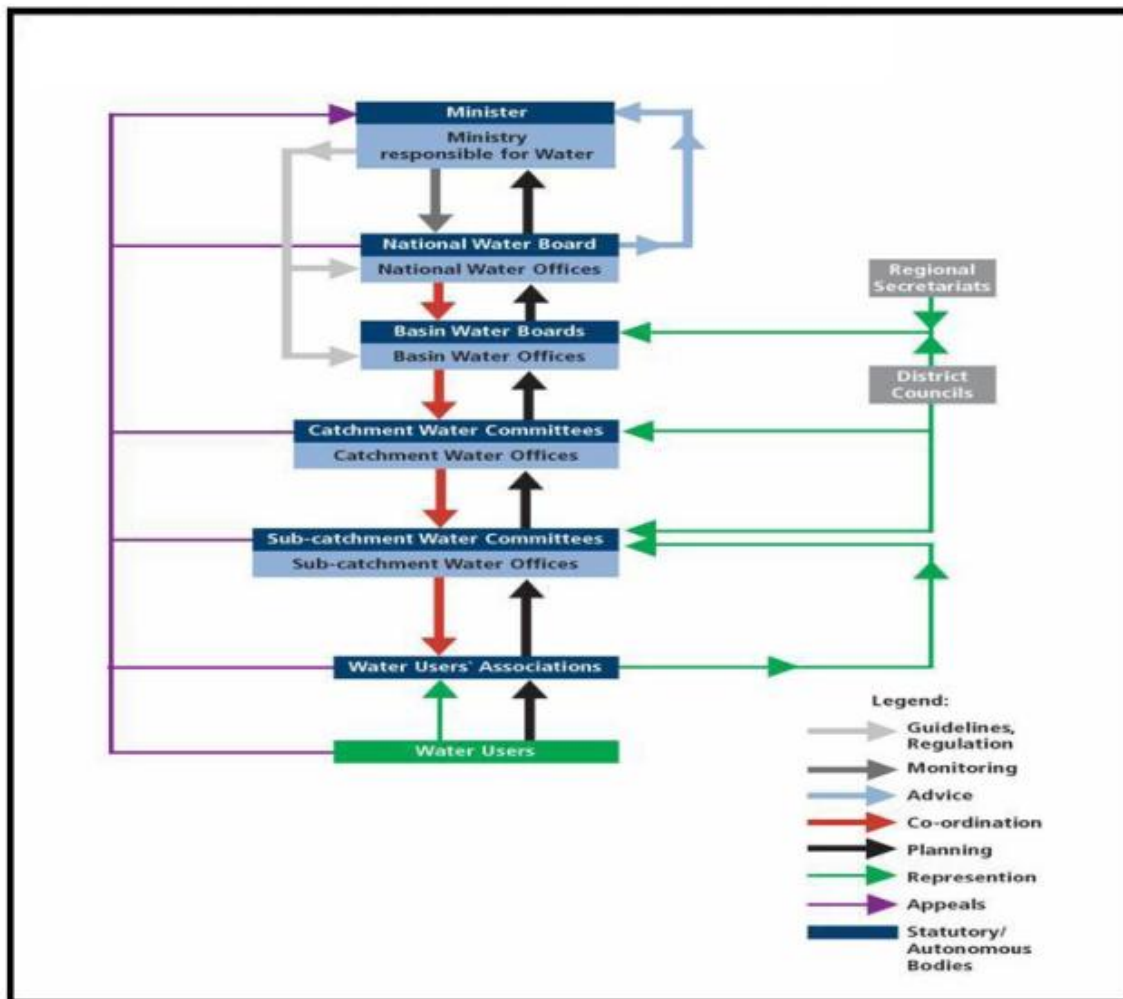
2.2.1.9.3 District level

According to Water policy 2002, District council are responsible for planning and development of water resources in accordance with the Basin plans, protection and conservation of natural resources in the Villages and wards, establishment of by-laws on the management of water resources, conflicts resolution in accordance with the established by laws and also assessment of water demand of their respective districts.

2.2.1.9.4 Water user Associations (Community level)

Water User Association is the lowest water resources management level. These associations are responsible for local level management of water resources, mediation of disputes among users and between groups within their areas of jurisdiction (URT, 2002). Water management is often a local affair, whether it involves a few farmers working together to bring water from stream to their fields or a village's citizens seeking a safe and reliable source for their water and a way to dispose of their wastes (Lenton, 2009). The institutional framework for water resources management in Tanzania is presented in figure 2.2

Figure 2.2: Institutional framework for water resources management in Tanzania



Source: National Water sector Development Strategy, 2006

2. 2 .1.10 Stakeholder participation in integrated water resources management

Stakeholder participation in IWRM is like in any natural resources management concern. Cernea (1985) asserts that IWRM empower people to mobilize their own capacities, to be social actors, rather than passive subject, to manage the resources, to make decisions, and to control activities that affect their lives. In 2002, Tanzania adopted a new water policy which embraced integrated water resources management as a key strategy for managing and developing the nation's water resources. The Water Sector Development Strategy

([WSDS], 2006-2015) was subsequently formulated to guide the implementation of the policy. Both National Water Policy (2002) and WSDS envisioned the need for the participation of stakeholders and the local communities in decision making at all levels of water resources management.

The use of participatory approaches to water resources management is one of the Dublin conventions (GWP, 2000). Other principles include water as a finite valuable resources; the important role of women; and water as an economic good. Although many researchers agree on the importance of involvement of stakeholder in IWRM, the level of involvement is still low in most of developing countries (Dangumaro, 2002). Bell (2001) argues that stakeholder's involvement in IWRM or in other environmental issues is based on three basic reasons; first the emergence of participatory approaches demonstrates the importance of local level communities consent in taking part in public decision-making processes especially on issues that directly affect their welfare. In this context, the local government participation could provide an important database, experience and ideas that could lead to practical, relevant, achievable and acceptable solutions to water related problems. Second, the need to use indigenous knowledge (IK) as well as opinions that is vital to environmental protection, including proper water resources use and management. The need to build public trust, lack of public trust might lead to protest and antagonism between water resources users and other stakeholders due to varying interests and demand.

Local communities in various areas of Tanzania have developed coping strategies to ensure conservation of water resources (Kangalawe, 2010). However, some of the traditional strategies have been eroded by modernization factors and population pressure to the extent of affecting water quality and quantity (Dangumaro, 2001).

Human activities that are conducted near water sources affect the water resources management, river ecology and the quantity of water through pollution and silt sedimentation

2.3 Theories on IWRM

This part presents a review of theories on IWRM which with regard to this study include Ecological management theory and the New Institutional Economic theory.

2.3.1 Ecological management theory

Water issues namely social, economic and ecological cannot be understood in isolation (Rogers, 2006). They are a web of interlinked concerns that require, ideally a holistic or integrated perspective through which do design appropriate management settings, Folke (2002) cited in Essaw (2002). Folke (2002) cited in Essaw (2008) also argues that human society is part of the biosphere and societies are embedded in an ecological system and that aquatic ecosystems are unique water dependent and therefore human activities create many different types of threats to these ecosystems (Essaw, 2008). Integrated water resources management is generally based on the perception of water as an integral part of the ecosystem, a natural resource and a social and economic good, whose quantity and quality determine the nature of its utilization (GWP, 2008).

2.3.2 New Institutional Economic theory[NIE]

IWRM is linked to New Institutional Economic (Lloyd, 2005).The evolution of NIE began with economist such as Ronald Coase (Lloyd, 2005).NIE is a branch of economics that goes beyond the usual economic focus on market, to look more closely at human-made institutions (Dictionary of Labour Law Talk, 2005 cited in Lloyd,2005). Generally, NIE has a: - worldview that incentives and rules can be used to regulate (govern) the behaviour of social actors and that: - problems of environmental degradation or control are caused by lack or insufficient rules and incentives (Hardin, 1968 cited in Lloyd, 2005) and that:- Solutions come via market and institutions. The market is regarded as the best form of regulation but has its fault; consequently, the market needs to be complemented by regulative institutions (Ostrom, 1999 cited in Lloyd, 2005).According to Lloyd (2005) there is a clear linkage between NIE thinking and IWRM. This can be illustrated by considering the three IWRM elements in the context of NIE

2.3.2.1 Integrated Planning and NIE

IWRM supports governance by taking into account the needs of all stakeholders. Integrated planning has a role at the policy level but more visible when incorporating all actors in a defined geographical unit of management for example a river basin as a part of a plan. The idea related to NIE is to involve or take into account the interest of all actors and stakeholders, in an effort to agree to the rules of the game. Integrated plans in one form or another are essential for the operationalisation of strategy and are used to regulate people's action.

2.3.2.2 Governance and NIE

IWRM typically involves a revision of institutions in order to take into account all actors and stakeholders in a chain that links the highest levels of formal governments (e.g ministries) with the end users (e.g in the form of village water user associations). In this way all actors and stakeholders (institutions) can be regulated. This is very attractive to NIE theory primarily because it helps apply the rules of the game and devolves power away from the formal governments, who are seen as often being obstructive and too slow to react to change and needs (Lloyd et al., 2005).

2.3.2.3 Economic and NIE

The economic element of IWRM involves water rights and user fees. It is not only the mean to be seen as a means to fund governance. It is also used as a means to regulate the demand of users and protect the resource. NIE states that the market is the tool to regulate demand, help protect resources and dictate the distribution of resources although this regulation needs to be complemented by governance (Lloyd et al., 2005).

2.4 Empirical literature review

2.4.1 Water Resources Management in the World

Experience from China shows that a key element in China's resources-oriented approach has been the coordination between the basin management and the district management at all the level of provinces, city and country (Lenton, 2009). In China there has been a growing recognition that water management requires a resource-oriented focus and not just infrastructure project, for example, in recent years the existing basin institutions and

related administration departments at all levels have been required to maintain the health of the Yangtze River (Huang, 2007 cited in Lenton, 2009). It has been emphasized that the protection of the environment and the construction of infrastructure should receive equal attention (Wag, 2002 cited in Lenton, 2009).

In Mexico the government has created regional water agencies for example Lerma – Chapala River basin regional management. The decisions of the federal government to create these new regional water agencies was the first step towards decentralizing the water administration and achieve more efficient coordination with the states and municipalities (Lenton, 2009). Apart from decentralization promoted by the federal government, in December 1989 the National water commission was established as the federal Water Authority. In each state, a water commission was set up as a facilitator for water authority and the water users were organized in civil associations in order to participate as representatives of their water uses in the Basin council (Lenton, 2009).

2.4.2 Water resources Management in Africa

The majority of rural Africa today is still under some influence of customary institutional arrangements for water management (Pollard, 2005). In South Africa, case study research on rural areas shows that there are villages where custom is still strong and traditional leaders have an important role, villagers have installed self-regulated water supply systems along customary lines, and the traditional leader's authority over water issues is extensive and includes conflict resolution in water matters (Böge, 2003). Likewise, it has been observed in the case of Nkayi district in Zimbabwe that villagers prefer to take decisions based on a process conducted through community meetings rather than through more exclusive committee structures, showing that the inclusive participatory character is part of the strength of customary informal institutions (Cleaver, 2000). Even when the institutional structures are in place to manage water resources on a river basin basis weak enforcement and conflicts of interests between different actors in the basin creates pressure on the institutions to do what is possible rather than what is necessary (Kashaigili, 2003).

An increasing number of African countries are experiencing water stress, nevertheless in most river basins, mechanism and institutions to manage water resources disputes are either absent or unsatisfactory (UNESCO 2006). Therefore, not should plans and goals be developed but so should practical frameworks for implementing joint river management through efficient institutions and productive participation of all stakeholders be enhanced (United Nations, 2008)

Experience from South Africa shows that in seeking to bring coherence and integration to water resources management and at the same time address the issues of equity and sustainability, South Africa has embarked upon a process of decentralization of management and regulation (Pollard, 2005). Some of the basic water management institutions in South Africa are:- Catchment Management Agencies [CMA] which plays a coordinating role regarding water related activities and water management institutions, develop and implement catchment management strategy and encourage public participation; and Water Use Association [WUA] which is a statutory body established by the minister and operates at the localized level with exceptions especially when the length of the river managed by a WUA is so long that it relates more to the regional than local interest (Muller 2000) cited in Sokile (2002).

Experience from Kenya shows that water resources Management in Kenya is centralized at the national level (Rafiki, 1996). However, there are also river basin authorities which manage natural resources at basin levels. Furthermore, in each district there has been established a district water board which looks after the water affairs before the water catchment board deals with the issues. The participation of districts in water resources management in Kenya has promoted effective water resources management at the local level whereby water resources use committees have been established at the grassroots level to manage the water resources (Rafiki, 1996).

2.4.3 Water resources management in Tanzania

According to the current National Water Policy 2002, the management of water resources in Tanzania is vested with River Basin Authorities (URT, 2002). Tanzania adopted the River Basin Management approach in 1989 when the Minister responsible for water gazetted nine (9) river Basins which include Pangani, Rufiji, Wami-Ruvu, Victoria,

Tanganyika Nyasa, Rukwa, Internal drainage basin of lake Eyas, Manyara and Bubub depression(Central Tanzania) and the Ruvuma and southern coast basin (URT,2006). These institutions are mandated to manage water resources and implement the water law at the basin level.

According to NAWAPO (2002), WRM in Tanzania should be organized through participatory and representative forums, starting at the national level and spreading to the basin and sub-basin level. The policy identifies five levels of basin management, national, basin, catchment, district and community or water user association level. The institutional framework for water resources aims to integrate sectors at different levels, and this is formalized water law. At the catchment level, the aim is to have a catchment council that will provide integrated planning and the district council will participate fully in basin boards and catchment councils. Districts are also responsible for planning and developing water resources. The community level and sub catchment WUAs are responsible for local-level management of allocated water resources (URT, 2002).

2.4.4 Participation of Local Government Authorities in IWRM in the Rufiji Basin

According to the Local government Act (1982 a) Local government authority refers to a sub national or semi-autonomous level of government discharging its function in a specified area within a nation. The Local government (District Authorities) Act, No 7 of 1982 established the Local government district authorities in rural areas and the Local government authorities (Urban Authorities) Act, No 8 of 1982 established the Local government in urban areas. In regard to this research the focus is on district authorities. District authorities include the district councils, village councils and Ward development committees (URT, 1982a).

According to the Local government authorities Act No, 7 of 1982, the area of jurisdiction of district authorities are divided into divisions and the divisions are divided into wards. The ward development committees are administrative units functioning between the villages and the district council. One of their main tasks includes coordinating the planning and budgeting inputs of the village councils before they are submitted to the district council. The district council possesses more power than the village council, for

example the district council approves the by-laws made by the village council and formulates the district plans and budgets which affect the lower layer councils. According the Local government Authorities Act ,1982a the basic function and duties of each district authorities are; to maintain and facilitate the maintenance of peace, order and good governance within its area of jurisdiction, to promote social welfare and economic well-being of all persons within its area of jurisdiction, to further the social and economic development of its area of jurisdiction and take necessary measure to protect and enhance the environment in order to promote sustainable development. Being normally closer to the people local government authorities are supposed to know better the needs of the local area and not only what the people can contribute but also how to engage them in development activities (URT,1982a).

