WATER GOVERNANCE AND PATTERNS OF WATER USE TO SUPPORT LIVELIHOODS IN THE LOWER KAFUE RIVER BASIN, ZAMBIA

Thesis

Submitted by

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DECLARATION

I do hereby declare that this dissertation is my own work and effort and that it has not been submitted anywhere for any other award. Due acknowledgments have been done where other sources of information have been used.

Signature.....

Date .....

CERTIFICATE OF APPROVAL

We do hereby declare that this thesis is from the student's own work and effort and all other sources of information used have been acknowledged. This thesis has been submitted with our approval.

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LIST OF ABREVIATIONS

CC	Catchment Council
CBO	Community Based Organizations
COWI	Consultancy Within Engineering, Environmental Science and Economics
CSO	Central Statistical Office
DMMU	Disaster Mitigation and Management Unit
DWA	Department of Water Affairs
ECZ	Environmental Council of Zambia
FAO	Food and Agriculture Organization of the United Nations
FNDP	Fifth National Development Plan
GDP	Gross Domestic Product
GRZ	Government of the Republic of Zambia
GWP	Global Water Partnership
IWRM	Integrated Water Resource Management
ITT	Itezhi-Tezhi
MDGs	Millennium Development Goals
MAL	Ministry of Agriculture and Livestock
MACO	Ministry of Agriculture and Cooperatives
MCT	Ministry of Communications and Transportation
MDGs	Millennium Development Goals
MEWD	Ministry of Energy Water and Development
MoF	Ministry of Finance
MLNREP	Ministry of Lands, Natural Resources and Environmental Protection
MTENR	Ministry of Tourism, Environment and Natural Resources
NGO	Non-Governmental Organization
NWASCO	National Water Supply and Sanitation Council
SAG	Sector Advisory Group
SCC	Sub-Catchment Council
SNDP	Sixth National Development Plan
SIWI	Stockholm International Water Institute
TAC	Technical Advisory Committee
WE	Water Efficiency
WGF	Water Governance Facility
WRAP	Water Resources Action Program
WSPS	Water Sector Program Support
WSS	Water Supply and Sanitation
WUAs	Water User Associations
WWF	World Wide Fund for nature
ZAWA	Zambia Wildlife Authority
ZEMA	Zambia Environmental Management Agency
ZESCO	Zambian Electricity Supply Company
ZMD	Zambia Meteorological Department
ZMW	Zambian Kwacha

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ABSTRACT

Water is the primary source of life and livelihoods. The survival of both rural and urban communities depends on water use for agriculture, fishing, livestock, domestic consumption and energy production. To enhance accessibility to the life supporting commodity for all, the water governance system in Zambia has undergone several reforms. The reforms were meant to foster decentralization by devolution of powers to grassroots water institutions and increase participation of rural households in water resource use decision-making process. The main objectives of this study were to determine the level of awareness and participation of rural households in water governance; to document the rural households' pattern of consumptive and productive use of water for supporting livelihoods; to document some of the constraints and conflicts related to water use in the lower Kafue River Basin. A review of policy documents and other literature; key informant interviews and a household survey were conducted to collect and analyze data for the study.

The study results show that smallholder farmers are key actors in rural water use, particularly water use for agriculture, domestic consumption and fishing. They can significantly influence water use decisions at grass root level. However, the majority of rural households (90%) were not aware of the new water institutions introduced by the Water Management Act of 2011 and the knowledge of their functions was scanty. Moreover, there was limited community participation in water governance. About 97% of the respondents expressed ignorance about community participation in water use decision-making processes at grassroots level

The study results further show that, despite the intrinsic value of water, its use by rural households is mired in several constraints. About half of the respondents have access to water resources, but clean and safe water is accessible to only about 19 percent. Irrigated agriculture accounts for 35 percent of respondents using water mainly for subsistence crops such as vegetables and tomato. On the other hand, water use for fishing is limited to natural water bodies which suffer constraints of overfishing owing to use of illegal fishing methods and non-compliance to fishing regulations.

The policy implications of these findings are that formulation of new water policy and regulatory frameworks in Zambia is necessary, but the implementation of such policies at end-user level is the most critical in improving accessibility to water resources and improving the livelihoods of rural households. It is of utmost importance that government should make efforts to ensure increased awareness about water sector policy reforms and enhance community participation in water governance institutions in order to effectively implement decentralization policies in the water sector.

CHAPTER 1
INTRODUCTION

1.1 Background

Landlocked Zambia is one of the few African countries endowed with many water bodies such as rivers, lakes, and wetland plains. It hosts the Zambezi which is also the largest river in the country. Others rivers include: the Kafue, Luangwa and Luapula. Among the basins in Sub-Sahara Africa, the Zambezi Basin, shared by Angola, Botswana, Malawi, Mozambique, Namibia, Tanzania, Zambia, and Zimbabwe, has in the recent past captured interest of many scholars both at local and international levels. Originating from North-western Zambia, the Zambezi River Basin covers approximately 3,000 kilometers to where it empties into the Indian Ocean, en route providing a drainage basin of about 1,400,000 km^2 (Pinay, 1988). The major uses of the basin waters are hydro-electric power generation, crop irrigation, fisheries and recreation (Rodger *et al.*, 1998).

The Kafue River is a tributary of the Zambezi River and covers an area of about 155,000 km^2 representing 21% of Zambia's surface and about a quarter of the Zambezi catchment (Burke, 1994). The Kafue River Basin is of great economic importance to Zambia as it flows through major cities and hosts about half of the Zambian population, with a 65% urban and 35% rural proportion (FAO, 2001). The capital city, Lusaka, lies in the South with many urban centers while, the Copperbelt, which is a mining and industrial area, lies in the North. All these cities are located in the Kafue River basin and rely heavily upon the surface and groundwater resources of the Kafue River Basin. Moreover, owing to its geographical location, the Kafue River Basin is a source of hydro-power and water supply to over 40% of the Zambian population living along the river basin (GRZ, 2008).

The irrigation potential of Zambia is estimated at 523,000 hectares, of which 202,000 hectares lie in the Kafue River Basin. However, approximately 35,000 hectares are actually utilized by commercial agricultural enterprises (sugar estates) and small-

holder irrigation (FAO, 1997). Traditional agricultural crops such as cassava, maize and groundnuts are mainly limited to the highlands. Conflicts over tenure and water access rights the Kafue River basin have been occurring due to the fact the basin supports dense fisheries activities, rich natural resources and wild life, and a large human population (Mweemba *et al.,* 2007; WWF, 2005).

Currently, Zambia faces the challenge of limited economic diversity and continues to heavily depend on mining, especially copper accounting for about 80 percent of Zambia's exports (CSO, 2012). In the past decade, the buoyant global demand for metals led to unprecedented economic growth which averaged 5 percent. However, the narrow economic diversity exposes the country to adverse external shocks, as was the case during the recent financial crises of 2008. Therefore, diversifying the sources of economic growth ranks high on national priorities and it is envisaged that economic diversification will broaden the benefits of economic growth to a larger segment of communities (GRZ, 2011).

In this context, water resources when harnessed in an efficient, optimal and pro-poor manner, provide a viable source for economic diversification in Zambia and can serve to improve rural livelihoods among the poor communities that are located within the proximity of water resources. However, this goal can only be achieved if water resource regulation, management and governance address the barriers that prevent the poor from deriving maximum benefits from water resource endowments. The rural households are faced with limited or lack of access and tenure to water resources, degradation of water resources due to industrial effluent pollution, tragedy of the commons and increasing human population (USAID, 2008; ECZ, 2001; and Chileshe, 2005).

1.2 Statement of the Problem

Water as a natural resource plays a critical role in rural livelihood improvement and economic development in Zambia. However, despite Zambia having abundant water

resources, the resource is not readily accessible to support rural livelihood activities such as irrigated agriculture, fishing, and domestic water supply. According to recent studies which centered on the availability of water for commercial agriculture and hydropower production, the Kafue River Basin is soon approaching a state of economic water scarcity (World Bank, 2009; Scott-Wilson Pièsold, 2003; and COWI, 2009). This is further exacerbated by the increasing demand for water use to support a growing population and economic growth in key sectors such as agriculture, industries, hydropower generation and human consumption. Recent studies on governance of water resources suggest that lack of good governance has been negatively affecting livelihoods and other benefits that might be derived from optimal water use (Sievers, 2006; Chabwela & Haller, 2008; and Salian, 2009).

The water sector in Zambia was operating based on various ad-hoc sub-sector water policies that provided guidelines for development and management of water resources which were characterized by a diffuse institutional framework before the first National Water Policy was enacted in 1994. Zambia, like many other Sub-Sahara African countries, has relentlessly continued attempting to improve water resource management through formal policies, legislation and institutions with the intent to improve the livelihoods of end users (Mehari *et al.*, 2008).

The Government of the Republic of Zambia is cognizant of the inefficiencies of sectoral water management to meet the rural domestic water consumption demand for both basic and productive needs. Against this background, the government has been implementing various water reform initiatives aimed at improving the management and accessibility to water resources. Recently, the country adopted the Integrated Water Resource Management (IWRM) approach under the support of the Water Resources Action Program (WRAP) in 2006. IWRM is a holistic approach to water use, management and governance that aims at generating efficiency in water resource use, achieving equity in the allocation of water across different social and economic groupings and ensuring environmental sustainability that protects the water resource base and associated eco-systems (GRZ, 2004a).

In line with government's commitment to good governance, the 1994 water policy was revised in 2010. The major focus of the revised water policy is decentralization and stakeholder participation in water resource management through establishment of locally based institutions such as Catchment Councils, Sub-catchment Councils and Water User Associations (Water Act, 2011). At national level the formal legislation and water policies seem to be well articulated and understood. Invariably these policy changes or interventions are expected to have a positive impact on rural livelihoods through improved accessibility and utilization of water resources.