The Rufiji basin works with District councils, and Village governments, in managing water resources in the Basin. At the district level there established water resources management district facilitation teams (DFTs) composed of members from different professional backgrounds (Mwaruvanda,2007).The function of these teams is to assist water users in the formation of Water user Associations (WUAs) which are responsible for managing water resources at the lower level as reflected in the National Water Policy 2002. A Water user association may be formed by the agreement of the majority of a group of water users for one or combination of the following purposes to manage, distribute and conserve water from a source used jointly by the member of the water user association and resolve conflict between members of the association related to the joint use of a water source (URT, 2009).

2.4.5 Recent Research findings

A study by Kayunze (2009) on process, experiences and guidelines for the formation of sub-catchment water user Associations in the Great Ruaha River Catchment area –Iringa and Mbeya Region in the Rufiji Basin in Tanzania indicated that formation of Water resources District facilitation teams (DFTs) and the participation of local communities in management of water resources through formation of water user associations (WUAs) was significant for effective water resources management in the Rufiji basin .

Findings of a study by Lankford et al. (2007) on adaptive framework for river basin management in developing countries: A case study of the Great Ruaha river in Tanzania indicated that if IWRM strategies are to address issues that are of importance “locally” this can only be achieved by understanding the social-political context and especially the conflicts that characterize the area. In the Great Ruaha sub basin the embeddedness of local institutions in complex livelihoods renders designing institutions for water management highly problematic.

A study by Lloyd et al. (2005) on Integrated water resources management, more specifically on: - how has IWRM helped exert sustainable water resources in the Rufiji Basin in Tanzania found that the idea of stakeholders participation in the Rufiji basin at the lowest level of the society was through the creation of Water users Associations .They are the cornerstone of decentralized process of governance and participation of all stakeholders in water management in the Basin. However, they are locally focused to such extent that they only have the capacity to comprehend or consider local water uses.

A further study done by Egis International and Service Plan Ltd (2011) on Social Assessment for Water Resources Management in the Rufiji basin revealed that efforts to involve LGAs in the basin to participate in the management of water resources had been promoted through the formation of District/Catchment Facilitation Teams and Water user Associations which provide a vital link between the Rufiji Basin and LGAs falling within the jurisdictions of the basin

A study by Masanja (2008) on integrated Catchment Management a case of Ndembera sub catchment of Great Ruaha in Iringa Rufiji basin revealed that natural resources (land, water and forest resources) are available and play a critical role in the lives of people living around Ndembera Sub-catchment. Additionally environmental degradation (soil erosion, reduction of water in sources, and depletion of soil fertility) is the result of people who lack resources conservation knowledge and skills as well as lack of suitable enforcement measures of natural resources conservation policies and legislation.

Findings from a study done by Mwaruvanda (1996) on Hydrometric data Verification and irrigation projects in the Great Ruaha sub –basin indicated that water resources

management at the grassroots level need involvement of the resource users in the form of social organization such as water user associations to ensure that all users are well informed on water resources management issues.

A research carried out by Makfura on Sub catchment User Associations and Water Resources Management conflicts in Tanzania (Great Ruaha catchment Mbarali District) revealed that involving stakeholders in the management of water resources from local level to the national level was significant not only to reduce water conflicts but to enhance sustainable water resources management in Tanzania.

A survey conducted by WREM International (2012) towards the preparation of Integrated water resources management and development Plans [IWRMDP] for the Rufiji Basin found that although the National Water Policy (2002) promotes integrated water resources management and advocates a multi-sectoral implementation approach, the existing cross-sectoral coordination mechanisms are weak and inadequate. The current basin water resources management and local government institutional frameworks are considered separate and parallel to each with inadequate provisions for integration or synergy. Coordination between the two frameworks is usually limited to cross representation on specific administrative and management committees at different levels.

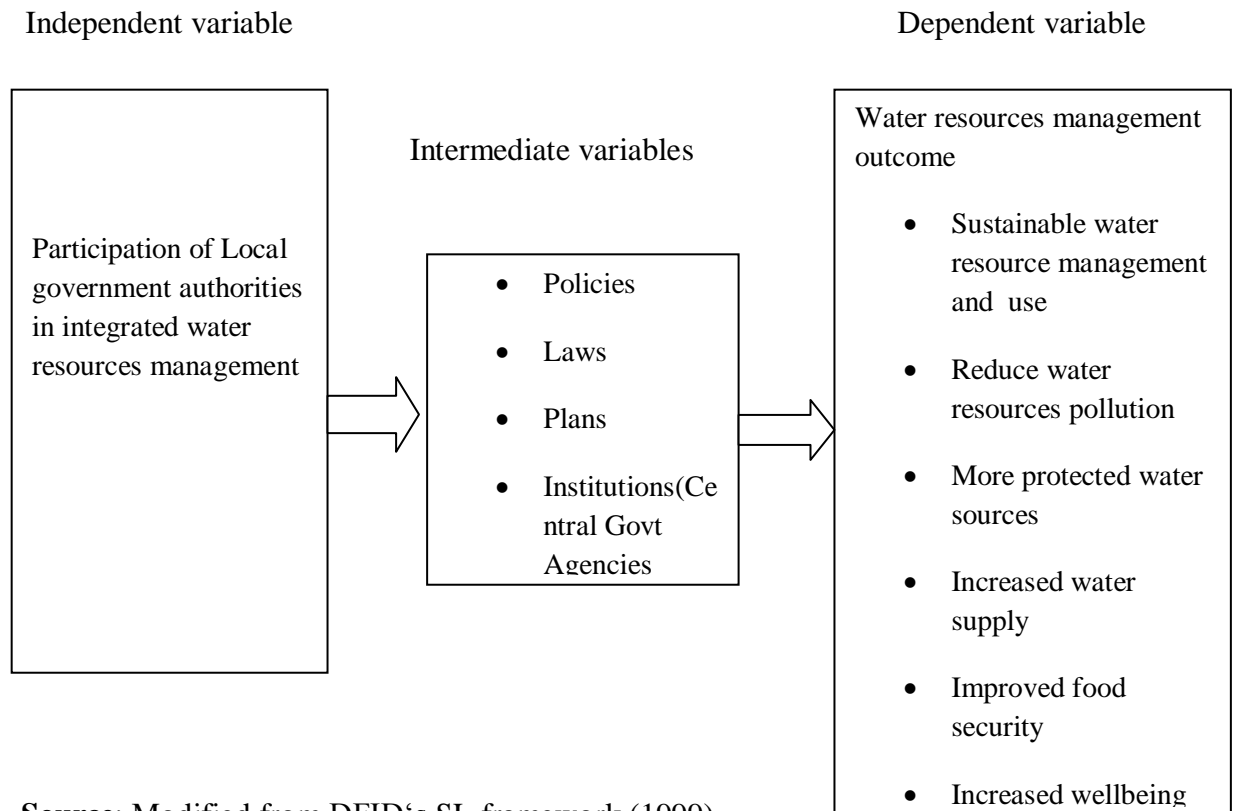
The National Water Sector Development Strategy 2006, points out that a number of different government departments or agencies deal with various aspects of water resources management according to their own mandates or needs, and also their own legislative provision, with little integration towards holistic-basin wide planning and management.

With reference to the above literature it is not clearly known if the participation of LGAs in integrated water resources management given the basin approach to water resources management has promoted effective water resources management in Tanzania. This study, therefore, tried to look at the participation of LGAs in IWRM given the basin approach to water resources management and help bring to light if their participation has provided valuable contribution towards an effective integrated water resources management in Tanzania with a focus on Little Ruaha River Iringa district.

2.5 Conceptual Framework

Figure 2.2 explains the conceptual framework about the participation of LGAs and the performance of IWRM. It assumes that participation of LGAs in integrated water resources management leads to sustainable water resources management and use. But for the local government authorities to participate effectively in IWRM depends on other factors like existence of good policies, laws ,plans, institutions and the willingness of local communities to participate. Policies and Plans provide frameworks on the roles and responsibilities of LGAs in managing water resources. Therefore sustainable water resources management will depend on how policies, plans and laws stipulate about the roles and responsibilities of LGAs in the management of water resources. Good policies, plans and laws promote effective participation of LGAs in Water resources management hence sustainable water resource management and use. When there is sustainable water resources management there will be improved food security and people’s livelihoods.

Figure 2.2: A Conceptual framework on participation of Local government Authorities and performance of Integrated Water Resources Management



Source: Modified from DFID’s SL framework (1999)

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter shows how the research questions and objectives were achieved. The section describes the research design and methodology that were used to gather and analyze the data for the study. It includes research design, sample and sampling techniques, method of data collection and data processing and analysis.

3.2 Study area

The study was conducted in Iringa District specifically in two selected divisions of Pawaga and Kalenga. Iringa District is one among the six administrative districts of Iringa region. The district is composed of 6 divisions and sub divided into 23 wards and 122 villages. According to the 2002 population census, Iringa District council has 269,908 people. This population is composed of 133,278 men and 136,630 women.

The population density varies per division in terms of population per surface area. Currently, there are 63,010 households. The district covers the area of 20,576 sq kilometers of which only 9,857 sq kilometers are habitable and the rest are occupied by National parks, Forest, Rocky Mountains or water bodies. The district is located between latitudes 7.00'-8.30' south of Equator line and longitudes 34'-37' East of Greenwich meridian. It is bordered by Mpwapwa district (Dodoma region) to the North, Kilolo district to the East, Mufindi district to the south, Chunya district (Mbeya region) to the west and Manyoni district (Singida) to the North West. In this study two divisions of Pawaga and Kalenga were selected.

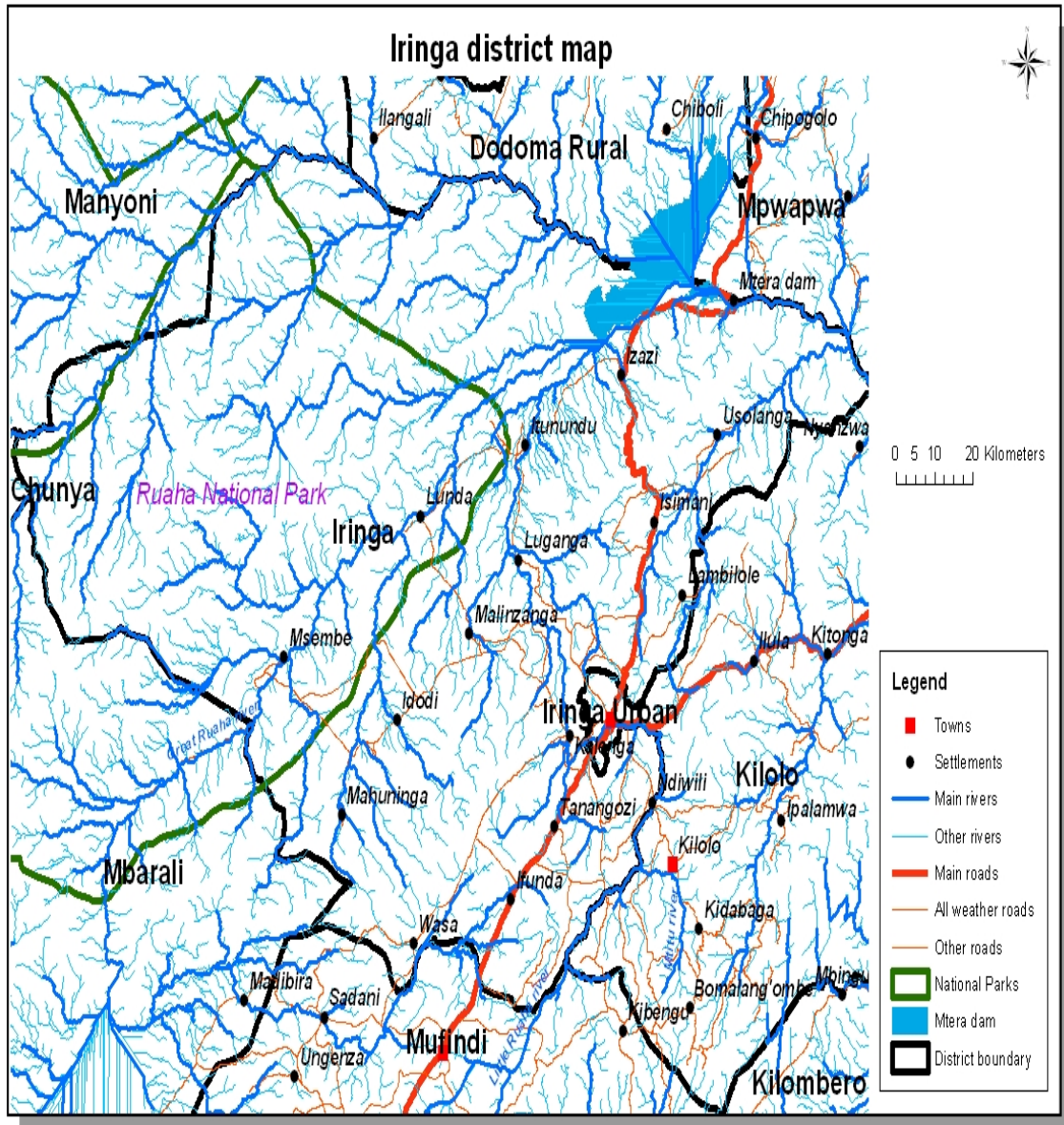
Pawaga and Kalenga divisions are two among the six administrative divisions in Iringa District. Pawaga and Kalenga divisions are rural located in the North –West of Iringa district near Iringa town. They form part and parcel of the Ruaha plains, which lie within the little Ruaha River. Water resources management in this area is coordinated by Rufiji Basin Water Board. The water resources of Pawaga and Kalenga divisions are used mainly for irrigated agriculture including rice cultivation and sustain agro-pastoral livelihoods and hydropower production in the downstream. Besides paddy rice that is

cultivated with formal and indigenous irrigation schemes in the area under supplementary irrigation, other crops cultivated in the area under rain fed agriculture include maize, tobacco, groundnuts and beans. This area was selected due to water resources challenge it faces caused by increased irrigation schemes and it's being upstream of the Mtera hydropower generation dam which also face challenge of reduced water volume which normally leads to power shortage in the country.