Furthermore, recent studies done on water governance in Zambia have concentrated their analyses at national level and the role of women in water resource management (Casarotto and Kappel, 2012; Uhlendahl *et al*., 2011; Salian, 2009). However, there is a limited number or dearth of studies done on water governance and livelihoods in Zambia that focus on the household or community level. Very few studies in Zambia, if any, have been conducted to assess the performance of the newly decentralized water institutions at household or community level. There is limited knowledge or information on the level of households' awareness of the decentralized water institutions that have been promulgated to manage local water resources. Information on the level participation by local communities in the decentralized water institutions for planning and management is equally scanty or non-existent. Hence, there is a great need to fill this information gap in order to comprehensively document how rural communities are utilizing water resources for their livelihoods as well as their level of knowledge and participation in water governance institutions in Zambia's Kafue Basin.

1.3 Study Objectives

The main purpose of the study was to explore the macro and micro-level operational framework of water governance and livelihoods in Zambia's lower Kafue River Basin. The specific objectives were:

1. To document the changes in water policies and institutional frameworks that regulate water use in Zambia.
2. To determine the level of awareness and participation of rural households in water governance in the lower Kafue River Basin.
3. To document the rural households' pattern of consumptive and productive use of water for supporting livelihoods in the lower Kafue River Basin.
4. To document some of the constraints and conflicts related to water use in the lower Kafue River Basin

1.3.1 Key Research Questions

In view of the above background and research objectives, the study was guided by the following questions:

i. *What policies and institutional frameworks or governance institutions guide or regulate water resource use in Zambia?*

ii. *What is the level of household awareness and participation in water governance institutions in the lower Kafue River Basin?*

iii. *What is the household pattern of consumptive and productive use of water in supporting livelihoods in the lower Kafue River Basin*?

iv. *What are some of the existing constraints or conflicts regarding water use in the lower Kafue River Basin?*

1.4 Significance of the Study

As noted earlier, there is an increase in demand for water resources in the Kafue River Basin. This is due to an increase in demand for competing uses such as urban water supply, rural water supply, irrigation, energy production and industries (Funder *et al.*, 2010). Faced with such competing demands for water, the Kafue River is soon approaching a state of economic water scarcity (COWI, 2009). Against this background, there is a need to have a comprehensive understanding of aspects of

water governance and the patterns of water use for supporting rural livelihood in the Kafue River Basin.

The results of this study will thus provide current and valuable information that will assess the country's water resource management and governance in general and the Kafue River Basin in particular. This research study is important in that it will provide comprehensive information that could help address the challenges or constraints faced by the water sector in Zambia in terms of managing scarce resource in light of increased competition and conflicts in the utilization of water. This research study will also provide comprehensive information in aspects of water use for supporting rural livelihoods at household or community level. The information generated from this study will also be helpful in the formulation of recommendations or strategies for improving the water governance and overall performance of the water sector.

1.5 Organization of the Thesis

This section outlines the layout of the study on water governance and patterns of water use for supporting rural livelihoods in the lower Kafue River Basin. The dissertation is organized into 6 chapters as follows:

Chapter 1 is the introductory part of the study. It presents the brief background information of the water sector in Zambia. It also presents the statement of the problem for the study. Other sections included in this Chapter are the study objectives, the key research questions and study significance. The Chapter then ends with an outline of the organization of the thesis.

Chapter 2 presents a review of literature on water governance and water use for supporting livelihoods. It provides definitions for subject matters like water governance and Integrated Water Resource Management (IWRM). This chapter also presents the conceptual framework used for this study.

Chapter 3 presents the methods and procedures followed in the study. It begins with the descriptive summary of the study area in terms of their geographical location, climate, population size, and historical background of the area, habitants and the major economic activities taking place in the study area. This is followed by an elaboration of the research approach, the data collection methods and analysis utilized.

Chapter 4 is the first analytical chapter which presents the results and discussions on water governance. It begins with the macro-level analysis providing an overview of the water sector reforms and the governance or institutional and legal framework in Zambia. It also highlights the characteristics of the decentralization process in the water sector; basin-level institutional arrangements and the relationship between Central and Basin-level water institutions. The chapter then also presents the micro-level analyses based on the study findings from the household survey which highlights aspects or issues of household awareness of water institutions and participation in water use decision-making; presence and effectiveness of the new water institutions at basin-level; and the institutional support to resolve water related problems.

Chapter 5 presents the survey results and discussions on water use to support rural livelihoods. The first section presents the social-economic characteristics and sources of rural livelihoods. It provides a descriptive analysis of the sampled households as well as presents the characterization of domestic and productive water uses to support rural livelihoods. The chapter ends by highlighting the constraints faced by water users in pursuit of rural livelihoods.

Chapter 6 presents a summary of findings and implications, policy conclusions and policy recommendations drawn from the study on livelihoods and water governance in the lower Kafue river basin.

CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

This chapter reviews literature on and water governance and water use to support livelihoods. The chapter present definitions of the concepts of Integrated Water Resource Management (IWRM) and Water Governance as well as highlight the importance of water resources in supporting livelihoods and poverty reduction. The chapter also discusses and summarizes past studies on water resource governance, management and water use in supporting rural livelihoods. The chapter ends with a presentation of the conceptual framework guiding the study.

2.2 Integrated Water Resource Management

Integrated Water Resource Management (IWRM) is a familiar terminology to many scholars in the world today. It has gained acceptance at international level, as the most appropriate, holistic and conservative way of managing the scarce water resource, with many, but competing users (Huppert, 2007).

Several studies have been conducted in water resource management especially upon the realization that sector-specific management of natural resources have failed to perform leading to degradation of natural resources, necessitating a paradigm shift towards IWRM (Duda and El-Ashry, 2000). IWRM encompasses multiple areas ranging from economic, environmental, technical, social-cultures and ensures the sustainability of water resources for future generations. According to the Global Water Partnership (GWP), IWRM is defined as "a process that promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems" (GWP-TAC, 2000).

Similarly, the World Bank defined IWRM as "the adoption of a comprehensive policy framework and the treatment of water as an economic good, combined with decentralized management and delivery structures, greater reliance on pricing, and full participation of stakeholders" (World Bank, 1993). However, according to Jonch-Clausen and Fugl, (2001) the core concept of IWRM is to promote co-ordinations and integration of multiple sectors, disciplines and stakeholders to achieve a holistic cross-sectoral water management.

Mulwafu and Msosa (2005) conducted a study that examined ex-ante the effect of IWRM on poverty reduction in Malawi. Importantly, this study showed that although Malawi had swiftly endorsed the MDGs and clearly reflected its principles in the National Water Policy (2004) and Poverty Reduction Strategy Paper (2002), a combination of human and financial resource constraints negatively affected the successful implementation of these policies and strategies. They also note that the adopted strategies did not articulate water as a medium of livelihood improvement and poverty alleviation in a holistic manner. Others concluded that even though wetland cultivation, is important for improving people's livelihoods in Malawi, its sustainability is threatened by various activities in the ecosystem. Thus, wetland sustainability is dependent on the collaboration among various end-users, as well as wetland related policies and laws. These policies and laws should be sensitive to the social and power relations existing in wetlands; otherwise some stakeholders like the chiefs allocate more wetlands to themselves at the expense of the others leading to wetland allocation conflicts (Wallace *et al.*, 2003 and Kambewa, 2005). Mulwafu and Msosa (2005) further provide evidence that policy reforms (new water policies and legislation) undertaken in the 1990, in Malawi did not result in increased access to water rights by the poor and other marginalized groups, despite the over-arching goal of the policy change being increased participation of the poor people and to widen their access to water rights.

Nyambod and Nazmul (2010) support the adoption of IWRM as a guiding principle to water reforms and management for human development based on its perceived

benefits to the environment, agriculture and water supply and sanitation. They reached this conclusion based on narrative evaluation of IWRM policy in Bangladesh and Cameron. However, El-Sharkawy cited in Koppen, Giordano, and Butterworth (2007) argues that IWRM is inappropriate because it does not consider the centuries-old 'customary water management practices' that are still in place in most developing countries. To address the problem, he proposed the adoption of Community-based Water Laws and Water Resource Management Reforms that are based on more refined roles of the state and public institutions in dealing with water management. His general conclusion was that community-based water laws in Latin America, Sub-Saharan Africa, and Asia are a precious social capital with many strengths such as the fact that robust resource use is adapted to the locality; rules are dynamic and responsive to new opportunities and communities also proactively address upcoming problems at both local and larger scales; they are livelihood oriented although hierarchical; they have nested structures for conflict resolution through rules that match notions of fairness and the physical characteristics of water resources.

The global picture of the current water crisis is that, it is not a technical challenge per se, but a result of poor governance systems and usually associated with problems of operations and management of institutions in the water sector, (Keen, 2003). GWP acknowledges these challenges and concludes that IWRM is a political process where conflicts arising from conflicting interests should be resolved (GWP-TAC, 2003). Therefore, successful implementation of IWRM plans requires effective governance strategies (Koudstaal et al., 1992 cited in Savenije and Van der Zaag, 2000; Salian, 2009). This implies that the key to successful implementation of IWRM is the establishment of suitable policies and laws, viable political institutions, self-governing and autonomous local systems coupled with a wide range of institutional arrangements supporting such systems (Grigg, 1999, Wallace *et al.*, 2003).

2.3 Water Governance

In the recent past, there has been a paradigm shift from "water management" alluded to in IWRM to "water governance". While, the former embraces both the process-related and institution-related functions such as planning, controlling, organizing and leading, the latter refers to a particular group of individuals "the management" with decision making authority and can issue orders to subordinates (Huppert, 2007). It is imperative to understand the true meaning of these two expressions to avoid the possibility of the obvious misunderstandings that could ensue. Integrated Management implied in IWRM is usually interpreted as an overarching umbrella organization with overall decision making power over multiple sector organizations. However, this must not be viewed as the only option; the other option is that sector organizations continue playing their key roles in their respective organizations. Therefore, what IWRM does is to organize and coordinate the different stakeholders for a common mutual goal that iron out conflicting interests of all actors. Mechanisms such as these which resolve conflicting interests of different stakeholders or actors and align them with a common goal for mutual benefit are best described by the term "governance". According to Huppert (2007), "Water Governance", in adaptation of the governance definition put forward by Williamson (1996), may be defined as "the means by which order is accomplished in the relation between the different stakeholders in the water sector in order to avoid potential conflicts and realize mutual gains in the context of IWRM".