3.2.1 Economic Activities

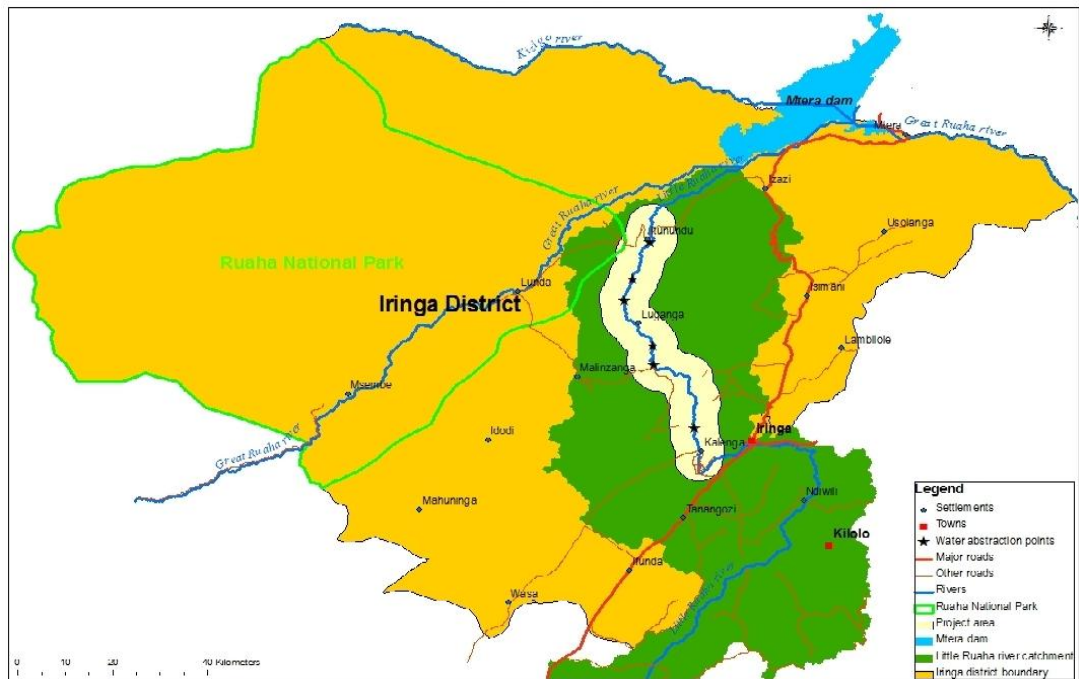
Pawaga and Kalenga divisions are predominantly rural with their population residing in rural areas engaged mainly in agriculture and livestock as their major undertakings. Agricultural activities are mainly done through irrigation using traditional and improved schemes. Crops cultivated include paddy (rice), maize, onions, tomatoes, groundnuts, bananas and beans. Other economic activities are forestry, tourism and trading .Rice is the cash crop and Maize is the main staple food crop.

Figure 3.1: Iringa District Council Map: Administrative Boundaries



Source: Iringa District council Water department 2012

Figure 3.2: Iringa District council map showing the study area



Source: Rufiji Basin Water Office -GIS Dep, 2013

3.3 Research design

The study used a cross-sectional design. The researcher collected data at one point in time using questionnaire copies for individual respondents and key informants. The design was appropriate because it is cost effective, less time consuming and much information was obtained in relatively short time. Both qualitative and quantitative data were collected. Qualitative approach was dominant in the study and was supplemented by quantitative approaches in data collection and analysis.

3.4 Sample size and Sampling techniques

A total of 100 respondents were involved in the study. The sampling units in this study were the individual respondents. The study employed non-probability sampling technique. The technique was also used to sample Pawaga and Kalenga divisions in which one ward from each division and two villages from each ward which border with Little Ruaha River were selected purposively as well. The two divisions were selected based on their location, with one being upstream (Kalenga) and the other downstream

(Pawaga). Twelve (12) Village leaders, 4 Ward leaders, 16 Water user association leaders, 8 Village environmental committee leaders, 2 extension officers in the study area and 8 irrigators' association leaders and 40 irrigation scheme farmers were selected purposively. A list of sampled respondents is shown in Table 3.1

Table 3.1: Sampled respondents by Division and Wards

| Sampled respondents | Sample Ward | Sampled Village | No of respondents |
|---------------------|-------------|-----------------|-------------------|
| Pawaga | Itunundu | Itunundu | 22 |
| | | Kimande | 23 |
| Kalenga | Kalenga | Kalenga | 23 |
| | | Ibangamoyo | 22 |
| Total:2 | 2 | 4 | 90 |

Source: Field Data, 2013

Purposive sampling was also used to select 10 key informants for the study. The key informants were important because they are the ones who were accessible, willing to talk and have great depth of knowledge on issues. Through the key informant interviews, information about participation of LGAs in IWRM, constraints faced by LGAs in managing water resources and the influence of LGAs in IWRM were collected. A check list of open- ended questions was used to guide the interviews. The key informants considered under this study included 4 Rufiji basin water Board staff, 6 Iringa District council staff. A list of key informants is shown in Table 3.2.

Table 3.2: Sampled key informants who participated in the study

| Key informant | No of respondents |
|---|-------------------|
| Water Officer Rufiji basin water Office | 1 |
| Hydrologist Rufiji Basin | 1 |
| Water right Officer Rufiji Basin water office | 1 |
| Community Development Officer Rufiji Basin | 1 |
| District water engineer | 1 |
| Irrigation Engineer | 1 |
| Forest officer | 1 |
| District land Officer | 1 |
| District agricultural Officer | 1 |
| District Environmental Officer | 1 |
| Total | 10 |

Source: Field Data; 2013

3.5 Operationalisation of the Variables

IWRM aims to ensure that scarce water resources are used efficiently. It also aims to coordinate the planning and activities that have both a direct and indirect impact on water resources and to achieve more sustainable utilization of water including for better environment (Lloyd, 2005). This study therefore looked at the performance of Local Government Authorities in IWRM based on selected elements of IWRM which are governance, efficiency and sustainable use of Water resources. These are selected indicators relevant to LGAs participation in IWRM. These elements (variables) are shown in the Table 3.3.

Table 3.3: Operationalisation and measurement of participation variables

| Variable | Data collected |
|------------------------------------|---|
| Governance | Data on existence of local level water resources management institutions (water user associations, irrigator's association and water and environmental committees) and records on water use conflicts and abstractions with water use permits |
| Efficiency | Irrigation infrastructures (example modern irrigation schemes with proper intakes, lined canals and drainage systems Improved and traditional irrigation schemes) |
| Sustainable use of water resources | Water resource management plans, Village land use plans, water flows records and best agricultural practices. |

Performance of LGAs in IWRM was determined (measured) based on selected IWRM elements as shown in table 3.3 (governance, efficiency and sustainable use water resources). Good water governance, high water use efficiency level and sustainable use of water resources means high performance while the opposite means low performance. Existence of local level water resources management institutions (water user associations), low record of water use conflicts and abstraction with water use permits means good water governance, existence of modern irrigation schemes or improved irrigation scheme with intakes, lined canals and drainage system means high water use efficiency and existence of operational water resource management plans, village land use plans, high water flow records means sustainable use of water resources management.

3.6 Methods of data collection

Both qualitative and quantitative information were collected. The study collected both primary and secondary data. Primary data were collected from the field (field data). Primary data collection employed qualitative and quantitative data collection methods. In this study, multiple qualitative methods of data collection were employed; they included questionnaires, key informants interviews, participant observation and focus group discussion using checklist. Secondary data were obtained through documentary review whereby various reports (Water use permit records, Water resources management plans, Water use conflicts reports, Water flow reports, District irrigation reports), books and articles related to water resources management were reviewed.

Questionnaires based on interview technique were optimal for data collection of sensitive data. The questionnaires were administered to respondents on one-to-one basis (Appendix i, ii & iii). These included Rufiji basin water board staff and District staff especially those in the department of Agriculture, Environment and natural resource, water department, extension officers in the research area, Ward and village leaders, Water user association (irrigators and water supply) leaders. Focus group discussion [FGD] was conducted with village government members, farmers, Water user association leaders. Their composition included participants with different age, sex, education levels and occupations. The selection of participants for discussion was made purposively with the assistance from Ward Executive Officers [WEOs] of the respective wards after the researcher had devised a selection criterion. The FDG were very useful for the study and aided the collection of information on respondent's perception, feelings, experience and reaction with regard to water resources management, a checklist of open-ended questions was used to guide the discussion (Appendix iv). In the presented study the size of focus group ranged from 9-12 people.

In depth interview [IT] was also used especially with the key informants. A checklist of open ended questions was used to guide the interview (Appendix v & vi). The researcher collected supplementary information about the respondent's personal characteristics and environment which is often of great value in interpreting result.

In this study about ten key informants were interviewed so as to complement data obtained from observation, questionnaires and documentary review.

Secondary data were obtained through documentary review. In this research documentary review was the major source of secondary data. The secondary data were obtained through reviewing documents including reports and books. These reports included research reports, river water flows data, District irrigation reports, basin water resources management plans, water user records, District annual reports, water use conflicts reports and water abstraction reports. To get such reports Iringa district council offices, Rufiji basin office and irrigation schemes offices in the research area were visited

Observation method was also employed by the researcher. According to Kothari (2004) one of the advantages of using the method is that “the information obtained under this method relates to what is currently happening”. Under this technique the information is sought by way of investigator’s own direct observation without asking from the respondents. The researcher took the role of a participant observer while in the field observing and recording what was observed, by using a camera some photo to show the real situation were taken. In using the technique, the researcher prepared observation schedule (Appendix vii) which provided a list of issues that were observed in the field such as agricultural practices on water sources, river flows, location of irrigation infrastructures and water resources degradation activities.

3.7 Data processing and Analysis

Both primary and secondary data were processed manually. This included editing, classification, coding, transcription and tabulation of data collected. Data were summarised, coded and entered into the statistical package for social science version 16.0 (SPSS v16.0) computer software and then analyzed. Descriptive statistics such as frequencies means and cross tabulation, tables, figures and graphs were used to display data and the study results. For qualitative data content analysis was used to analyse the data. This included information gathered during focus group discussion and those collected from documentary materials.

The use of content analysis technique was aimed at reducing the total content of the qualitative information to a series of variables. Verbal discussion held with individuals was broken down into meaningful information using content analysis. This helped in ascertaining values and attitude of the respondents.

CHAPTER FOUR

PRESENTATION OF FINDINGS AND DISCUSSIONS

4.1 Introduction

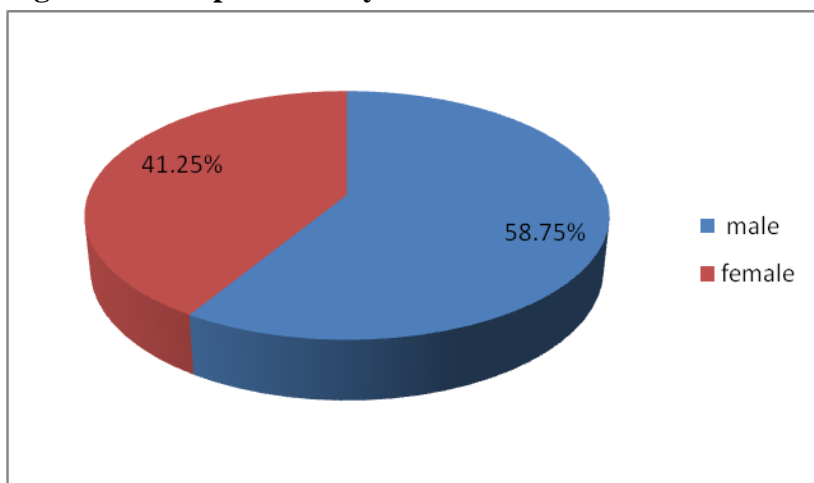
This chapter presents the research findings. After presenting descriptive statistics, the findings are presented in line with the research questions as follows: What were the existing structures and processes used to establish IWRM in the study area? What are the water resources management activities conducted by local government authorities in the study area? Is there good relationship between local government authorities and the Basin water Offices in managing water resources? What are the constraints faced by local government authorities in managing water resources? Are the local government authorities able to influence the performance of integrated water resources management in the study area?

4.2 Socio-Demographic characteristics of the Respondents

4.2.1 Respondents by sex

Figure 4.1 and Table 4.1 show that a total number of 100 respondents were included in the study, the results show that among the respondent 58 (58 %) were male, while 42 (42 %) of the respondents were female. The question of water resources management touches both men and women in the community. The results show that most of the respondents 58 (58 %) were males. The possible argument behind could be that in water resources management, males play a great role in the control, allocation, resolving conflicts and water distribution. On the other hand, females are responsible for domestic water use. Men and women often have different priorities and responsibilities and are impacted differently with development interventions (Makufu, 2011). Therefore; gender of the respondents plays a big role in recognizing responsibilities of both men and women with regard to water resources management. With that regard the study considered views from both men and women. This could also be a way of ensuring that the voice of women who are mainly neglected but impacted heavily by water scarcity was heard (Makufu, 2011).

Figure 4.1: Respondents by Sex



Source: Field Data, 2013

Table 4.1: Respondents by sex, age and education level

| Characteristics | | No of respondents | Percentage |
|-----------------|---------------------|-------------------|------------|
| Sex | Male | 58 | 58 |
| | Female | 42 | 42 |
| Total | | 100 | 100 |
| Age | Between 18-45 yrs | 71 | 71 |
| | Above 45 | 29 | 29 |
| Total | | 100 | 100 |
| Education level | Primary education | 69 | 69 |
| | Secondary education | 17 | 17 |
| | College | 14 | 14 |
| Total | | 100 | 100 |

Source: Field Data, 2013

4.2.2 Respondents by Age

Table 4.1 also shows that 71 (71%) most of the respondents were between (18 and 45) years old while 29 (29%) were above 45 years old. This means that 71 (71%) of the respondents aged between 18 and 45 years old mainly the youth who are the main group engaged in economic activities in the study area compared to 29 (29%) of the respondents aged above 45 years old. These results suggest that the main economic activity, namely irrigation agriculture in the area attracted more youth as it is the only available employment opportunity for them to be engaged in.

4.2.3 Respondents by Education

Table 4.1 shows that the majority of the respondents 69 (69%) had primary education, followed by those with secondary education 17 (17%) while 14 (14%) had college education. These results indicate that most of the respondents 69 (69%) had primary education level compared to 17(17%) and 14(14%) who had post primary education level. This means the majority of the people live in the study area have primary education. It can therefore be argued that the study considered views from both those with low education level as well as those with high education level.

4.2.4 Main Economic Activities

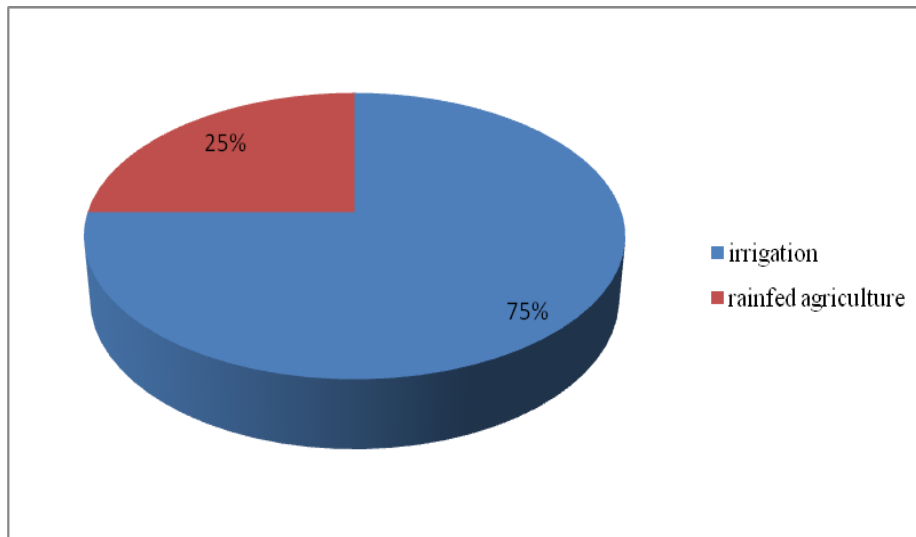
Respondents were asked to identify the major economic activities conducted in the study area. Table 4.2 indicate that 65 (65%) of the respondents were engaged in agriculture, 30 (30%) were engaged in pastoralism while 5 (5%) were engaged in fishing activities. These results suggest that the main economic activity of the study area is agricultures. Agriculture as the main economic activity has impact on water resources management. When asked to identify different types of agriculture practiced around the Little Ruaha River the majority of the respondents 75 (75%) said that irrigated agriculture is practised in the area while 25 (25%) of the respondents reported that agriculture depends on rainwater as shown in Figure 4.2. It is therefore, clear from the results that people in the research area depend on both irrigation agriculture and rain fed agriculture even though irrigated agriculture is done by the majority of the people as reported by 75 (75%) of the respondents. Furthermore, fishing is also done in the upper part of the sub catchment especially during the rainy season. These results are in consistence with those by Mwaruvanda (1996) who found that communities in the Great Ruaha catchment depend much on irrigation agriculture.

Table 4.2: Respondents' Economic Activities

| Economic activities | No of Respondents | Percent |
|----------------------------|--------------------------|----------------|
| Agriculture | 65 | 65 |
| Pastoralism | 30 | 30 |
| Fishing | 5 | 5 |
| Total | 100 | 100 |

Source: Field; Data 2013

Figure 4.2: Types of agriculture practised



Source: Field Data, 2013

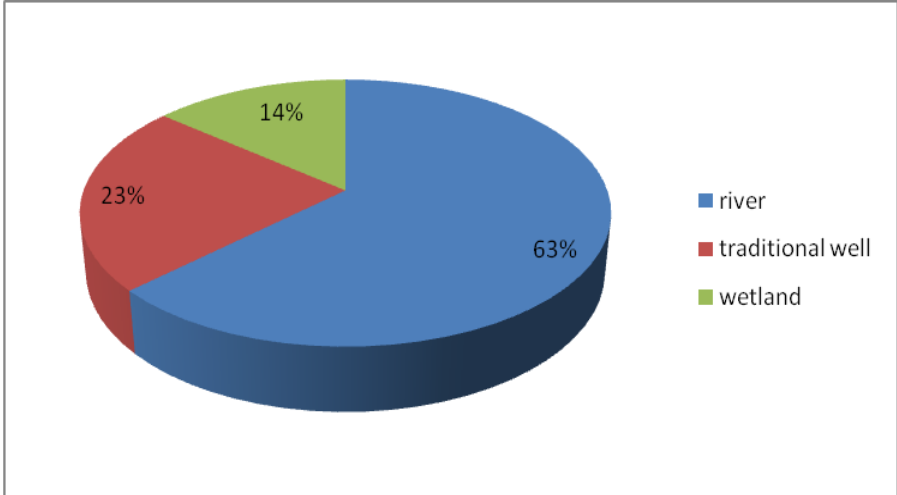
Based on the results it can be argued that the presence of water resources, in this case the Little Rauaha River has motivated irrigation agriculture in the study area. Many crops including rice, maize, beans, banana and vegetables are irrigated on a large scale and in small farms (Mwaruvanda, 1996). When asked on how irrigation was done, during the focus group discussion at Kalenga division members said that irrigation is done depending on the season of the year;- During the rainy season people practise rain-fed agriculture while during the dry season they do irrigation, For example, Kalenga and Mkoga-Charahan irrigation schemes have water use permits which allow them to use water during the dry season hence depend on rain-fed agriculture during the wet season

However, this was not the case with Pawaga division which is downstream and dry as respondents said they entirely depend on irrigated agriculture which is normally done during the rainy season. During the dry season water intake and irrigation canals are supposed to be closed to allow water flow downstream to Mtera dam for hydro power generation. This was also complemented by water rights officer in charge at the Rufiji Basin water Office who said water rights are issued depending on the applicant's water use demand, water quantity and rain season. *"Some water rights allow holders to irrigate during dry season that is from July to November while other water users are allowed to use water only during the rainy season that is from late November to June"* she said.

4.2.5 Sources of Water for Irrigation

Respondents were asked to identify different sources of water for irrigation available in the area. Figure 4.3 shows that the main source of water for irrigation was Little Ruaha River as reported by 63(63%) respondents. Fourteen (14%) respondents said agriculture in the area depended on wetlands. The remaining 23 (23%) respondents said the source of water in the area was traditional wells. Other sources like wetlands and traditional wells are used for domestic and gardening especially during the rainy season. Data from questionnaires were complemented by data from observation, interview and focus group discussion. It was noted that in the study area Little Ruaha River was the main source of water; the river supports both irrigation activities and domestic uses. Also, during the focus group discussion at Kimande village, members pointed out that their livelihood totally depended on the Little Ruaha River. *“We cannot live here without this river; everything you see here like these good houses and livestock is because of the river”*, they said.

Figure 4.3: Sources of Water for irrigation



Source: Field Data, 2013

These results suggest that people in the study area depend totally on the river to get water for irrigation. They also suggest that agriculture is the largest consumer of water. Water is needed for irrigation during both dry and wet season for paddy, maize and vegetables. The type of use accelerates unsustainable use of water resources as water resources are abstracted throughout the year as a result the resource also continues to dwindle year after

year (Lankford, 2007). To reverse the situation deliberate efforts are needed for protecting and sustaining water resources in the area.

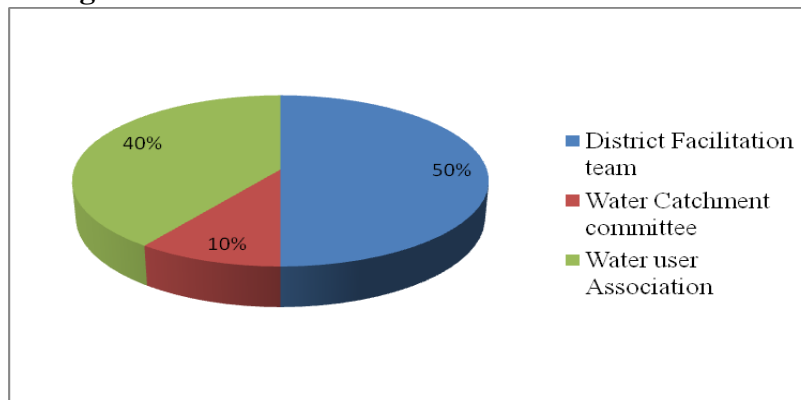
4.3 Structures and Process used to establish IWRM at the local level

4.3.1 Structure used to establish IWRM

Respondents were asked about the structures used to establish integrated water resources management at the local level. Figure 4.4 shows that 50 (50%) respondents indicated that the District Facilitation team (DFT) was the formal structure for implementing IWRM activities at the local government authorities especially at the district level while 40 (40%) mentioned Water user associations (WUAs), (has been a link between grass root community and the water resources management at the high level) and 10 (10%) reported water catchment committees (has been the structure at the village level). From the results it is clear therefore, that DFT and WUAs are the formal structures that have been used to establish IWRM at the local level.

These findings are consistent with those by Egis International and Service Plan Ltd (2011) on Social Assessment for Water Resources Management in the Rufiji basin which revealed that efforts to involve LGAs in the basin to participate in the management of water resources had been promoted through the formation of District/Catchment Facilitation Teams and Water user Associations which provide a vital link between the Rufiji Basin and LGAs falling within the jurisdictions of the basin.

Figure 4.4: Structures used to establish integrated water resources management at local government level



Source: Field Data, 2013

4.3.2 Process of forming District Facilitation Teams [DFT]

When asked about the process of forming District Facilitation Teams, the Iringa district DFT Chairman said that, Rufiji Basin Water Office in collaboration with the district council facilitates the formation of district Facilitation Team (DFT). First the Rufiji Basin Water Office [RBWO] requests the District Executive Director to nominate 10 experts from different departments of the district council to compose a District Facilitation Team on Water resources management. The common departments where the experts came from include Agriculture (Crop, livestock and Irrigation), Water, Planning, Community development, Natural resources and Education. Since the DFT members have various educational backgrounds normally they get trained so that they can do the work of facilitating WUA formation in the same way. DFT members get training on water policy, participatory methodologies, adult learning methodologies, integrated water resources management (IWRM) and communication skills so that they can work efficiently in multidisciplinary and multi-sectoral team (Kayunze,2009). DFT provide a technical link between RBWO and district council on water resources management (Mwaruvanda, 2007). DFT help in sensitizing local communities on water resources management, capacity building of WUAs, sub catchment water committees and resolving water related conflicts.

4.3.2.1 Process of forming Water user Associations [WUAs]

When asked about the process of forming WUAs, the Rufiji Basin community development officer said, the process of forming WUAs was elaborate and highly participatory. She continued to say that the process begins with identification of the local water resources issues to be addressed by the WUA and corresponding discussion in the village meetings. The discussion is aimed at generating consensus among the local communities and the need for collective action. The village meetings are conducted into two phases, first with village government and second with all the villagers. DFTs play a key role in this initial stage by providing technical support to the local communities and identifying and assessment of water resources issues. The assessment steers the meetings towards reaching consensus and developing plan forward. After reaching consensus and developing a plan forward, the local communities proceed with selecting their WUA representatives. Inhabitants of each sub -village choose their WUA representative. The

WUA leaders are selected from their membership through secret ballot. The WUA then proceeds to prepare its constitution in consultation with the local communities. The constitution is submitted to the district council for review and comments. The final constitution is then submitted to the Rufiji basin water Board for approval and registration of the WUA as legal entity. Formation of WUAs is one of the main characteristics of the transfer of rights and responsibilities for management of water resources from government agencies to communities and the private sector (Kayunze, 2009).

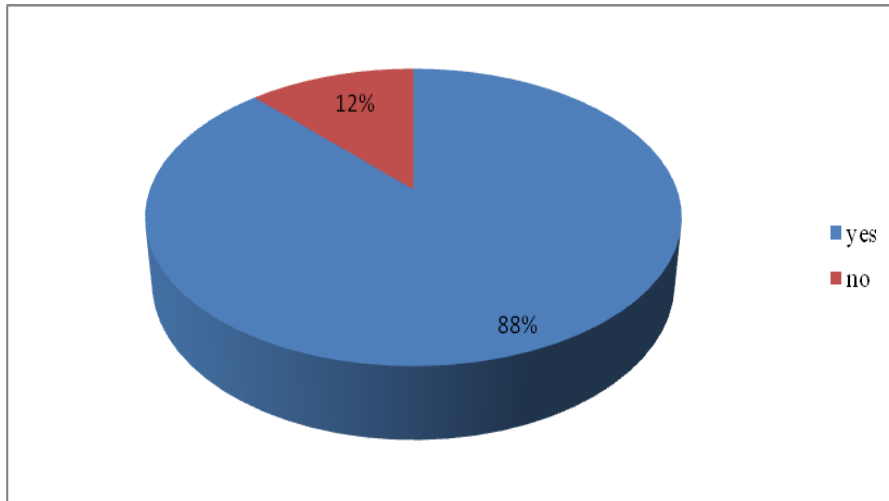
4.4 Water resources activities conducted by Local government Authorities

This section shows water resources management activities conducted by Local Government Authorities. These include formation of water user associations, formation of water and environmental committees, formulation of environmental and water sources protection bylaws, preparation of land use plans and provision of water resources management education.

4.4.1 Formation of water user associations

Respondents were asked whether they were aware of the existence of WUAs in the study area. Figure 4.5 shows that majority of the respondents 88 (88%) were aware of the presence of WUAs in the little Ruaha sub catchment while 12 (12%) of the respondents reported that were not aware of the existence of such institutions like WUAs. These results show that most of the members of the public around the little Ruaha River sub catchment are aware of the existence of the lower level water resources management institutions. It can be argued therefore that most of the community members 88 (88%) in the study area are members of the water user association (WUAs). During the focus group discussion at Kalenga village respondents indicated that being members of WUAs enabled them to get water use permit from the basin water board and it also reduced the cost of paying the economic water use fee charged by basin water office annually as cost were shared among members of the WUA. *“being member of a water user association helps us pay less water user fee as every one of us contributes then it becomes easy to pay our annual water use fee to the basin water office”*, they said.

Figure 4.5: Existence of Water user associations



Source: Field Data, 2013

Table 4.3: Water user associations (Community Owned Water supply Organizations)

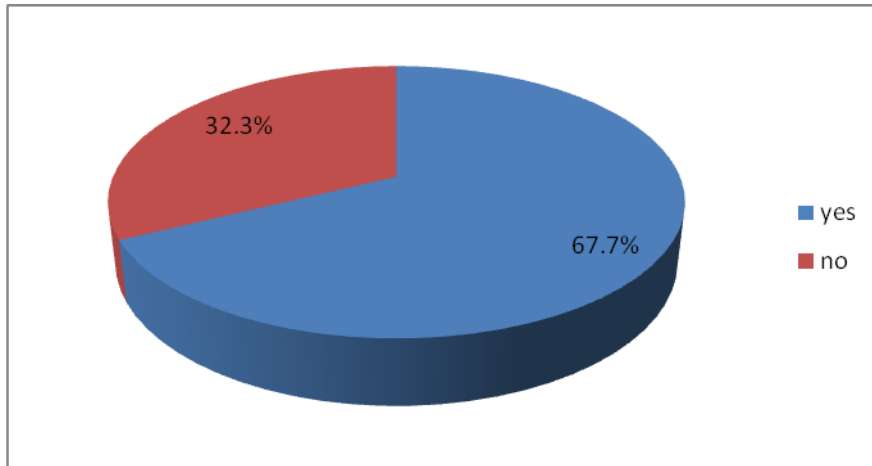
| Name of WUA | Number of village | Number of people benefiting |
|-------------------|-------------------|-----------------------------|
| Tangagozi/Kalenga | 12 | 22,716 |
| Magubike | 5 | 10775 |
| Pawaga | 8 | 13132 |
| Mgera | 3 | 4180 |

Source: Iringa District Council Water Department 2013

4.4.2 Formation of water and environmental committees

Respondents were asked about the existence of water and environmental committees. Figure 4.6 shows that 65 (67.7%) of the respondents reported that most villages in the study area had water and environmental committees while 31 (32.3% of the respondents indicated that there was no water and environmental committees. These results suggest that most villages in the study area have water and environmental committees. Village water and environmental committees constitute the arm of the village governments whose main functions include sensitization of villagers on water and environmental issues, demarcation and protection of water sources through tree planting, enforcement of village government by-laws regarding water sources and environmental issues (URT, 2012a).