Water use decisions are usually based on governance systems across different stakeholders. Therefore, promoting sound and dynamic interactions among these stakeholders is cardinal for improving water governance reforms and water policy implementation. According to the Global Water Partnership (GWP), water governance is defined as "the range of political, social, economic and administrative systems that are in place to develop and manage water resources, and the delivery of water services, at different levels of society" (Rogers and Hall, 2003). However, the Stockholm International Water Institute (SIWI) simplified the definition of water

governance as what "determines who gets what water, when and how" (Tropp, 2005).

In the Zambian context, external aid has facilitated the restructuring of institutions governing the water resources. This has seen the establishment of the National Water Policy for Zambia, the Water Resources Action Programme (WRAP), the Water Sector Programme Support (WSPS), and the Integrated Water Resources Management (IWRM) and Water Efficiency (WE) plan (GRZ, 2008). Nevertheless, little interest is given to studies of water use and governance in Zambia, as seen from the analysis of the water governance system and institutional set up conducted by Scott-Wilson Pièsold (2003) in the broader context of an Environmental Impact Assessment Study for the Kafue River Basin. This is in addition to GRZ (2000) which provided a brief review of the institutional framework that concerns water management and legislation, but was silent or paid no particular attention to water policies and governance issues.

According to a study on modes of water resources appropriation in Zambia, Chileshe (2005) showed the analysis of social-political processes focusing on institutions and how they operated by incorporating all water users especially the poor and vulnerable. The study endeavored to highlight mechanisms that generate gaps between legislative and *de facto* management of water resources, but it was exclusively biased to legal aspects of water management, omitting the policy framework.

In a related study, Chileshe *et al.,* (2005) identified the localized conflicts among water users resulting from allocation of water resources through issuance of formal water rights. They also showed that the current national water policy, legal and institutional frameworks are biased towards the urban water sector and provide water rights to affluent Zambian communities, while neglecting the local communities. Water is viewed or perceived in terms of survival and a basic human right by local

communities, while at national and legislative level, it is viewed or perceived in terms its' economic potential that has to be maximized.

A study on competition for water, cooperation and conflict in Namwala District, Zambia, by Funder *et al.* (2010) identified the different levels of conflicts resulting from water resource use. The study concentrated on identifying competing water resource users and conflicts associated with it and overlooked the role of legal, legislative and policy frameworks in such conflicts.

In order to have an understanding of the challenges facing the Kafue River Basin, several studies have been conducted. Recently, a study done in Zambia on good water governance and Integrated Water Resource Management (IWRM) by Uhlendahl, *et al.,* (2011) argued that even if decentralization and stakeholder participation are key to efficient operation of the water sector in Zambia, their successful implementation is impeded by lack of adequate human resources to support such decentralized institutions. The authors further argued that central institutions are reluctant to relinquish some of their powers and authority to the decentralized structures. Similarly, Scott-Wilson Piésold (2003) points out that lack of transparency and equitable allocation of water resources are some of the challenges facing water governance in Kafue River Basin.

Other studies were skewed towards legal aspects of water rights allocation and the conflicts arising from contradictory interests in water resource use among stakeholders (Mamdani, 1996; Simbalawi, 2007). Studies that are sectoral in nature have also been done. However, they focus on the detailed operation of a single institution without regarding the interconnections, eventual duplication of tasks and overlaps amongst various institutions (Cardno Agrisystem, 2009). More recently, Salian (2009) presents an attempt to highlight the gaps in the existing water governance regime in the Kafue River Basin and the factors that cause these gaps**.** However, he exclusively concentrated on a macro-level analysis leaving out micro-

level analysis of end-users of water resources. No study targeting rural livelihoods and governance at grassroots level has been done in Zambia.

Water use to support rural livelihoods largely depends on availability and its availability hinges on how efficiently institutions mandated to provide the services are governed. Governance includes the ability to design sustainable and socially accepted public policies and ensure effective implementation by all stakeholders (Rogers, 2002; cited by Solanes and Jouravlev, 2006).

Therefore, governance entails the capacity to both formulate and implement suitable policies. These capacities result from establishment of consensus, coherent management systems (based on institutions) as well as adequate administration of the system (Solanes and Jouravlev, 2006). "Governance", though not a predetermined solution to new water management challenges associated with policy, regulatory and institutional reforms, its importance is largely associated with the society's limitations and inability to implement profound institutional changes. These challenges culminate from the fact that reformation of any regime results in radical transformation and dismantling of previous management regimes. In any case, what has been perceived to be the salient feature of governance crisis in many countries is the mismatch of institutional arrangements between old and new regimes (Pena and Solanes, 2003). Therefore, it is critical to comprehend the relationship between documented water legislation, policies and institutional arrangements, and implementation at grassroots' level (end user).

2.4 Water Resource Use and Rural Livelihoods

Studies of rural domestic water use patterns have been conducted in several contexts, particularly linked to areas where water scarcity is severe, but no recent studies are available for Zambia. Nyong and Kanaroglou (2001) conducted a household survey to explore domestic water use patterns in Nigeria highlighting a trade-off between the distance from a water source and water quality. In a related study, Dungumaro

(2007) used the South Africa General Household Survey to explore the availability of domestic water, finding important relations among the quantity of water consumed, quality and distance of the water source, the size of the household, and household income. Again adopting a household survey approach, though in a more urban context; Potter and Darmame (2010) found that water consumption patterns depend on the water sources used, household income, and the cost of water use. In Zimbabwe, Manzungu and Machiridza (2005) carried out an assessment of water use and the possibility of implementing Water Demand Management (WDM) at household level in Harare. Their results showed that poor infrastructure, lack of information dissemination, lack of training at household level and lack of institutional capacity hindered the implementation of WDM. In related studies, Manzungu and Mabiza (2004) and Kujinga and Jonker (2006) further explored the link between water use and water governance. The key finding from this study is that good governance is critical in ensuring households' access to water resources and improved livelihoods.

Various studies have analyzed smallholders' water use in irrigated agriculture in connection with livelihood improvement and poverty alleviation. In a study on smallholder irrigation in Sub-Saharan Africa, You (2008) argued that irrigated agriculture, despite being a key ingredient in increasing agricultural productivity and poverty reduction, does not play a significant role in agriculture for Sub-Saharan Africa. Hanjira *et al.,* (2009) adds that unless coupled with improvement of human capital and developed rural markets, access to irrigation water will not contribute much to rural livelihood improvement and poverty reduction in Africa.

The Poverty-Environment Partnership (PEP) advance theoretical arguments that link multi-dimensional livelihood improvement and poverty reduction to water management (PEP, 2005). Other key results advanced by PEP were that, investments targeted at improving access to water supply and sanitation yields more social benefits and that local level institutions which are accessible to rural communities are central to improving natural resource management and poverty reduction. Nyambod

and Nazmul (2010) succinctly synthesize the link between water resources and multi-dimensional poverty or human development. They note that access to water is a basic human need and a universal human right, but child mortality continues to be adversely affected by diarrhea diseases caused by lack of clean water and adequate sanitation. Among adults, diarrhea diseases lead to productivity losses thereby reinforcing deep inequalities and exposing vulnerable households to the vicious cycle of poverty.

Hanjira and Gichuki (2008) examined investments in agriculture water management for livelihood improvement and poverty reduction in three river basins in Africa, namely the Limpopo, Nile and Volta River basins. They argue that increased investments in land and water resources are key pathways to enhance agriculture productivity and to catalyze agricultural and economic growth for effective livelihood improvement and poverty alleviation. Especially in irrigation where huge potential for vertical and horizontal productivity potential largely exists and are linked to employment creation. They also outlined that scarcity and degradation of land and water resources, and poor governance and weak institutions constrain the growth potential.

In Asia, Hussain (2005) showed that Pro-Poor Management of Water for Farming (PPMWF) in irrigated agriculture leads to 20% lower poverty than for adjacent rain-fed areas (control areas) controlling for land distribution. The endorsed pro-poor intervention strategy was Participatory Irrigation Management (PIM). Lipton (2007) argued that although the measured impact of PIM by Hussain looked robust, it needed to allow for externalities such as the interaction with groundwater and micro-irrigation or out-of-scheme downstream effects. After exploring this implication, Lipton (2007) found that the inefficiency of gross inequality in irrigation reflects similar wider-scale findings on aggregate inequality and vulnerability. Therefore he recommended that PPMWF planning must itself adapt to the needs for sustainable water resources, manageable health impacts, and proper treatment of displaced people when designing and implementing ‘innovative’ new schemes. Both studies

used household surveys conducted in 2001-2 in 26 major and medium canal irrigation systems (and adjoining rain-fed areas) in India, Pakistan, Bangladesh, China, Indonesia and Vietnam.