Figure 4.6: Existence of water and environmental committees



Source: Field Data, 2013

4.4.3 Formulation of environmental and water sources protection bylaws

The study investigated if there were environmental and water sources protection by-laws in the study area. Table 4.4 shows that 78 (81.3%) of the respondents interviewed reported that villages in the study area had environmental and water sources protection bylaws while 18 (18.7%) indicated that there were no environmental and water sources protection bylaws. These results show that most of the villages in the study area had environmental and water sources protection by laws. However, 18(18%) said there were no environmental and water sources protection bylaws, this could be due to poor implementation of these bylaws as the result people see as if they don't exist. These bylaws are very important for protecting water resources and the environment in general. They are used to punish those people who are engaged in environmental degradation activities including cultivating on water sources, deforestation and grazing on water sources. These results are consistent with those by Kangalawe (2010) who found that at the grassroots level village governments have developed environmental protection bylaws but are not effectively enforced.

Table 4.4: Existence of environmental and water sources protection by laws

| Existence of environmental and water sources protection bylaws | No of respondents | Percent |
|--|-------------------|---------|
| Yes | 78 | 81.3 |
| No | 18 | 18.7 |
| Total | 96 | 100 |

Source: Field Data, 2013

4.4.4 Preparation of land use plans

Respondents were also asked about the existence of land use plan in the study area. Table 4.5 shows that the majority 73 (73%) of the respondents interviewed indicated that villages in the study area had land use plans in place while 23 (23%) of the respondents reported that villages had no land use plan. From these results it is clear that most of the villages in the study area had land use plans in place. The fact that slightly less than a quarter of the respondents replied negatively, it could be due to the reason that these plans are not implemented hence makes people feel that the plans are not in place. Land use plans help in demarcating village land for various uses, for example areas of water sources, village forest, areas for grazing and livestock watering points (Kangalawe, 2010). This helps water sources be conserved as no human activities are allowed to be conducted in those areas. It can therefore be explained that lack of land use plans promotes unsustainable use of natural resources and conflicts over resource use for example farmers and livestock keepers. The degradation of water sources threatens sustainability of the water resource with potential negative effect to ecosystem integrity, human health, food security, industrial production, and investment of various socio-economic sectors (URT, 2002).

When asked about the applicability of land use and management plans, the Iringa district land officer indicated that land use planning process has been done to many of the village especially in Pawaga division but the challenge is in implementing those plans as most of the villagers are engaged in both agriculture and livestock keeping hence make their implementation even more difficult.

Table 4.5: Existence of Land use Plans

| Existence of land use plans | No of respondents | Percentage |
|-----------------------------|-------------------|------------|
| Yes | 73 | 73 |
| No | 27 | 27 |
| Total | 100 | 100 |

Source: Field Data, 2013

4.4.5 Acquisition of water use permit

Respondents were asked whether or not they have water use permits. Table 4.6 shows that 88 (88%) of the respondents had water use permit and 12(12%) did not have water use permit. These results indicate that people in the study area comply with the legal water use requirement. The few who said that they had no water use permit is an indication of the existence of some people who use water without having water use permit. Water use permits are a mechanism through which a user can access water for a particular use without jeopardizing another user’s right (Lloyd, 2005). Water use permits provide legal entitlement to access and use water for specified purposes and at specified times and is required for all productive uses of water (Lankford, 2007). When asked on the applicability of the use permit, the Rufiji Basin water use permit officer said, water use permit does not guarantee that specified quantity of water will always be available, there are instances when the Rufiji basin water office (RBWO) can suspend or vary water use permit as deemed necessary *“in many cases villages have applied for and obtained water use permit to legally protect the abstraction needs of their schemes”* she said.

The main objective of water use permit is to facilitate the better control and regulation of water in the sub catchment by enabling the RBWO to sanction new withdraws, to stop unauthorized and to prevent over-abstraction. In theory, the aim of insisting on water right even for very small-scale users is to provide them with a legal tool to safeguard their water resources against infringement by large scale commercial water users (Lankford, 2007). Local communities are generally willing to formally legalize their abstraction (Lloyd, 2005). This is possibly because they appreciate that water is increasingly scarce and suspect that they will lose out to other villages if they do not do

so. It is also clear that in many cases communities registering water use and paying the required water use fees, will result in investment in water infrastructure like conversion of traditional to modern irrigation intakes and lining of canals (Mehari, 2007).

The findings are consistent with those by Lloyd (2005) who found that local communities are generally willing to formally legalize their abstraction by having water use permit despite the fact that it costs money and is a complex and lengthy procedure with many bureaucratic problems.

Table 4.6: Existence of water use permit

| Ownership of water use permit | No of respondents | Percentage |
|-------------------------------|-------------------|------------|
| Yes | 88 | 88 |
| No | 12 | 12 |
| Total | 80 | 100 |

Source: Field Data, 2013

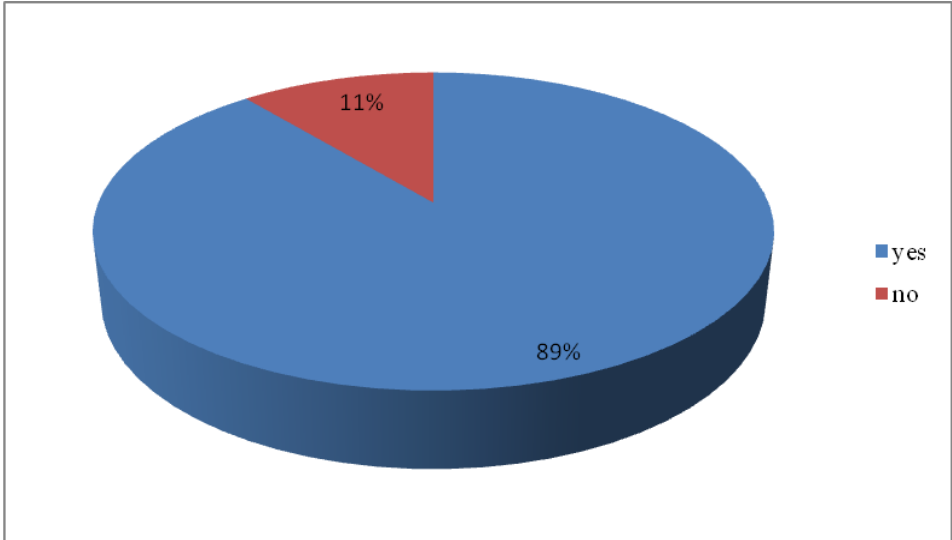
4.4.6 Payment of water user fee

Respondents were asked if they normally pay their annual water use fee as required. Figure 4.7 shows that 89 (89%) of the respondents reported to be paying economic water user fee annually as required while 11 (11%) of the respondents indicated that they were not paying as required. These results show that many people in the study area were paying economic water use fee as required. Slightly more than ten percent said that they were not paying represents those people who use water without having water use permit. In theory, economic water use fee have dual purpose: first to improve the cost recovery of the water management activities, second to provide financial incentives to water users (schemes and individuals), to reduce waste and optimize water use (Lankford, 2007). When asked if economic water use fee contributed to effective water resources management, the Rufiji Basin water officer said, the current water use fee did not contribute to more effective use of water in the sub catchment. This explanation is consistent with those by Sokile (2003) who found that famers are not reducing demand to save on water fees as in many places irrigators are expanding their irrigated land to maximize benefit from water they have paid for. This has impacted on the sub catchment in a way that the farmers now feel they own the water and therefore want to get their

investment worth, leading to major over usage of water distributed and affects the downstream users.

However, monitoring of abstractions is so limited there is no way one can link the fee to the water abstracted (Mwaruvanda, 2005). These findings are consistent with those by Lankford (2007) who found that water users with water use permit were paying the economic water use fee as required though at low rate compared to the amount they were abstracting.

Figure 4.7: Payment of water use fee



Source: Field Data, 2013

4.4.7 Provision of water resources management education

Table 4.7 shows that 68 (71.9%) of the respondents said that they were aware of issues related to water resources management while 28 (28.1%) of the respondents replied negatively. These results suggest that most of the people in the study area were aware of issues related to water resources management and environmental conservation in general. Community awareness on water resources is very significant for the sustainable management of the water resources (Bell, 2001). When water users are aware on issues related to water resources management and the environment in general it helps to cultivate a culture of sustainable use of the resources. Furthermore, during focus group discussion at Itunundu village members indicated that they mostly receive education

when new irrigation schemes are being established and during village land use plan processes “*in fact we can’t deny if it is education our agricultural extension officers have tried much to educate us it’s we who don’t understand these issues we can’t blame them*” they said.

Table 4.7: Water Resources Management Education

| Awareness | No of respondents | Percent |
|-----------|-------------------|---------|
| Yes | 69 | 71.9 |
| No | 27 | 28.1 |
| Total | 96 | 100 |

Source: Field Data, 2013

4.5 Relationship between Local government authorities and the Basin water Office in managing water resources

This section shows the relationships that exist between LGAs and Basin Water Office.

4.5.1 Relationship between LGAs and BWO

Respondents were asked about the relationship that existed between Local government authorities and the Basin water office. Table 4.8 shows that 76 (76%) of the respondents reported that the relationship existed while 24 (24%) said no relationship that existed between LGAs and BWO. These results suggest that there is relationship between LGAs and BWO. Relationship here refers to the way BWO and LGAs co-operate with each other in managing water resources. Relationship between the Local governments is very critical to the effective implementation of IWRM. The Rufiji Basin Water Office realizes that establishing good cooperation with the local government authorities and the WUAs instills trust and helps develop good governance and sustainable water resources management (Kayunze, 2009). Good governance develops trust both between people and institutions through which people can work together to achieve good environmental management (Lankford, 2007). When asked whether there was good relationship between LGAs and BWO, the Iringa district natural resource officer said “*we cannot deny that there is no relationship with the basin office we work with them very closely, for example during the exercise of evicting bricks makers along the river at Kalenga ward it was basin people who helped us*” he said.

Table 4.8: Relationship between LGAs and BWO

| Existence of relationship | No of respondents | Percent |
|---------------------------|-------------------|---------|
| Yes | 76 | 76 |
| No | 24 | 24 |
| Total | 100 | 100 |

Source: Field Data, 2013

4.5.1.1 Water use conflict resolution

Respondents were asked about the existence of water use conflicts in the study area. Table 4.9 shows that 31 (31%) of the respondents pointed out that there were no water use conflicts, while 69 (69%) of the respondents reported to have experienced water use conflicts. From these results it can be argued that people in the study area experience water use conflict. This is because water in this area is highly needed for the daily life of the people especially in Pawaga division which is a dry area. During the focus group discussion at Kimande village, members revealed that there were conflicts between users of the same irrigation scheme and intra-sectoral water use conflict which is between irrigation and Hydro-power production namely Mtera dam. *“It is TANESCO people who normally complain that we are using much water for irrigation as the result Rufiji Basin Water Office staff normally come and close our irrigation canals”* they said.

When asked about how water use conflicts are resolved the Iringa District Water engineer said that most local conflicts are mediated and resolved by WUA members and village governments. He further said, conflicts that cannot be resolved at the WUA and Village government level are usually reported to Rufiji Basin Water Board (RBWB) for further action or prosecution where necessary. Village government leaders and District council also play an important role in water related conflict resolution (Kayunze, 2009). When asked about the cooperation with the RBWB in conflict resolution, the district water engineer indicated that they have been working closely with basin water office in managing water resources in the district *“basin staff help us in conflicts resolution and supervision of borehole drilling for community water supply”* he said. These findings are consistent with those by IUCN (2009) which indicated that conflicts over resources use is

just a manifestation of the very high level of competition that exists for basin resources hence require effective system to resolve them.

Table 4.9: Water use conflicts

| Existence of Water use Conflicts | No of respondents | Percentage |
|----------------------------------|-------------------|------------|
| Yes | 69 | 69 |
| No | 31 | 31 |
| Total | 100 | 100 |

Source: Field Data, 2013

4.5.1.2 Water use Permit Application process

When asked about the process of issuing water use permit, the Rufiji Basin water use permit Officer said, the process is initiated by prospective permit applicant. She further said, the RBWO on behalf of the Board, after registering the application involves the WUAs and District council by requiring them to endorse the application before approval by the BWB. She also said, the RBWB request information from District Administrative Secretary (DAS), District Executive Director (DED) and District Agricultural Officer (DAO) regarding the issuance of the permit in question. This is consistent with findings by Kayunze (2009) who established that participation of stakeholders in the permit issuing process ensures that local communities have a say in water allocation decision processes. During discussion at the district, District irrigation engineer indicated that they were working closely with the basin water office in issues related to water resources management, *“We always give comments to new water use application and even when water use permit is granted they normally give us a copy so we know who legal water users in our district are”* he said.

4.5.1.3 Enforcement of water use permit compliance

Responding to the question about the involvement of LGAs in water resources management, the Rufiji Basin Water Officer said that, permit requirement compliance is undertaken by RBWO in collaboration with the District and village leaders. Moreover, my office sometimes authorizes village executive officers to conduct major control and regulation exercise to identify illegal water users who do not comply with permit conditions, check on the operational status of water abstraction points and drainage

canals and close illegal water abstraction canals. He further said that, his office normally uses village executive officers in tracing and identifying new illegal water abstractions in their villages based on the Rufiji basin water user register as shown in Table 4.9. Those found to be illegal users are normally fined or taken to court to be prosecuted. The degradation of water sources threatens sustainability of the water resource with potential negative effect to ecosystem integrity, human health, food security, industrial production, and investment of various socio-economic sectors (URT, 2002). Therefore, abstraction of water in the upstream needs to be carefully monitored as there might be significant impact on water flows especially during the dry season.

Table 4.10: Water use permits of Little Ruaha River between Kalenga and Pawaga divisions

| S/N | Water use Permit Name | Source Name | Amount m ³ /d | Type of use |
|-----|---------------------------------------|--------------------|--------------------------|-------------|
| 1 | Tanzania Electric Supply Co (TANESCO) | Little Ruaha River | 342,558.72 | Hydropower |
| 2 | Pawaga Irrigation Committee | Little Ruaha River | 345,600.00 | Irrigation |
| 3 | Umoja wa Umwagiliaji Mangalali | Little Ruaha River | 18,835.20 | Irrigation |
| 4 | Umoja wa Umwagiliaji Luganga | Little Ruaha River | 51,840.00 | Irrigation |
| 5 | Umoja Wa Umwagiliaji Mafuruto | Little Ruaha River | 57,024.00 | Irrigation |
| 6 | Umoja wa Umwagiliaji Kibwe | Little Ruaha River | 207,360.00 | Irrigation |
| 7 | Umoja wa Umwagiliaji Kipera | Little Ruaha River | 7,948.80 | Irrigation |
| 8 | Cherehani Mkoga Irrigation Committee | Little Ruaha River | 172,800.00 | Irrigation |
| 9 | Abdul Adam Sapi | Little Ruaha River | 1,944.00 | Irrigation |
| 10 | Umoja Umwagiliaji Kiwere | Little Ruaha River | 8,812.80 | Irrigation |
| 11 | Umwagiliaji – Mkirima | Little Ruaha River | 51,840.00 | Irrigation |
| 12 | Kikundi cha Umwagiliaji Tupendane | Little Ruaha River | 1,728.00 | Irrigation |
| 13 | Umwagiliaji Kipera "B" | Little Ruaha River | 1,209.00 | Irrigation |
| 14 | Wakulima Ruaha Gardern Kidenge | Little Ruaha River | 984.96 | Irrigation |
| 15 | Matunda Group | Little Ruaha River | 2,419.20 | Irrigation |
| 16 | Jumuiya ya Watumia Maji Pawaga | Little Ruaha River | 2,200.00 | Domestic |

Source: RBWO, 2013

4.6 Constraints faced by LGAs in managing water resources

This section shows the constraints faced by LGAs in managing water resources. These include poor irrigation infrastructure, low community awareness on policies and laws related to water resources management, inadequate funding, population increase, climate change and overgrazing.

4.6.1 Irrigation infrastructure

Respondents were asked about the types of irrigation infrastructure available in the study area. Table 4.10 shows that 35 (35%) of the respondents were using traditional irrigation schemes and 57 (57%) of the respondents indicated that they were using improved irrigation schemes with intake while 8 (8%) of the respondents reported to be using modern irrigation scheme. These results suggest that most of the irrigation infrastructures in the study area had no proper water use structures except few schemes. Data from questionnaires were complemented by data from observation, it was observed that traditional abstractions do not have control gates leading to drawing water into the farms even when not necessary and most of the canals are not proportional to the irrigation water requirements. Most schemes visited like Mbolimboli, Kalenga, Mkoga- cherehani and Mlinge are not cleaned thus reduce conveyance efficiencies. The study also unveiled that there a lot of abstraction canals which could be replaced by one canal to command the same area. This could reduce losses considerably. Moreover, most of the schemes do not utilize all the land available for irrigation but yet the canals still abstract the same amount of water and although sometimes there is no crop in the field yet water is made to flow in the fields which eventually seeps underground or evaporates.

Table 4.11: Types of irrigation infrastructure

| Type of irrigation infrastructure | No of respondents | Percent |
|--|-------------------|---------|
| Traditional scheme | 35 | 35 |
| Improved scheme with intake | 57 | 57 |
| Modern scheme with intake and lined canals | 8 | 8 |
| Total | 100 | 100 |

Source: Field Data, 2013

Table 4.10 indicates that number of improved schemes with intake is greater than other types of irrigation infrastructure. Also, traditional irrigation infrastructure is higher than modern schemes. Generally, it can be said that there are efforts in improving the irrigation infrastructure in the areas visited during the study. As far as the status is concerned, Table 4.11 provides a clear illustration as follows:

Table 4.12: Status of irrigation schemes (Little Ruaha river)

| Scheme | Legal status | Infrastructure status | Irrigated area (Ha) | Amount of water graded(Lts/sec) |
|------------|--------------|-----------------------|---------------------|---------------------------------|
| Mafuruto | Authorised | Traditional | 120 | 360 |
| Kipera A | Authorised | Partial improved | 150 | 300 |
| Kipera B | Authorised | Traditional | 120 | 200 |
| Mangalali | Authorised | Partial improved | 187 | 210 |
| Kalenga | Authorised | Modern | 225 | 200 |
| Luganga | Authorised | Partial improved | 500 | 600 |
| Mlambalasi | Authorised | Partial improved | 120 | 200 |
| Kiwele | Authorised | Partial improved | 320 | 450 |
| Ipwasi | Authorised | Partial improved | 150 | 300 |
| Mkilima | Authorised | Partial improved | 1500 | 600 |
| Mlengi | Authorised | Partial improved | 3500 | 4000 |
| Mkomozi | Authorised | Traditional | 2000 | 360 |
| Mbolimboli | Authorised | Traditional | 2000 | 240 |

Source: Iringa District Council Irrigation Department (2013)

4.6.2 Water use efficiency

Respondents were asked about the existence of irrigation infrastructure with drainage system which helps return water to the main river after farm use. Table 4.12 shows that 57(57%) of the respondents reported that irrigation infrastructure in the research area had no drainage system while 43 (43%) of the respondents indicated irrigation infrastructure had drainage system. These results suggest that most of the irrigation schemes in the study area have no drainage system which allows water back to the main stream after farm use as found by Mwaruvanda (1996). Additionally the use of wood stakes, grass, stones and other materials are most common for the traditional furrows. Most traditional schemes do not have drainage systems and water from the farms find its own way into gullies and stream.

It was also observed that fields under irrigation were scattered over a large area. Consequently, water had to be conveyed to small fields which were far apart thereby

increasing conveyance losses, high seepage losses due to unlined canals and poor management of canals and lack of regular periodic cleaning which is crucial for optimum performance of irrigation scheme. Also, farm water use is poor in most of the irrigation schemes, for example, Mboliboli, Mlengi, Mukoga Chelehani and Kalenga, fields are not leveled and have no proper drainage system; water after farm use finds its own way to the main river. A camera was used to take photos of irrigation canals as shown in Figure 4.8. To contain the situation therefore, there is a need to expand research and introduce farming technologies that use less water for irrigation so as to minimize over abstraction and promote efficient and sustainable use of water in the sub-catchment. Proper management of water resources requires proper water use infrastructures (Lankford, 2007).

Table 4.13: Existence of drainage systems in irrigation schemes

| Existence of irrigation infrastructure with drainage system | No of respondents | Percent |
|---|-------------------|---------|
| Yes | 43 | 43 |
| No | 57 | 57 |
| Total | 100 | 100 |

Source: Field Data, 2013

Figure 4.8: Irrigation Canals



Modern irrigation canal (Mbuyuni)

Traditional irrigation canal (Itunundu)

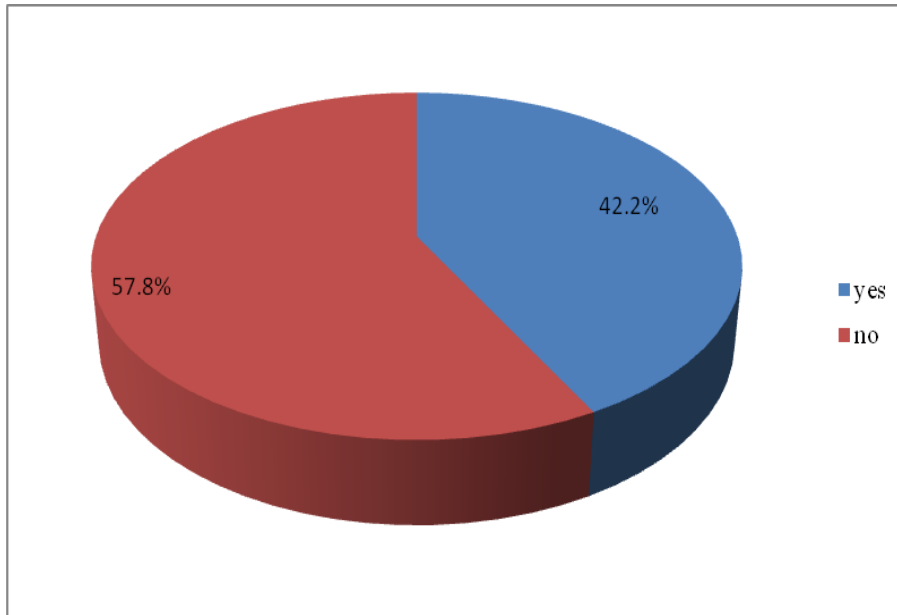
Source: Field Photo taken at Itunundu and Mbuyuni Villages

4.6.3 Community awareness on policies and laws related to water resources management

Respondents were asked about the awareness of the water resources management related laws. Figure 4.9 shows that 52 (57.8%) were not aware of the law that governs the management of water resources, while 38 (42.2%) of the respondents indicated they were aware. From these results it is clear that local communities in the research area were not aware of the laws and regulations which govern water resources management. Community awareness on policies and laws related to water resource management and utilization is very critical to the better management of water resources. Protection of water resources is often inadequate, not because of the lack of laws and regulation, but due to limited enforcement (IUCN, 2010). This was complimented by village government members during the focus group discussion at Kalenga village who said “*We have been cultivating near the river banks for many years and the river has never dried why should we stop, may be if the government will give us food to feed our families*” they said.

These results are consistent with those by Masanja (2008) who found that environmental degradation (soil erosion, reduction of water in sources, and depletion of soil fertility) is the result of people who lack natural resources conservation knowledge and skills as well as lack of suitable enforcement measures of natural resources conservation policies and legislation.

Figure 4.9: Awareness of the law which govern the water resources management



Source: Field Data, 2013

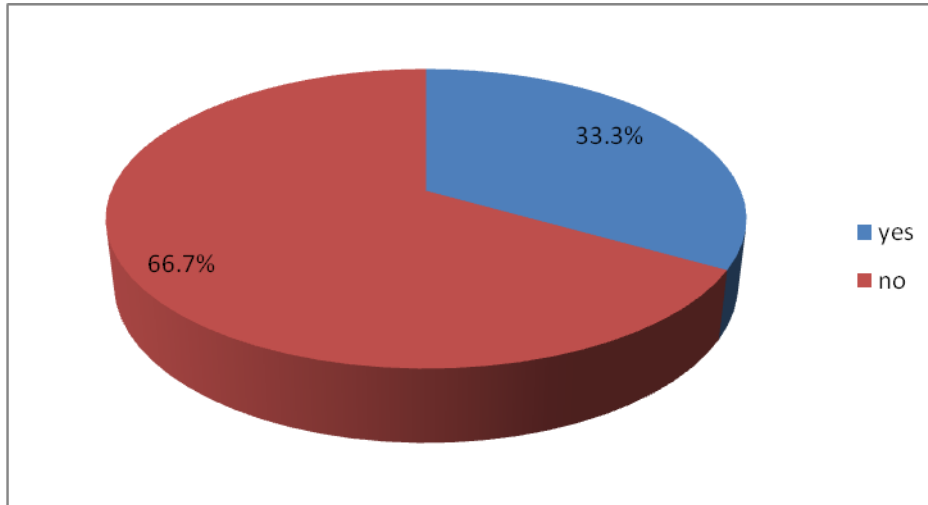
4.6.4 Inadequate fund allocation for water resources management

Key respondents were asked about the funding of water and environmental conservation activities. Figure 4.10 shows that majority of the respondents 4 (66.66%) reported that no funds were allocated for water resources management while 2 (33.34%) indicated that LGAs allocate funds for water resources management. These results suggest that LGAs do not allocate sufficient financial resources for water resources management. This includes funds for improvement of irrigation canals, demarcation of water sources, tree planting on water sources, public education on water sources protection and environmental conservation. Inadequate funds allocation makes LGAs unable to manage water resources effectively.

Adequate funding for water resources management is very vital for ensuring that there is proper water resources management (Mwaruvanda, 1996). When asked if the district allocates sufficient funds for water resources management activities, the Iringa district natural resources officer indicated that issues related to natural resources management including water resources are not given priority at the district level; they are even not reflected in the district development plan (DDP) therefore not budgeted. The officer said,

“it is a challenge as we normally depend on donor funded projects to take care of issues related to natural resources; even if it is put in the district budget normally money comes from donors of which we cannot depend on much” he said.

Figure 4.10: LGAs Fund allocation for water resources management



Source: Field Data, 2013

4.6.5 Population Increase

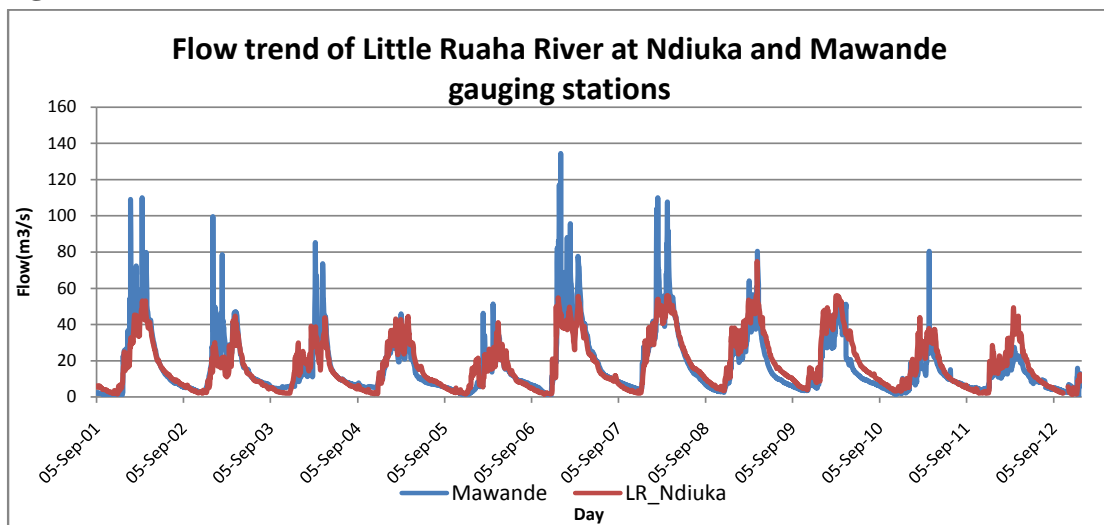
When asked about population increase in the area the Itunundu Ward Executive Officer (WEO) said there have been a big increase in number of people in the area over time, *“these people are those who were evicted from Ihefu wetland in Usangu, we do not allow them to come in but there are few unfaithful village leaders who normally allow them”* he said. Population increase leads to increased demand in land for cultivation and settlement which results in unsustainable agricultural practices and deforestation of catchment areas (Masanja, 2008). Population increase puts pressure on the available resources (Lankford, 2007). This is in line with the study by Kangalawe (2010) in Iringa and Mbeya Regions who found that population increase in rural areas had led to bottom valley cultivation practices ‘vinyungu’ which result in drying of water sources .

4.6.6 Climate change

Figure 4.11 shows Little Ruaha River flows trend for two stations: at Ndiuka (upsteam) and at Mawande (downstream) for the last ten years (2001-2012).The figure illustrates clearly that water resources have been decreasing steadily, in 2001 flow levels were high

compared to 2010. It could be argued that water use has been increasing substantially over time the situation which leads to reduced River flows. When asked on the flow of the Little Ruaha River the Itunundu ward Agricultural extension officer said that water in the river has been decreasing year after year “for the past five years you could not see the river bed easily but now everything is seen, in some parts the river is even dry” he said. This is in consistent with the study by Kangalawe (2010) who found that the increase in demand for water has not matched with the water resources which have been dwindling overtime as a result of climate change. Given this situation there is a need to increase the communities ability to undertake alternative livelihood activities such as beekeeping, business and poultry; expanding community education on environmental matters and climate change adaptation (beginning from the grass root levels) education that should be tailored to suit local conditions; empowering riparian communities to manage natural resources more sustainably (Kangalawe,2010).