2.5 Conceptual Framework

This study uses a holistic framework proposed by Braune and Goldin (2012) and Andreis *et al.*, (2004) to investigate the water governance and livelihoods of rural households in the lower Kafue Basin. It is generally agreed that a holistic approach to water resources management requires an integration of a number of different systems, namely the Environmental System of which the Natural Water Resource System is part, the Human Development System, which places many demands and impacts on the Environmental System, and lastly the Water Resources Management System. The Water Sector represents the Institutional dimension of the last-mentioned system (Braune and Goldin, 2012). A definition of the Water Sector notes that:

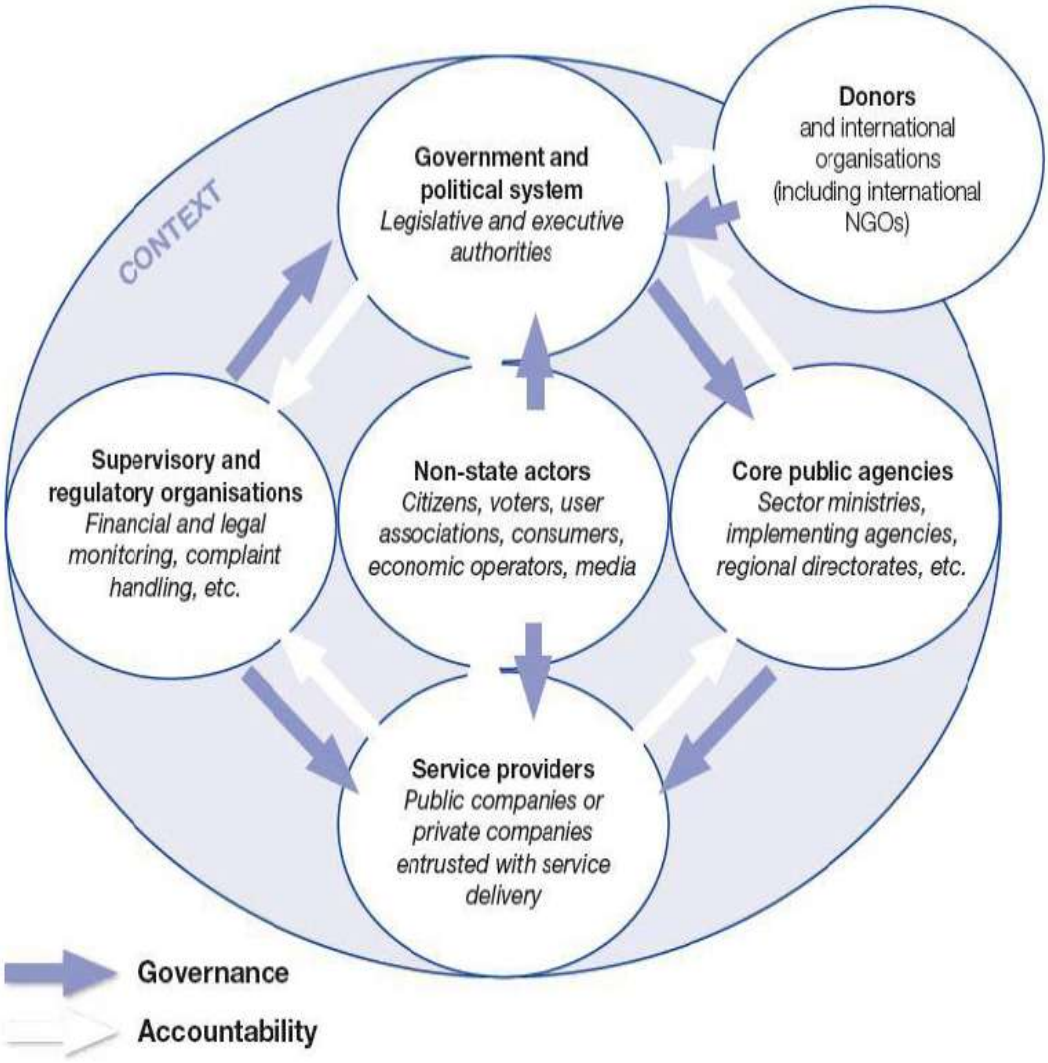
> The 'water sector' consists of all means and activities devoted to creating net 'added value' from the water resources available on a given territory. The water sector operates in a complex interplay between water resources and the socio-economic and environmental system in a given country. It comprises two main segments:
> • 'resources activities' that influence the spatio-temporal distribution or the quality of the water resources with a view to manage these resources as an asset.
> • 'use activities' that use water in transformation processes for social uses (e.g. water supply), economic uses (e.g. agriculture, industry, energy), and environmental uses (e.g. functioning, restoration and conservation of ecosystem services). These activities in fact benefit from the 'ecosystem services provided by water'(UN-Water TFIMR, 2009)

According to Braune and Goldin (2012), such a definition or description involves distinguishing between elements of context, of functioning and of governance. Context sets the scene in terms of the available assets and natural conditions. Functioning informs about the transformation processes occurring in the territory, whereby resources are mobilized and used for producing goods and services.

Governance provides the decision-making architecture that explains why actors are pulling the territory along a certain development path.

The stakeholders of the water sector are in general the governmental actors responsible for management and policy making, the consumers, e.g. agriculture, and their associations, the civil society, the public or the private sector managers (utilities), the donors and the universities and research centers (knowledge sector). These different actors interact with one another (See Figure 1); their relationship to each other from a governance/accountability point of view is presented in the diagram following. The knowledge sector will need to engage with all these actors and have an entry point through formal links with each group of actors (Braune and Goldin, 2012).

Figure 1: Key Actors in Water Sector and their Inter-Relationships



Source: Braune and Goldin, 2012

This study investigates and documents water governance and rural livelihoods in the lower Kafue River Basin. The study focuses on water resources, end users, its governance and associated institutions as a coupled system (Andreis *et al.,* 2004). All the components in the system are important and determine the choices made by water users. Thus, at rural community level, use of water resources is affected by several factors such as: water institutions, accessibility to water resources and water governance regimes. These factors determine the water resource use to support rural livelihoods and create vulnerabilities from both external and internal forces. In

addition, among these factors are changes in state control such as policies, laws and institutions.

The holistic framework proposed by Braune and Goldin (2012) and Andreis *et al.,* (2004) greatly contributes to identifying processes or factors that influence water governance and rural households' pattern of water use for supporting livelihoods. The framework or approach contributes to identifying the types of data that need to be collected and analyzed as well as the method to be used for data collection. In other words, the framework highlights what sort of focus the research should have.

CHAPTER 3
METHODOLOGY

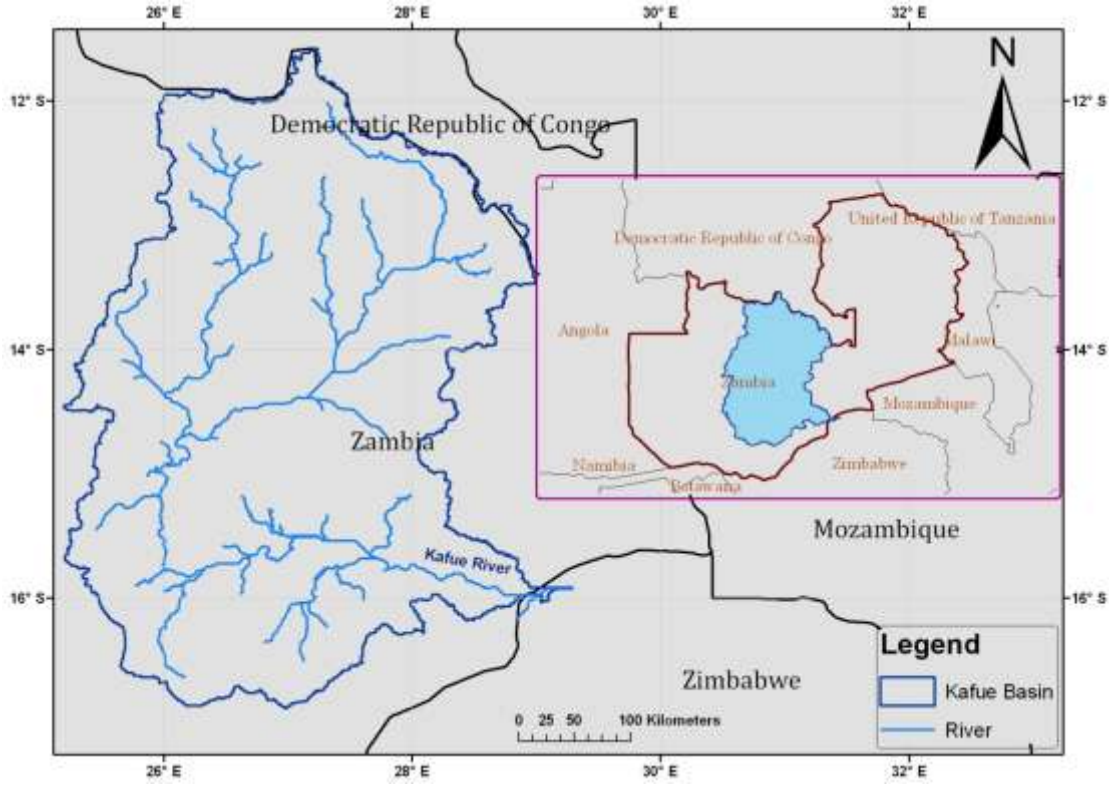
3.1 Introduction

This chapter presents the methodology used in this study. The chapter begins with a description of the study area where the data used in the study was collected. The chapter then presents the research design and the data collection methods utilized. The chapter also describes how the data collected was analyzed as well as the study limitations.

3.2 Description of the Study Area

The study was conducted in the lower Kafue River Basin (Figure 2). The Kafue River is the major tributary to the Zambezi River, with a catchment that occupies about 20% of Zambia's total land area (Schelle and Pittock, 2006). The basin also hosts the Kafue Flats flood plains which is about 50 km from Lusaka and stretches about 250km long and 60km at its widest point and 15° 11`-16° 11 S, 26° -28° 16`W (Chabwela and Haller, 2008). The river has the lowest flowing gradient in the Kafue flats floodplains as it drops 15 meters in 400 km rendering the area to extreme flatness, hence, the name Kafue Flats. Historically, the flood plain originates from a buried lake through which the Kafue River meanders along with lagoons, oxbow lakes, marshes and abandoned river channels (Chabwela and Siwale, 1986; cited in Chabwela and Haller, 2008).