Figure 4.11: Flow trend of little Ruaha River



Source: RBWO, 2013

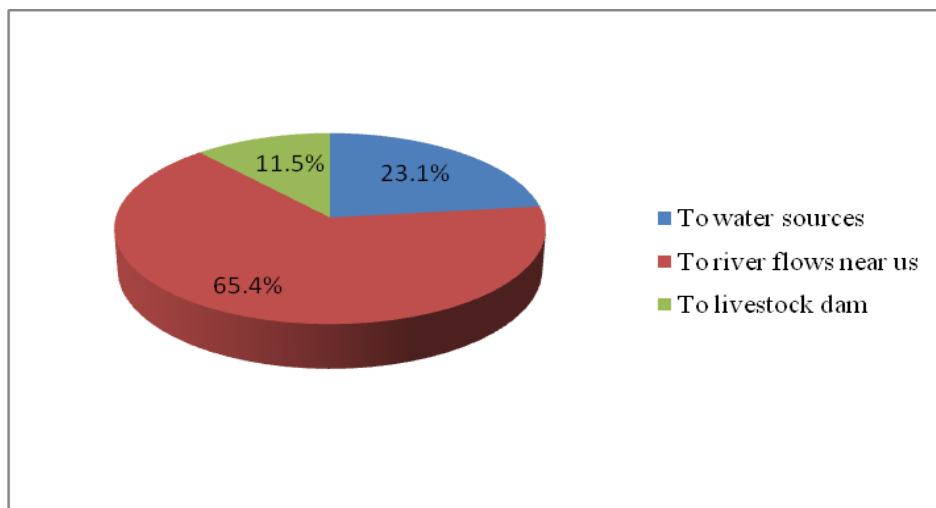
4.6.7 Livestock grazing and watering on Water sources

Respondents were asked on the impact of livestock on water resources. Figure 4.13 shows that 34 (65.4%) of the respondents indicated that livestock grazing and watering is mostly done on the river, 21 (23.1%) showed that livestock graze and get water in water

sources while 6 (11.5%) indicated that livestock get water in the constructed community livestock dam. These results suggest that livestock grazing and watering on water sources is common in the study area. These results are supported by Lloyd (2005) who found that degradation of water sources in the Great Ruaha River area was the result of livestock grazing on water sources and expansion of irrigation areas. It could be argued that uncontrolled grazing of livestock on water sources leads to degradation of water resources. When asked on the increase of livestock in the area Itunundu Ward livestock extension officer said, in the recent past, there has been a rapid increase of livestock in the area especially in Pawaga division due to immigration of pastoral ethnic communities namely Sukuma, Barbeig, Gogo and Masai, most of these are those who were evicted from the Usangu wetland (Ihefu).

Overgrazing can be observed mostly along cattle tracks towards water sources and around water points as shown in Figure 4.14.

Figure 4.13: Livestock grazing and watering



Source :Field, Data 2013

Figure 4.13 depicts that the impact of grazing and watering is greatest on rivers that flow near settlement areas which are also used for domestic consumption. It means most people get contaminated water from these rivers. The figure also indicates the impact on the livestock dams ranks last while other water sources rank the second.

Figure 4.14 Overgrazing on water sources



Herd of Cattle at Itunundu village

Source: Field photo, 2013

It can also be deduced from the photo, Figure 4.14, that livestock keeping entail people having large numbers of cattle which is typically traditional way of livestock rearing. Such a big number of livestock affects the land resources including posing stress on water resources. Water resources are exposed to over abstraction and pollution problems.

4.7 LGAs ability to influence the performance of IWRM

This section shows the identified areas in which LGAs can influence the performance of IWRM. These include allocation of sufficient funds for irrigation projects, enforcement of environmental by-laws, preparation of water resources management plans, preparation of land use plans and establishing of water resources management institutions.

4.7.1 LGAs Ability in influencing the performance

Respondents were asked about the LGAs ability to influence the performance of IWRM. Table 4.14 shows that 80 (80 %) of the respondents reported that LGAs are able to influence the performance of IWRM while 20 (20%) of the reported LGAs cannot

influence the performance of IWRM. These results suggest that LGAs are able to influence the performance as indicated by 80% of the respondents. Moreover, 20 (20%) of the respondents said LGAs are not able to influence the performance. It can be argued that those who responded negatively were influenced by the poor implementation of LGAs development activities. Local governments provide basic services that affect people in their areas of jurisdiction (URT, 1982).

When asked about the position of LGAs in water resources management, the Iringa district Land officer said *“all the water use plans are done at local level, everything done at local level have impact on water resources; therefore, it depends on how we use the water available, we can help proper management of water resources if we can have good water use plans and do the opposite if we don’t care”* he said. These results are consistent with those by Masanja (2008) who found that it is at local government level where various uses of water resources are found, for example agriculture, domestic use, fish farming and livestock use hence effective water resources management programme needs to consider water resource use plans at the local government level.

Table 4.14: LGAs ability to influence the performance of IWRM

| LGAs ability | No of respondents | Percentage |
|--------------|-------------------|------------|
| Yes | 80 | 80 |
| No | 20 | 20 |
| Total | 100 | 100 |

Source: Field Data, 2013

4.7.1.1 Allocation of sufficient funds for irrigation project

When asked about funds allocation for irrigation project, the Iringa district Irrigation engineer said that the district receives funds from the central government through the Agricultural Sector Development Programme [ASDP]. He further said that funds allocated for irrigation project were little compared to the projects planned to be implemented *“Due to insufficient funds we normally give priority to new irrigation projects”* he said. Furthermore, it was observed that most of the irrigation schemes in the study area had no proper infrastructures, for example some irrigation schemes have had intake without lined canals and drainage system. This is consistent with findings by

Lloyd (2005) who found that lack of proper irrigation infrastructure was a major constraint to better management of water resources. Having better irrigation infrastructures with lined canals and drainage systems reduces water losses due to seepage and increase water use efficiency as water is conveyed to the farms without any losses and thereafter use return to the main river through the drainage system for downstream uses including the ecosystem (Mwaruvanda, 1996).

It can be argued that allocation of sufficient funds for irrigation projects can improve water resources management as the result of having good water use infrastructures which reduce water losses and seepage.

4.7.1.2 Enforcement of environmental by laws

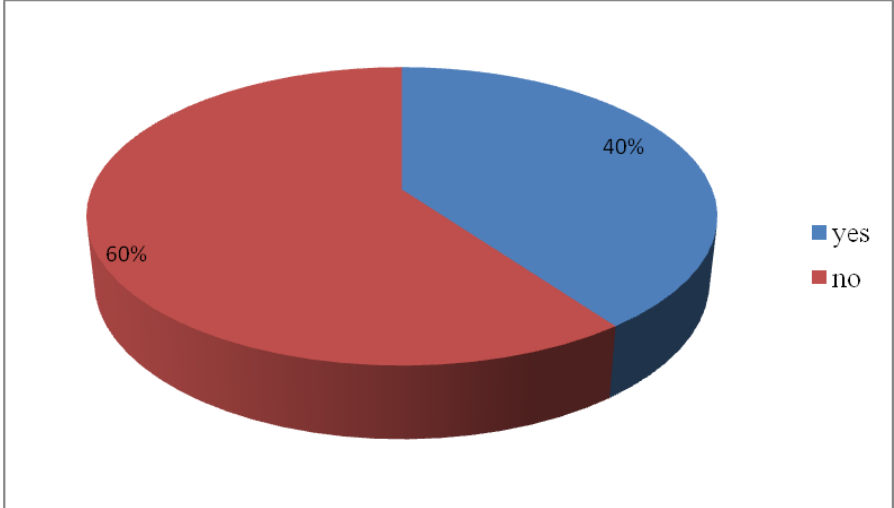
When asked about the ability of LGAs to enforce the environmental bylaws, the Iringa, district environmental Officer said the district has bylaws which prohibit human activities on water sources, for example people are not allowed to conduct any human activity within 100 meters from the river banks on both sides. He further said that, implementation of those bylaws was the duty of the village governments in their respective areas. Therefore, effective water resources management will depend on how local government authorities like district council, village governments, and ward councils are able to enforce water and environmental bylaws in their area of jurisdiction.

4.7.1.3 Preparation of water resources management plan

Key respondents were asked about the availability of Water resources management plan at the local government level. Figure 4.15 shows that 4 (40%) of the respondents indicated there was water resources management plan at the local government level while 6 (60%) of the respondents indicated that local government authorities had no water resources management plans. These results suggest that local government authorities have no water resources management plans. When the Iringa District irrigation engineer was asked about the existence of water resources management plan, he replied that there were no water resources management plans at the district level, he said *‘the plans we develop here are mainly for the use of the resource but not for management of the resource’*.

These results are consistent with those by Llyod (2005) who found that water resources management plan was a pre-requisite to implementation of integrated water resources management programmes, but in most river basins these plans have not been developed. Water resources management plans enable proper management of the resources as water demand is matched with the supply hence it becomes easier to take into consideration various future uses of water resources and creates a good climate for sustainable use of the resources (GWP, 2000). Therefore, having no water resources management plan in place especially at the local level promotes unsustainable use of the resources .This is because lack of water resources management plans at the local government level has negative impact on water resources as it becomes difficult for the water resource use at the local level to be integrated in the basin integrated water resources management plan and development [IWRMPD] which is the base for water allocation and management in the basin. Furthermore, having no water resources management plan at the local level means water is used without considering other users as well as future use hence creates a space for unsustainable use of the resource. In theory having a water resources management plan at the local level is the pre-requisite for the implementation of IWRMPD at the basin level (URT,2012a), therefore LGAs water resource plans has big influence on the implementation of IWRMP.

Figure 4.15 Existence of water resources management plan

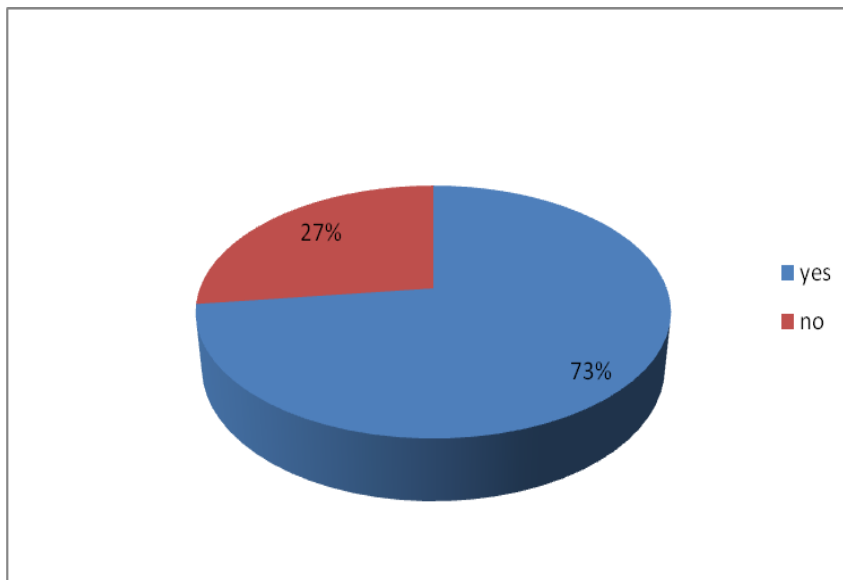


Source: Field Data, 2013

4.7.1.4 Preparation of land use Plans

Respondents were asked about the availability of land use plans. Figure 4.6 shows that 73(73%) respondents indicated that land use plans were available in the study area while 27(27%) said land use plans were no in place in the research area. These results suggest that land use plans are in place in the study area. Twenty seven (27%) of the respondents said that there were no land use plan in the study area. Low implementation of the plans could have affected those who replied negatively. Formulation of land use and management plans promotes better management of land and other natural resources including water (Kangalawe, 2010). Availability of land use plans at the village level therefore influences better management of water resources. Lack of land use plan causes land use conflicts and mismanagement of resources.

Figure 4.16: Existence of Land use Plans



Source:Field Data,2013

4.7.1.5 Establishing Water Resources Management Institutions

Respondents were asked whether they were aware of the existence of WUAs in the study area. Table 4.14 shows that the majority of the respondents 88 (88%) were aware of the presence of WUAs in the little Ruaha sub catchment while 12 (12%) of the respondents reported that they were not aware of the existence of such institutions like WUAs. These results indicate that there are water resources management institutions in the study area.

The findings show that there are water resources management institutions at the local level in the form of irrigators associations as Table 4.15 indicates. Their main functions are water allocation; maintaining irrigation infrastructures and resolving water use conflicts among irrigators of the same irrigation scheme or canal. Efficient water resources management at the grassroots level require social organizations such as water user association to ensure that all users are well informed and involved in these issues (Mwaruvanda, 1996). When asked about the existence of water resources management institution, the Iringa district irrigation engineer said that there are institutions in form of water user associations “*in fact the water user associations formed in this area play a big role in facilitating water allocation in the irrigation canals and resolving conflicts among members of the same scheme*” he said.

Table 4.15: Existence of water resources management institutions

| Existence | Number of Respondents | Percentage |
|-----------|-----------------------|------------|
| Yes | 88 | 88% |
| No | 12 | 12% |
| Total | 100 | 100 |

Source: Field Data, 2013

From Table 4.14 it can be deduced that a good number of water resources management institutions exist in the area that was visited during the study. This implies that it is easy for the local communities to be assisted in terms of adopting effective ways of using the water resources available. To substantiate this finding, Table 4.15 illustrates various water user associations that have been registered within the study area.

Table 4.16: Water user association (Irrigators associations)

| Name of WUA | Legal status |
|-------------------|--------------|
| Cherehani Mkoga | Registered |
| Kalenga | Registered |
| Mangalali | Registered |
| Luganga | Registered |
| Mkilima (Magozi) | Registered |
| Mlinge Pawaga | Registered |
| Mkombozi/Magereza | Registered |
| Mlambalasi | Registered |

Source: Iringa District Council (2013)

Table 4.15 depicts that there are eight registered water user associations in the study area. This means that with these associations water users can get guidance on how best the water resources can be used so as to yield good results not only in agriculture but also other uses. What is important is to ensure that the associations should be well coordinated and hence perform their role of helping water users effectively.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

5.1 Introduction

The study was about Participation of LGAs and the Performance of IWRM in Tanzania: A case study of Little Ruaha River Iringa District. It aimed to know if the participation of LGAs in IWRM given the Basin approach to water resources management has promoted effective water resources management. This chapter presents the summary, conclusion and Policy implications.