Figure 2: Location Map of the Kafue River Basin



Source: Stenek *et al*., (2011)

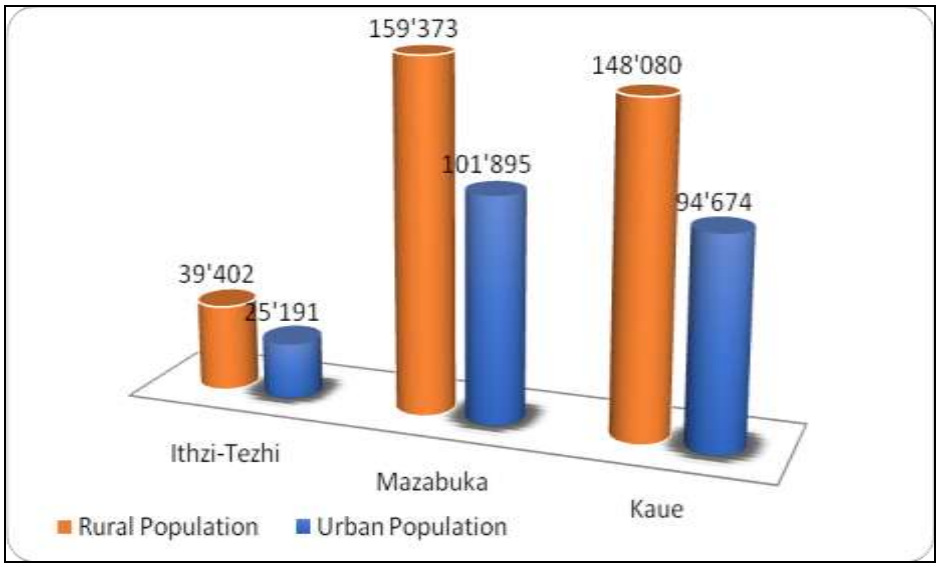
The study area was chosen mainly because it was a pilot area for implementation of the newly introduced water institutions of the decentralized water policy. The area was also chosen because there are several economic activities taking place and which mainly depend on the Kafue's water resources. Some economic activities demanding Kafue's water include municipal supplies and industrial use, in addition to major livelihood activities centered on both livestock rearing, rain-fed and irrigated agriculture, primarily sugar-cane growing, maize, and winter wheat production. The farming communities face various challenges among which climate change which results in erratic rainfall or floods with negative consequences on household food security. Fishing is also a major source of livelihood around the fishing camp villages.

Livestock production mainly cattle is a significant part of the livelihood of the people especially areas in Itezhi-Tezhi nearing Namwala district. The Ila ethnic group of

Namwala, were at one time said to be the richest cattle keepers in Central Africa (Williams, 1984; cited by Associated Programme Flood Management (APFM), 2007). The Tonga of Mazabuka and Monze are among other cattle keepers. However, the decline in cattle population due to diseases has seen several people in the Kafue Flats shift to crop farming and fishing. This has been a major paradigm shift in livelihood systems of the sub-catchment. Fishing, apart from being an important occupational activity, is the main source of protein due to the fact that cattle herding communities look at cattle as a store of economic value and for prestige rather than for household nutrition. The Twa is the major ethnic group originally practicing fishing, but have been joined by new immigrants from areas as far as Luapula, Northern, Eastern and Western Provinces. The significant rise in the number of fishermen over the years, mainly new settlers from other regions of the country has caused problems of overfishing (APFM, 2007).

The lower Kafue River Basin comprises four districts namely Itezhi-Tezhi, Namwala, Mazabuka and Kafue. All the three districts were covered for this study. In all the study districts, the rural population component outweighs the urban population (Figure 3).

Figure 3: Urban and Rural Population in the Sampled Districts



Source: CSO, 2010 Census of Population and Housing

The poverty levels are highest in rural areas accounting for about 76.8 % of the population. In comparison, about 26.7% live in poverty in the urban areas (Monitoring of Living Conditions Survey, 2006). The characteristic features of these districts are described below:

3.2.1 Kafue District

Kafue district is located in Lusaka Province and has a poverty headcount ratio of about 60.5% (CSO, 2010). The main activities carried out by the households are subsistence crop farming and fishing. Sugar cane is being cropped on the northern bank of the Kafue but few households are involved in production. The district is relatively close to the large market of Lusaka. Despite being the smallest district geographically, Kafue has a total population of about 243, 000 with about 95,000 and 148, 000 urban and rural populations respectively (CSO, 2010). The high population in Kafue is owing to its proximity to the capital city Lusaka and presence of a number of industries in the area which offer alternative sources of livelihood.

3.2.2 Mazabuka District

Mazabuka district is located in Southern Province. The estimated poverty headcount ratio in the district is about 59.6% (CSO, 2010). The main economic activities carried out by the households are subsistence and cash crop farming, and fishing. The sugar industry is significant in the district due to the presence of Zambia Sugar Company, the country's leading sugar producer. Mazabuka District has the highest total population among the sampled Districts of about 261,000 people comprising 101,000 and 159,000 urban and rural populations respectively (CSO, 2010). The high population in Mazabuka is attributed mainly to the thriving Nakambala Sugar Estate (Zambia Sugar Plc, 2010) which supports other subsidiary firms.

3.2.3 Itezhi-Tezhi District

Itezhi-Tezhi district is located in Southern Province and has a poverty headcount ratio estimated at about 60.8% (CSO, 2010). The main economic activities carried out by the households are livestock rearing and subsistence food production. The district is characterized by the presence of a large hydropower dam in Itezhi-Tezhi which influences the flooding pattern of the Kafue Flats. Itezhi-Tezhi District is the least populated region with a total population of about 64,000 people with a rural and urban population of about 39,000 and 25,000 people respectively (CSO, 2010). The low population in Itezhi-Tezhi is mainly because the region has very little economic activities. Apart from electricity power generation, Itezhi-Tezhi district has no other viable industry to provide employment, and as a result, the majority of the people depend on farming, cattle rearing and fishing for their livelihoods.

3.3 Research Design

A research design is a set of guidelines and instructions to be followed in conducting the research (Babbie, 1998). A design is used to structure the research and to show how all major parts of the research project – the samples or groups, measures, treatment or programmes and so on work together to try and address the central research questions. In other words, the research design is the overall plan for relating the conceptual research problem to relevant and tractable empirical research. In this research, the design to be used is a case study approach. According to Thomas (2011), "Case studies are analyses of persons, events, decisions, periods, projects, policies, institutions, or other systems that are studied holistically by one or more methods. The case that is the *subject* of the inquiry will be an instance of a class of phenomena that provides an analytical frame — an *object* — within which the study is conducted and which the case illuminates and explicates." This research employed a case study research design in Zambia which attempts to document and provides an

in-depth understanding of water governance and rural livelihoods in the lower Kafue River Basin.

3. 3.1 Data Collection Methods

The study utilized both primary and secondary data in order to document water governance and the rural households' pattern of water use in supporting livelihoods the lower Kafue Basin. Primary data was collected by use of a structured questionnaire which was personally administered to the rural households. Data was also obtained by interviewing key informants individually as well as reviewing literature from selected government documents, reports, journals and other published articles relevant to the study. The study methodology used is based on the concept of 'triangulation', which involved the use of several sources of information. The following explains in detail the data collection methods that were used:

Document Review - First, archival research was conducted to gain an understanding of water policies and the water reform process in Zambia as well as the socio-economic context of the lower Kafue Basin. The review was conducted from secondary sources such as government policy and programme documents as well as various legislative Acts, internet sources, and academic papers and journals, consultancy reports and so on. A desk review of documents including, but not limited to the GRZ Vision 2030, National Agricultural Policy (2006-2015), National Environment Policy, Sixth National Development Plan, water policy, water act, decentralization policy, government annual review reports was conducted. Some institutions visited and consulted include: Central Statistics Office, Ministry of Agriculture and Livestock, Ministry of Energy and Water Development, Zambia and Environmental Management Agency.

The document review also served to present background information on the study area physical characteristics such as the population, geographical location and geographical boundaries, area coverage of the river basin, climate data, rainfall patterns and the water resource endowment. Other information collected are

economic activities that support livelihoods in the area. The collection of secondary data was also meant to complement data collected from the survey.

Key informant interviews - In addition to the document review, key informant interviews were also conducted to gain an understanding of socio-economic context of the lower Kafue Basin as well as the policy context and water reform processes in Zambia. The interviews of key stakeholders like government officials, and donors were mainly conducted in Lusaka and the study area. Key informant interviews were also carried out in the study area in a semi-structured approach with district-level officials such as councilors, village headmen and other traditional leaders and representatives of government departments based in the local communities (such as Camp Extension Officers under the Ministry of Agriculture and Livestock) in order further understand water governance issues and the reform process in the water sector. In addition to this, the qualitative data collected focused on different types of water uses to support livelihood activities, constraints and competition among water users. Some of the same questions from the structured questionnaire were asked as open ended during the key informant interviews as a way of triangulation. During the key informant interviews, an electronic voice recorder was used to ensure capturing of complete information provided. These key informant interviews were complemented with direct field observation.

Household Survey - Primary data was collected by use of a structured questionnaire which was personally administered to the small-scale farmers. Household heads were interviewed in order to document various aspects of awareness and participation of the l households in water governance in their community. The interviews were also aimed at documenting or assessing the rural households' pattern of consumptive and productive use of water to support their livelihoods.. Design of the questionnaire for the interviews was guided by the study objectives to elicit relevant information.

The questionnaire comprising both open and closed ended questions (Willem *et al.,* 2007) was designed in order to capture the data useful for the study. Open-ended questions enabled the respondents to freely describe experiences regarding the issues

related to the performance of water sector decentralization and stakeholder participation in terms of decision-making processes in water resource governance. Interviews were preceded by visits to the village headmen for the purpose of explaining the objective of the study to the leaders and to encourage the village residents' active participation. However, before the fully fledged survey, the questionnaire was pre-tested to ensure completeness and determine whether the instrument was able to capture the desired data. Where necessary, the desired corrections were made and the complete questionnaire was designed (Willem *et al.,* 2007).

The questionnaires were administered face-to-face with respondents by the Researcher and trained enumerators; who were able to translate the survey instrument into the local language for effective communication between non-English speaking respondents and the enumerators. Prior to the household interviews, three (3) Enumerators or Research Assistants were trained on how to administer the structured questionnaire. The training content was comprehensive enough to sensitize the Enumerators about the purpose of the survey as well as on the modalities of administering the questionnaire. The enumerators were supervised by the Researcher. At the end of the field work every day, all questionnaires were delivered to the Researcher who along with the enumerators would check all the questionnaires for completeness and for removal of some obvious errors. Repeat visits to respondents where necessary were carried out. This approach was aimed at ensuring that quality data was collected during the survey.

3.3.2 Sampling Procedure

For the household survey, the study used a non-probabilistic sample called "purposive sampling technique". The sampling technique used is appropriate in case studies where a small sample is selected using subjective judgment to select informative cases and meet the study objectives (Sounders et al., 2007). This is based on the argument that the sample can be selected based on their typical phenomenon

representation. In this study, interviews with rural households, key informants such as village headmen and councilors and local level government departments, were carried out to collect information on water governance and the performance of the decentralized new water institutions in water resource management at end user level.

The study area was divided into three zones or clusters. Zone 3 was Itezhi-Tezhi, Zone 2 was Mazabuka District and Zone 1 was Kafue District. Five (5) villages were purposively selected from each Zone to capture the variability of end user`s experiences or practices on water governance and livelihoods. The 5 villages selected comprised 2 large and 3 small villages. The large villages were defined as those comprising more than 100 households and small villages as those with less than less than 100 households. The survey covered 15 villages and 432 households which were selected at random using a set rule of 24 cases and 36 cases for small and large villages respectively. The sampled cases of 24 and 36 households were selected to ensure that both small and large villages are equally represented in the sample. The Ministry of Agriculture and Livestock Camp Officers were helpful in locating the sampled villages. In each Zone, one village was sampled far away from the Kafue river basin to act as a control. Each household selected and interviewed by each enumerator was identified by using stickers stack at the door. That ensured no repeated interviews of the same household. All respondents in each village were interviewed on the same day to curb possible variations of data due to time differences. The sampled villages and the respective samples are shown in Table 1.

Table 1: Distribution of the sample by the study area

District	Name of Village	Number of Households Sampled	Number of households per village from Village registers	Sample as % of total households
Itezhi-Tezhi	Babizhi	36	210	17 %
	Basanga	37	176	21 %
	Batunga	23	68	34 %
	Iyanda	24	39	62 %
	Shapama	24	88	27 %
	Total	**144**	**581**	**25%**
Kafue	Kasaka	35	225	16%
	Muchuto	24	93	26 %
	Mulampa	23	54	43 %
	Mwachingwala	22	58	38 %
	Tukunka	36	401	9 %
	Total	**144**	**831**	**17%**
Mazabuka	Magobo	24	98	24 %
	Manyonyo	24	87	28%
	Nalwama	24	55	44 %
	Nanga	36	286	13 %
	Shimungalu	36	189	19 %
	Total	**144**	**715**	**20%**
	Grand Total	**432**	**2127**	**20%**

3.4 Data Analysis

The quantitative data collected using structured questionnaires were analyzed using the Statistical Package for Social Scientists (SPSS). Descriptive statistics such as frequencies, mean, comparison of proportion and cross-tabulations were used to describe the structure of the data. The secondary and qualitative data collected from documents and key informants was also summarized and analyzed to understand pertinent water governance and livelihoods covered in the study. The qualitative data was also useful in further explaining or interpreting the quantitative results from the household survey. A descriptive-analytical narrative was used to present the findings from the study in order to have a comprehensive picture of the key issues concerning

water governance, water sector reforms, and patterns of water use to support livelihoods in Zambia's lower Kafue River Basin.

3.5 Limitations of the Study

The problem under study determines the research design adopted and limitations are inevitably associated with every research design. It was not the intention of the study to generalize the results to the whole Country, therefore, the sample size used was not nationally representative and the sampling techniques employed were only more representative to the study area. However, the analyses conducted allows for more insight in the characteristics of household water use, governance institutions, rural livelihoods and suggest policy options that would improve the livelihoods of households in the study area.

CHAPTER 4
WATER GOVERNANCE IN ZAMBIA AND PARTICIPATION OF HOUSEHOLDS IN GOVERNANCE INSTITUTIONS IN THE LOWER KAFUE BASIN

4.1 Introduction

This chapter presents the results and discussions on water governance in Zambia. It begins with the macro-level analysis providing an overview of the water sector reforms and the governance or institutional and legal framework in Zambia. It also highlights the characteristics of the decentralization process in the water sector; basin-level institutional arrangements and the relationship between Central and Basin-level water institutions. The chapter then also presents the micro-level analyses based on the study findings from the household survey which highlighting aspects or issues of household awareness of water institutions and participation in water use decision-making; presence and effectiveness of the new water institutions at basin-level; the institutional support to resolve water related problems; and aspects of financial sustainability.

4.2 Policy Context

The Zambian Government's overarching goal over the next two decades is to become a prosperous middle-income country, with a competitive and outward oriented economy, where hunger is eradicated and poverty is reduced to minimal levels (GRZ, 2006). Implementation of development programmes follows national development planning which was reintroduced in 2003. The Sixth National Development Plan (SNDP) is being implemented in the period 2011-2015

A number of policies, strategies and plans have been undertaken aimed at employing an integrated approach in the utilization of water resources for agriculture, energy and environment and emerging issues such as climate change.

In the agriculture sector, GRZ, since 1991, embarked on agricultural policy reforms. The main thrust of these reforms was the liberalization of the agricultural sector and promotion of private sector participation in production; marketing; input supply; processing and credit provision (GRZ, 2006). The key drivers to catalyze these developments are water and energy resources. The development agenda for Zambia is clearly outlined in the Vision 2030 that galvanizes the various sectoral development initiatives towards the achievement of a national goal *'to be a prosperous middle income nation by the year 2030.'* Since government has decided to diversify the economy where agriculture is a centre stage, it is thus government vision to develop agriculture in an efficient and sustainable manner to assure food security at both household and national levels and to maximize the role of the agricultural sector in its contribution to GDP. These reforms, which reintroduced agricultural cooperatives in 2001, had seen the sector start registering growth with an average of 18 percent contribution to the GDP per year.

The following policies have been developed to guide agricultural and water development in Zambia including:

(i) The Vision 2030 was formulated in 2006 to guide the economic development of Zambia with a view to encourage its citizen to work hard to transform this country into *a prosperous middle income nation by the year 2030.*

(ii) National Agricultural Policy (NAP), 2004-2015: This Policy guides the development of agriculture up to the year 2015. The main thrust is to ensure sustainable development of land and water resources for both rain fed and irrigated agriculture for food security and income generation especially for rural populations where people depend on agriculture for their livelihood. In this regard the Policy emphasizes the development and use of wells, boreholes, dams and springs for irrigation and rural water supply throughout the country.

(iii) The Irrigation Policy and Strategy (IPS), 2004-2015 was developed with the aim of guiding the development of the irrigation subsector in Zambia in order to put 70,000ha of new land under irrigated agriculture by 2011. Out of this plan, 10,000 ha will be large scale commercial; and 30,000ha each emerging commercial and small scale farmers. The IPS was supported by the National Irrigation Plan (NIP) that established the Irrigation Development Fund to compliment the implementation modalities of the Policy through the National Development Plans. However, this can only be achieved substantially investing in water for irrigation and support from other sectors such as transport and communication.

(iv) The National Water Policy, 1994 (revised 2010) is the revised version of the 1994 edition. The earlier edition was promulgated primarily to guide the restructuring of the water sector with a strong bias to water supply and sanitation. The 2010 Policy has re-examined the role of water resources in an integrated manner and has provided guidance on the institutional and legal framework taking into account modern principles of water resources management (e.g. efficient and equitable water allocation to all users) and best international practices to promote sustainable national socio-economic development. One of the new measures advantageous to the farming community provided for by the National Water Policy of 2010 is the exclusion of traditional and small scale farmers with irrigation plots not to acquire water permits for their agricultural activities. Irrigation plots of less than 0.5ha will be exempted from water permits by the new water legislation. With regard to water for energy, the Policy is meant to ensure availability and accessibility to adequate and reliable supply of water at a reasonable and justified cost so as to promote national development for sustained growth, employment generation and wealth creation.

(v) The Integrated Water Resources Management/Water Efficiency Plan for Zambia, 2008 identifies key water resources management challenges currently facing Zambia and outlines strategies for sustainable water resources development with active stakeholder participation as Zambia develops and implements its national

development plans. These measure include bankable programmes ranging from water supply and sanitation; water development for productive use including water conservation and flood control; and restoration of wetlands after construction of hydropower dams. It is intended to support the implementation of the water related programmes in the current and future National Development Plans such as SNDP.

(vi) The Sixth National Development Plan (SNDP): Embraces the integrated water resources management and water efficiency plans that seek to promote efficient utilization of water resources with a view to increase Zambia's agricultural and hydropower generation capacity. As indicated earlier it aims at operationalizing Vision 2030, which seeks ultimately to boost irrigated agriculture thus promoting commercialization of agriculture.

4.3 Legal and Institutional Framework

In order to effectively interpret and implement government policies applicable to the water and agriculture sectors and to support implementation of water and agriculture development programmes, the Government of Zambia has to put in place necessary legal and institutional framework, often as enshrined in The Constitution of Zambia 1991 (as amended in 2006). The Constitution is the principle law of the Republic of Zambia which establishes the framework within which the subsidiary laws such as the Water Act operates, and in turn within which the regulation and allocation of water can take place.