5.2 Summary

Water resources are finite and vulnerable resource which is under pressure and growing scarce as a result of increasing multisectoral demands, and hence requires effective and sustainable management .The objective of the study was to assess the participation of LGAs and the performance of integrated water resources management a case study of Little Ruaha River Iringa District.

Specific objectives of the study were; to explore the existing structures and processes used to establish IWRM at the local government level; to find out activities conducted by local government authorities in managing water resources in their areas of jurisdiction; to explore the cooperation between the local government authorities and the basin water authorities in managing the water resources; to identify constraints faced by local government authorities in managing water resources in their areas of jurisdiction and ; to find out the ability of local government authorities in influencing the performance of IWRM in their areas of jurisdiction.

Related literature review about participation of Local government Authorities and the performance of integrated water resources management in Tanzania was done .Both theoretical and empirical literature was reviewed. The theoretical review provided the definition of key terms and theories upon which the study was based. The empirical review included the perspectives on IWRM and what has been done by other researchers globally, regionally and locally in relation to the research topic. The study was based on

new institutional economic theory. It used cross-sectional design to achieve its objectives. Two (2) divisions bordering Little Ruaha River were involved in the study. The sample size of the study was 100 respondents. The sampling technique used in this study was purposive. Data collection techniques were questionnaires administration, in –depth interview, observation, Focus group discussion [FDG] and documentary review. Quantitative data were collected and analyzed by using statistical package for social sciences [SPSS].For categorical variables simple frequency analysis and cross tabulation were used. For qualitative data analysis content analysis was used. This included information gathered during focus group discussion and those collected from documentary materials. The findings were presented in tables, charts and figures to easy interpretations.

The study findings show that participation of LGAs in IWRM had been enhanced through water resources management institutions at the grassroots level in form of irrigators' associations, community owned water supply organizations and village environmental committees which are involved in water allocation, resolving water use conflicts and control of environmental degradation but their performance is low. Furthermore, the study found that most people are aware of the bylaws and penalties for degradation of water sources and other natural resources in general but they admit not following them as they impact negatively their livelihood and that they lack alternatives. Climatic change, poor harvest and falling prices of crops drive people during difficult periods to overexploitation of natural resources for survival.

Inadequate institutional capacity and manpower for monitoring environmental matters and the general absence of monitoring programmes at the local level promotes unsustainable use of water resources. However, weak governance and law enforcement mechanisms to ensure adherence to prevailing policies and water management related legislations aggravates competitions for water use and conflicts for water which is a finite resource. To improve water resources management at the Local government level strategies are suggested which include awareness creations, capacity building, encourage and promote sustainable use of water resources by protecting water sources, provision of water resources management and environmental education at the grassroots level

especially to village water and environmental committees, promoting alternative sources of energy and technologies(solar power), tree planting campaigns, increasing technical capacity by employing more extension officers at the ward and village level, allocating sufficient resources for construction and improving irrigation infrastructures and enforcement of water and environmental conservation bylaws developed by local government authorities.

5.3 Conclusions

Based on the research questions the following conclusions are made:

5.3.1 Existing structures and processes used to establish IWRM at the local government level

Findings from the study show that the structures used to establish IWRM at the local level include Water user association (WUAs), District Facilitation team (DFT), Sub – catchment committees. Further, the results from the study show that there are water resources management institution at the grassroots’ level in the form of irrigators’ associations, community owned water supply organizations (COWSOs) and village water and environmental committees. These institutions play a great role in water resources management through water use conflict resolution, water catchment conservation, distribution of water to local communities, conservation of water sources, management of irrigation canals and enforcement of water use and environmental conservation bylaws.

5.3.2 Activities conducted by local government authorities in managing water resources in their areas of jurisdiction

Findings from the study show that local government authorities are engaged in a number of activities aimed at conserving the environment and proper use of water and other natural resources in the sub catchment. These activities include formation of water user associations, formation of water and environment committees, formulation of environmental and water sources protection bylaws, preparation of land use plans, and provision of water resources management education. All these initiatives have been done but they are not being implemented effectively, the situation accelerates water resources degradation in the Little Ruaha sub –catchment.

5.3.3 Relationship between the local government authorities and the Basin water authorities in managing the water resources

The findings from the study show that there is a good relationship between LGAs and Basin water authorities which is built on areas of water use conflicts resolution, demarcation of water sources, provision of water use permits and enforcement of water resources management law and regulations. However, this relationship is limited to cross representation on specific administrative issues. Additionally, coordination between the two frameworks is usually limited to cross representation on specific administrative and management committees at different levels.

5.3.4 Constraints faced by local government authorities in managing water resources in their areas of jurisdiction

Findings of the study show that LGAs in the course of managing water resources in their areas are faced by a number of problems which hinder effective management of water resources in their areas of jurisdiction. These constraints include, poor irrigation infrastructure, low of community awareness on issues related to water resources management, inadequate funding, population increase, climate change, overgrazing and inadequate extension services.

5.3.5 Ability of local government authorities in influencing the performance of IWRM in their areas of jurisdiction

Findings from the study indicated that LGAs are able to influence the performance of IWRM in their areas of jurisdiction. LGAs can influence the implementation of IWRM, as water resources users basically fall under their jurisdiction administratively. Water projects like irrigation and water supply are done at that level. Furthermore, LGAs are law enforcers at that level; they can arrest and prosecute people who degrade the environment. Moreover, they are the formal channels for passing information to the water resources user at the grassroots level. It is at that level where the water resources use plans and programmes are initiated, therefore effective implementation and good performance of IWRM will depend very much on how LGAs are engaged. Being the

level where development plans are initiated LGAs are able to promote better use of water resources and the vice versa. Therefore, enhancing their participation in IWRM is very significant for sustainable management of water resources.

5.4 Policy Implications

Participation of local government authorities in managing water resources has been enhanced but there is a need of developing an effective mechanism for assessing their performance .Currently the basin water resources management and local government institutional frameworks are considered separate and parallel to each other with inadequate provisions for integration or synergy. Coordination between the two frameworks is usually limited to cross representation on specific administrative and management committees at different levels. Therefore there is a need of developing an effective water resources management framework that will define clearly the role and responsibilities of LGAs in the management of water resources given the fact that resources users fallow under their jurisdiction.

5.6 Areas for further research

This study is not an end in itself despite usefulness and the relevance of the findings. It calls for further studies in different areas concerning the participation of LGAs and the performance of IWRM. The areas for further research that emanate from this study include among others Effectiveness of Water user Associations (WUAs) in managing water resources and LGAs and gender mainstreaming in integrated water resources management.

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APPENDICES

APPENDIX I

Questionnaire for water user association leaders, farmer and village leaders

1 Sex of the respondent

- (a) Male (.....)
- (b) Female (.....)

2. Age of the respondent

- (a) Below 18 years (.....)
- (b) Between 18 and 45 years (.....)
- (c) Above 45 years (.....)

3. Education level of a respondent

- (a) Primary education (.....)
- (b) Secondary education (.....)
- (c) College (.....)

4. What is the main economic activity in this area?

- (a) Agriculture (.....)
- (b) Pastoralism (.....)
- (c) Other activities (.....)

If others mention some of them.....

5. If the main activity is agriculture, please indicate the location of your farm in the following category

- (a) Far away from the water sources (>1Km) (.....)
- (b) Near water sources (60m to 1Km) (.....)
- (c) Closely/around water sources (<60M) (.....)

6. What type of agriculture are you practicing?

- (a) Irrigation agriculture (.....)
- (b) Rain fed agriculture (.....)
- (c) Others

7. Where do you get water for irrigation?

- (a) Traditional wells (.....)
- (b) River (.....)

8. If is irrigation agriculture, what kind of method do you use?

- (a) Tradition method (.....)
- (b) Modern large scale (.....)
- (c) All of the above (.....)

9. Does your irrigation scheme have water right from the basin water office?

- (a) Yes (.....)
- (b) No (.....)

10. Do your irrigation scheme pay water use fee as required?

- (a) Yes (.....)
- (b) No (.....)

11. Do you practice livestock keeping?

- (a) Yes (.....)
- (b) No (.....)

12. What type of pastoralism do you practice?

- (a) Nomadic (.....)
- (b) Zero grazing (.....)

13. Where do you water your livestock?

- (a) To water sources (.....)
- (b) To river flows near us (.....)
- (c) Others mention.....

14. Do villages have land use plans in this area?

- (a) Yes (.....)
- (b) No (.....)

15. Do villages have water and environmental committee in the area?

- (a) Yes (.....)
- (c) No (.....)

16. Do village governments in the area have bylaws on environmental and water sources protection?

- (a) Yes (.....)
- (b) No (.....)

17. Do you have water users association in your area?

(a) Yes (.....)

(b) No (.....)

18. Do irrigation schemes in your area return water to the main river after use?

(a) Yes (.....)

(b) No (.....)

19 .What problems irrigation schemes face in this area?
.....

20. Are there water use conflicts in this area? Yes () No ().If yes among which group.....

21. Are local government authorities able to influence the performance of IWRM? Yes ()

No ()

If Yes explain how.....

22. Are you aware of the law which guild the water resources management?

(a) Yes (.....)

(b) No (.....)

APPENDIX II

Questionnaire for district officials dealing with water and environmental management

1. Sex of the respondent

- (a) Male (.....)
- (b) Female (.....)

2. Age of the respondent

- (a) Below 18 years (.....)
- (b) Between 18 and 45 years (.....)
- (c) Above 45 years (.....)

3. Education level of a respondent

- (a) Primary education (.....)
- (b) Secondary education (.....)
- (c) College (.....)

4. Does your office participate in integrated water resources management?

- (a) Yes (.....)
- (b) No (.....)

5. Water structure is used to involve your office in integrated water resources management?

- (a) District Facilitation team (.....)
- (b) Water Catchment committee (.....)
- (c) Water user Association (.....)

6. Does your office have water resources use plans?

- (a) Yes (.....)
- (b) No (.....)

7. Does your office provide education on proper water resources use before establishing irrigation scheme?

(a)Yes (.....)

(b)No (.....)

8. Have your district developed bylaws to protect water sources and the environment?

- (a) Yes (.....)
- (b) No (.....)

9. Does your district council allocate financial resources for managing water resources in the area?

- (a) Yes (.....)
- (b) No (.....)

10. What challenges does your office face in managing water resources in this area?
Please mention

1).....2).....3).....

11. Does your office cooperate with the basin water office in managing water resources in the area?

- (a) Yes (.....)
- (b) No (.....)

12. Do you seek water right from the basin water office before implementing any water project?

- (a)Yes (.....)
- (b)No (.....)

13. Do irrigation schemes in the area has proper water use infrastructures like intake and lined canals?

- (a) Yes (.....)
- (b) No (.....)

14. Do irrigation schemes in the area return water to the main river after use?

- (a) Yes (.....)
- (b) No (.....)

15. Are there any water user associations like irrigators, community owned water supply (COWSOs) organization in your area?

(a) Yes (.....)

(b) No (.....)

16. Are there any water related conflicts in your area?

(a) Yes (.....)

(b) No (.....)

17. What activities does your office do in order to protect and conserve water sources?

Please mention

1).....2).....3).....

18. Does local government authorities development planning likely to influence the performance of integrated water resources management? Yes () NO (). If yes explain how.....

Questionnaire for Rufiji Basin Water Board Officials

1. Sex of the respondent

(a)Male (.....)

(b)Female (.....)

2. Age of the respondent

(a)Below 18 years (.....)

(b) Between 18 and 45 years (.....)

(c)Above 45 years (.....)

3. Education level of a respondent

(a)Primary education (.....)

(b)Secondary secondary (.....)

(c) College (.....)

4. What structures do you use to involve Local government authorities in management of water resources in the basin?

5. How do you involve Local government authorities in the management of water resources? Please explain

6. What problems do you face in involving local government authorities in the management of water resources in the basin? Please mention

1.2.....

3.....4.....

7. Do local government authorities always seek water rights before implementing water project?

(a)Yes (.....)

(b) No (.....)

8. Do you think Local government authorities are participating effectively in integrated water resources management in their area?

(a)Yes (.....)

(b) No (.....)

If NO why? Explain please.....

9. Do water users use water as per their water use permits?

(a) Yes (.....)

(b) No (.....)

10. Do water users in your basin use water efficiently?

(a) Yes (.....)

(b) No (.....)

11. Does basin water office inspect water use infrastructures before issuing water use permit?

(a) Yes (.....)

(b) No (.....)

13. Does the basin water office issue water use permit within reasonable time?

(a) Yes (.....)

(b) No (.....)

14. Does the basin water office have a water resources management plans?

(a) Yes (.....)

(b) No (.....)

15. Are local government authorities able to influence the performance of IWRM?

(a) Yes (.....)

(b) No (.....)

If Yes explain how

Thank you very much for your cooperation

Focus Group Discussions- Guide

1. Do you have water resources management institutions in your area?
.....
2. What are their functions and roles in managing water resources?
.....
4. Do you have experienced water use conflicts in your area?
.....
5. What type of water use conflicts do you experiences in your area?
.....
6. What are the institutions involved in managing water resources conflicts?
.....
7. How do you see the flow of water in the river?
.....
8. Do you experience any environmental challenge in your areas a result of population increase?
9. Do you think LGAs can influence the performance of IWRM?
.....
10. Do you think agriculture has helped you better in your life?
.....

Thank you for your cooperation

Key informants interview guide –District Officials

- 1 Does your district participate in IWRM?
2. Do you have any water resources management institutions in Pawaga and Kalenga division?
3. What process is used to establish those institutions?
4. What are the water resources management activities conducted by your district?.....
5. What challenges do you face in conducting those activities?.....
6. Does your Office allocate sufficient fund for water resources management activities?
7. Have your district prepared land use plans for the villages in Pawaga and Kalenga divisions?
8. What challenges to you normally face in managing water resources in your district?.....
9. Is there any relationship between the district and the Basin water Office?.....
10. Do you think LGAs are able to influence the performance of IWRM?.....

Thank you very much for your cooperation

Key informants interview guide –Rufiji Basin water Office Officials

1. What Process is use to engage LGAs in IWRM?
2. Do you think LGAs are participating effectively in IWRM?.....
3. What process is used to establish water user association at the LGAs level?
4. What are the procedures used to issue water use permit?.....
5. Do Basin water office has water resources management plans?.....
6. What constraints do you think hinder LGAs from participating effectively in IWRM?.....
7. Do you think LGAs are able to influence the performance of IWRM?.....

Thank you very much for your cooperation

Observation schedule

- Agricultural practices on water sources
 - i.Type of agriculture,
 - ii.Irrigation infrastructures,
 - iii.Types of crops grown
 - River flow status
 - i.River water level
 - ii.River water flows

- Environment status of the river
 - i.Trees along the river

- Other socio-economic activities along the river
 - i.Washing
 - ii.Livestock keeping
 - iii.Fishing

- Water resources degradation activities
 - i.Deforestation
 - ii.Overgrazing
 - iii.Cultivation near water sources