4.3.1 Legal Framework

The Policy objectives for the water sector are supported by the provisions of the various acts of parliament, which provide the legal framework for their development, regulation and management. Some of these pieces of legislation have provided for establishment of institutions to develop, manage or regulate the resources such as Water Board and NWASCO. Key Acts that have a bearing on water development and management include:

(i) The Water Act Cap 198 of 1949 is the principle Zambian water act and provides for the establishment of the Water Board - a regulator for the allocation and use of water resources in Zambia. The Act is based on principles of common law but is restrictive in nature as its jurisdiction is limited to administration of water permits (rights) and does not elaborate on modern water resources management practices. Costs for water use resulting from issued water permits (rights) is considered as a major constraint to investment in hydropower production as the current rates are considered too high. Further, it does not provide for shared watercourses or the management of groundwater resources. Having completed the revision of the National Water Policy in February 2010, the government is presently undertaking the task of repealing the current Water Act to make it responsive to the needs of the country.

(ii) The Environmental Protection and Pollution Control Act, Cap 204 of 1990: The Act provides for the protection of the environment and the control of pollution and for the establishment and functions of an environmental regulator – Zambia environmental management agency. Subsidiary legislation to this Act is the Environmental Impact Assessment Regulations that guide the execution of the environmental impact assessment studies for projects such as irrigation and hydropower generation projects that have a likelihood of causing environmental damage; it also provide for the development of management plans on how to mitigate such envisaged damage to ensure that the project safeguards environmental sustainability.

(iii) The Lands Act Cap 184 of 1995: The Act provides for the management of land in Zambia and that all land is vested in the President who holds it in perpetuity for and on behalf of the people of Zambia. In alienating land the President shall take such measures as shall be necessary to control settlements, methods of cultivation and utilization of land as may be necessary for the preservation of the natural resources on that land.

(iv) The Forests Act Cap 199 of 1973: The Act provides for the conservation and protection of forests and trees. The Act defines "river" for purposes of this Act as water bodies including lakes, streams, canals and other channels whether natural or artificial.

(v) The Fisheries Act, Cap 200 of 1974: The Act deals with the control and development of fishing. For the purposes of the Act, water is defined as water in any river, stream, watercourse, lake, lagoon, swamp, pond, dam, reservoir or other place of a similar nature.

(vi) The Local Government Act, Cap 281 of 1991: The Act outlines the functions of a Council which states "to provide and maintain supplies of water and, for that purpose, to establish and maintain water works and water mains", and "to take and require the taking of measures for the conservation and the prevention of the pollution of supplies of water."

(vii) The Water Supply and Sanitation Act, No 28 of 1997: The Act provides for the establishment of water companies to provide water supply and sanitation services. It also establishes the regulator, National Water Supply and Sanitation Council to regulate the water supply and sanitation service providers.

(viii) The Public Health Act, Cap 295 of 1930: The Act provides for the monitoring sanitation; health education; monitoring of drinking water quality; setting standards and general sanitary supervision throughout the country.

(ix) The Town and Country Planning Act, Cap 283 of 1962: The Act is primarily for urban planning and demarcation of areas (includes water and protection of farmlands) for development, the preparation, approval and revocation of development plans, the control of development and subdivision of land.

(x) The Mines and Minerals Development Act No. 7 of 2008: The Act provides for environmental protection during prospecting, mining, decommissioning and abandonment of mines. During mine dewatering, the Act provides for best practice of how to treat water from mine operations before discharging into the natural

environment to avoid pollution and land including farmlands degradation in mining areas.

4.3.2 Institutional Framework

The Zambian Government in 2003 introduced the Sector Advisory Groups (SAGs) as a vehicle for planning, implementation, monitoring and evaluation of the Poverty Reduction Programme. A number of SAGs were established including agriculture, water and energy. SAGs comprise representatives from key institutions and stakeholders, which basically are part of an Institutional Framework in the sector. Each SAG chaired by a Permanent Secretary of a particular sector, advises government on sector performance and policy issues, on efficient/effective use, transparent management and sub-sectoral coordination of assistance to the sector. It provides a forum for sector wide approach to planning, budgeting, delivery and implementation of programmes.

There are number of institutions involved in water activities in Zambia. The nature of their involvement ranges from policy/legal formulation and implementation, through service provision to consumption. For example, the institutions active in the water sector include the following:

(i) Government Ministries and Departments: Government ministries and departments have over the years played various roles in both the water supply and water resources sub-sectors. The following are the line ministries and institutions:
The Ministry of Mines, Energy and Water Development through the Department of Water Affairs (DWA) is the main institution responsible for water policy formulation and water resources management and development activities; and through the Water Board for water rights regulation. Table 2 below presents details of the functions the DWA and Water Board

The Ministry of Finance (MoF) is responsible for developing the country's macro-economic framework and planning of all national public investment programmes, including agriculture as well as mobilization and allocation of financial resources. The Ministry of Finance also plays a critical role in agri-food and water policy formulation and implementation. The MoF allocates funds in a sectoral manner, according to priorities determined by the Government.

Table 2: Functions of the Department of Water Affairs and Water Board

Functions	Department of Water Affaires	Water Board
Water Allocation	Investigates and approves Water rights and gives advice to the water board	Receives and Processes water rights applications Allocates water rights based on DWA's recommendations
Water Charges	Provides advice to DWA on water pricing strategies and determines water charges	Advises Minister (MEWD) on determination of water charges
Policy Formulation	DWA through the director participates in water policy formulation together with planning and other stakeholders	Water board secretary provides advice during water policy formulation
Planning	-Develops water resource plans -Conducts surveys to determine water resource availability and facilitate access to water resources	Develops water resource issuance plans
Water Quality Control	Monitoring and Evaluation of water resources for quality assurance	Controls water pollution and penalizes water polluters
Financing	Provides financing through budgetary allocations from Ministry of Finance	Mobilizes finances from water right charges that could be used as supplementary funding
Dispute Resolution	Provides technical support for water resource dispute resolution	Water board secretary testifies on all water related disputes in court
Management of Information	Assessment and surveying of water resources (surface and ground water)	Water right database compilation

Source: Water Policy, 2010

The Ministry of Agriculture and Livestock (MAL) has the responsibility to provide and manage water use for agricultural purposes such as livestock watering, fish farming and crop production

The Ministry of Local Government and Housing (MLGH) is tasked with the responsibility of mainly Water Supply and Sanitation and also participates in water policy development and physical planning of water supply and sanitation services. The Ministry of Local Government and Housing is the lead government unit in implementation of the Decentralization Policy. The Decentralization Policy of 2002 aims to devolve authority, functions and responsibilities to district level in order to improve quality of service delivery at the sub-national level, including management of water and other natural resources.

The Ministry of Lands, Natural Resources and Environmental Protection (MLNREP) is the main authority and coordinating body for environment, and natural resources management. Its main function is to promote stewardship of the land resources which include water resources and other natural resources

The Ministry of Health (MOH) is in charge of setting standards and monitoring the quality of drinking water, and also conducts public campaigns and sensitization on the importance of drinking clean and safe water

The Office of the Vice-President coordinates disaster management and acts as a rapid response unit to water disasters such as floods causing damage to bridges and houses

The Ministry of Transport, Works and Supply and Communication provides meteorological services and is responsible for inland waterways such as water transport

(ii) Local Authorities such as city, municipal and district councils have the responsibility to provide water supply and sanitation services to their operational

areas. This function is implemented through nine commercial water utility companies

(iii) **Regulatory Authorities** are statutory bodies established by Acts of Parliament. The main regulatory institutions are: (a) The Water Board as outlined above is responsible for allocating raw water rights to the various sectors of the economy; (b) The **National Water Supply and Sanitation Council (NWASCO)** established under the Water Supply and Sanitation Act, No 28 of 1997 is responsible for regulating the provision of water supply and sanitation services throughout the country; (c) the **Zambia Environmental Management Agency (ZEMA)** responsible for controlling and monitoring water quality and pollution and determines the conditions for discharge of effluents; (d) the **National Heritage and Conservation Commission** which is mandated to conserve the "natural heritage" such as waterfalls; and (e) **the Zambia Wildlife Authority (ZAWA)** which controls, manages, conserves, protects and administers National Parks for wildlife conservation including water resources for wildlife watering.

(iv) **Commercial Water Utilities/Parastatals:** Commercial water supply and sanitation utilities (CUs) have been established by local authorities under the Water Supply and Sanitation Act, 1997. The mandate of CUs is to provide efficient and sustainable supply of water and sanitation services under the general regulation of NWASCO. **Parastatals** such as Zambia Electricity Supply Corporation (ZESCO) Ltd are a vertically integrated public power utility, with the functions of generation, transmission, and distribution. ZESCO owns most of the power stations, transmission lines, and distribution facilities in Zambia, including small hydro and diesel power plants.

(v) **Private Sector:** These are guided by the Zambia Development Act on the various incentives for investing in the irrigation and other sectors. This includes the manufacturing, food and processing industries, mining, agricultural and hydropower generation. Examples include Zambia Sugar, and mining companies which supply water to their employees.

(vi) **Academic and Research Institutions:** Academic and research institutions participation in the water sector is regulated by the education Act and other related legal instruments. The main area of their participation is in the training of personnel and in research in the water sector. For instance, the University of Zambia and Copperbelt University offer training at both undergraduate and postgraduate levels. Other research institutes like the National Institute for Scientific and Industrial Research (NISIR) conducts research in water quality and pollution issues.

(vii) **Bilateral and multi-lateral Cooperating Partners** such as the European Union, World Bank, African Development Bank, Finland, Germany, Denmark, Japan and UNICEF have been the key financiers of water supply-related projects and programs in Zambia

(viii) **Non-governmental organizations (NGOs) and Community Based Organizations (CBOs)** which include World Wildlife Fund, Care International, WaterAid, Residents/Ward Development Committees operate in various fields related to water management, such as the promotion of community-based management of water supply schemes, sanitation and health education

4.4 Water Sector Reform Process in Zambia

Water management in Zambia had always been managed on a sectorial basis. All legislation and policies in the past tended to reflect a sectorial bias (COWI, 2009) and there have been limited approaches so far to the development of a comprehensive strategy for water resources management. Recognizing the inefficiency of sectorial water management, the Zambian government opted for a water sector reform following the IWRM approach, under the auspices of the Water Resources Action Program (WRAP). Its implementation started in 2001 with the

Ministry of Energy and Water Development (MEWD) in charge of the reform (GRZ, 2004a).

The main aim of water resource management in Zambia is explicitly and implicitly stated in the IWRM and Water Efficiency Implementation Plan as "to achieve equitable and sustainable use, development and management of water resources for wealth creation, socio-economic development and environmental sustainability by 2030" (GRZ, 2008). In order to achieve the above objective, Zambia initiated several water institutional reforms. In the year 2010, the revised national water policy was approved by Cabinet. The main aim of the revised 2010 water policy was to improve water resource management by setting up institutional coordination and stipulating the roles as well as responsibilities of various stakeholders in the water sector. Hence, the new policy is considered as a document that takes into account all water-related sectors and endeavors to address cross-sectorial interests focusing on water resources planning, development, management and utilization. It calls for various sector policy objectives incorporated in a document which is inspired by the principle of Integrated Water Resources Management with stakeholder participation and decentralization being the two major strands.

The major policy changes with reference to the previous 1994 water policy include the following:

- Decentralization of water resource management by facilitating decision-making process to trickle down to the lowest possible level. This approach is as a result of government's desire to decentralize the governance system and ensure a paradigm shift from, a heavily centralized system of today, to one based at provincial and district levels (GRZ, 2003). In order to reduce the disparity of access to water resources between rural and urban communities, the decentralization measure of the water sector was also undertaken to enhance devolution of power to the local or grassroots level. Consequently, the new water institutions were created, namely the Catchment Councils (CC) and Sub-catchment Councils (SCC) and the Water Users Associations

(WUAs) under the Water Resources Management Authority. Water management is therefore, a mandate of the Water Resources Management Authority (WRMA) which delegates most of the activities to catchment and sub-catchment Councils and Water User Associations (WUAs).

- Local level community and stakeholder participation in water resource management at all levels starting from the design, implementation and management of water resource-related programs and projects. It is a recognized fact that views of stakeholders are valuable in influencing decisions that affect their communities in water resources management and development. In addition, the 2011 Water Act fosters stronger participation of all stakeholders in the water sector, especially smallholders (GRZ, 2011). The National Water Policy adopts gender equity in accessing water resources as a guiding principle for water management. This principle is reflected in several articles of the 2011 Water Resources Management Act that promotes local community participation at all levels of decision making process with regard to water use.
- Promotion of regional cooperation in water resources management especially in areas of research and information exchange.
- Sustainable assurance of access to water resources in an equity manner amongst all users, consistently with social, economic and environmental needs of present and future generations.

Although the revised Water Policy refers to the normative aspect of water management, the question still remains on how these objectives would be fulfilled. Nonetheless, the implementation of the new water policy has been piloted with support from WRAP and DWA, which together have established two WUAs since 2008, namely Kamfinsa and Lunsemfwa. The Kamfinsa WUA is situated in the Upper Kafue catchment while the Lunsemfwa catchment is within the Upper Lunsemfwa sub-catchment of Luangwa catchment. Continuous disputes and competing water uses necessitated the establishment of WUAs in these areas. Manyonyo Water User Association is another WUA established to control water use

in the government funded Nega-Nega irrigation scheme in Mazabuka situated in the lower Kafue River Basin falling under the Zambezi catchment. The Manyonyo water user association is self-sustaining from membership subscription fees, but they lack the capacity to maintain the irrigation infrastructure.

Lessons learnt from the two pilot WUAs were fed back in the formulation of the Revised Water Policy and Water Resources Management Bill which was enacted by parliament in 2011. In the 2011 Water Resource Management Act, the WUAs play a critical role in water resource management in Zambia. While the pilot WUAs are financed through WRAP (EU and GIZ), within the new structure with the Water Resource Management Authority, Catchment Councils, and Sub-catchment Councils the WUAs will finance themselves mainly through water permit charges and grants only when necessary. Self-sustenance is evident in the Manyonyo WUA which thrives on membership contributions. However, since the WUAs would consist of voluntary members, training and capacity building efforts should be conducted at catchment and sub-catchment Council level to enhance effectiveness and efficiency in the operations of WUAs; nonetheless, some capacity building should be done within the WUAs for sustainability of institutional operation. The main functions of the decentralized water sector institutions in Zambia, namely, the Water Resource Management Authority, Catchment Councils, Sub-catchment Councils, and WUAs are shown in summary form in (Table 3).

Table 3: Functions of decentralized institutions outlined in the 2011 Water Resource Management Act

	Water Resource Management Authority (WRMA)	**Catchment Council (CC)**	**Sub-Catchment Council (SCC)**	**Water User Associations (WUAs)**
Water Allocation	-Approve the allocation plans and determine the amount of water to be allocated for different uses -Issue water rights -Identify potential sources of fresh water -Implement CC, SCC and WUAs activities where they don't exist	-Regulate and supervise the use of water at catchment level -Receives SCC management plans and submits to higher authority	-Regulates water use at SCC -Evaluates and recommends applications for water use rights -Prepares the allocation plan for the SCC management plan and submits it to CC -Monitoring water rights at SCC	-Administers water resources to end-users -Facilitates and supports inspections -Facilitates and maintains water supply infrastructure at end-users level
Water Charges	-Develop and revise water charges	-Corrects water charge revenue for and submits it to WRMA	-Monitors and ensures that all water charges due are paid	Payment of water charges for water resource use.
Water Quality	-Monitoring and Evaluation of Water quality -Protecting potential sources of fresh water -Protection, conservation and preservation of environment	-Water resource quality monitoring and evaluation -Catchment protection	-monitor water quality and control water pollution and catchment protection	-Monitor water quality and conserve water -Ensure catchment protection
Policy	-Formulate water policies and provide advice and recommendations to the minister	-Implement water policies at CC level	-Implement water policies at SCC level	Implement water policy at WUAs level
Dispute resolution	-Investigate and resolve any water use dispute at CC, SCC and WUAs levels -Facilitate conflict resolution through arbitration, mediation and reconciliation	-Investigate and resolve any water use dispute at CC level -Facilitate alternative dispute resolution	-Investigate and resolve any water use dispute at SCC level -Facilitate alternative dispute resolution	-Investigate and resolve any water use dispute at WUAs level -Facilitate alternative dispute resolution

Participation	-Conduct advocacy programs	-Conduct public awareness campaigns	-Public awareness campaigns -Promote community participation in water governance	-Promote community participation in water governance
Information Management	-development of a water resource information system -Implement water resource management activities where CC, SCC and WUAs do not exist	-Consolidate data from SCC and WUAs -Conduct hydrological and hydrogeological services -Implement activities for SCC and WUAs where they do not exist	-Collection of hydrological, metrological, water quality and quantity, socio-economic and environmental data for CC. -Maintain equipment for data collection	-Collection of hydrological, metrological, water quality and quantity, socio-economic and environmental data for CC. -Maintain equipment for data collection
Planning	-Develop national water resource strategy -Constitution recommendation for CC -Provide technical support and approve CC and SCC plans	-Prepare CC management plans and harmonize with the SCC plans -Provide technical support to SCC and WUAs	-Prepare SCC management and allocation plans -Harmonize WUAs management plans with SCC and provide technical support -Submit reports to CC	-Develop local water management plans and submit to CC and SCC

Despite Zambia having implemented some water sector reforms, the institutional set up is not yet aligned to the sector policies leaving 'grey zones' of responsibility and complex *de facto* arrangements. The review of empirical evidence shows that some of the major bottle necks to the full implementation of the new water policy include the following:

- Integrated approaches to water resource management not well understood at basin-level
- There is inadequate implementation of the institutional and legal framework at end users level
- There are inadequate decentralized institutional structures at grassroots level to provide for community and stakeholder participation
- There is inadequate human and financial capacity to man and finance the decentralized water resource management institutions at local level.

Uhlendahl *et al.* (2011) also identified the challenges of implementing IWRM in Zambia as being lack of adequate human resource to support the decentralized system, resistance to change by the centralized institution for fear of losing power and authority, and lack of the financial capacity.

4.5 Level of awareness and participation of households in water governance institutions in the Lower Kafue River Basin.

The chapter then also presents the micro-level analyses based on the study findings obtained from the household survey and key informant interviews in the Lower Kafue basin. The findings presented highlight aspects or issues of household awareness of water governance institutions and participation in water use decision-making; presence and effectiveness of the new water governance institutions at basin-level; the institutional support to resolve water related problems; and aspects of financial sustainability of the basin-level water governance institutions.

4.5.1 Awareness of Water Governance Institutions at Basin-level

IWRM is a commonly accepted practice for good governance of water resources and decentralization through involvement of different stakeholders in the water sector is also seen as critical to its successful implementation. In order to determine the effectiveness of the implementation of the decentralized water policy and the 2011 Water Management Act, awareness of water governance institutions at Basin-level was used as a proxy for the effective implementation of the policy in the study area. In this context, an analysis of the current levels of awareness and participation of smallholder famers in water institutions was done. In addition, the understanding of the functions and roles of the institutions and the perception of their performance was also analyzed. The interviews conducted focused on the respondents' awareness of the new water institutions which include Catchment Council, Sub-Catchment Council, Water Utility and Water Users Association. These institutions were

introduced following the enactment of the 2011 Water Act and the decentralized water policy.

The survey results show that, more than 90% of the households or water users in the lower Kafue River Basin expressed ignorance or were not aware of the newly introduced water governance institutions (see Table 4). This result is consistent with findings by Cassarotto and Kappel (2012). Their study further showed when disaggregated by gender, the women had a more limited awareness of water institutions when compared to the men. As shown in Table 4, this study also found that the households were also not aware of line ministries such as Energy and Water Development, Agriculture and Cooperatives, and Livestock and Fisheries which are also are also important in managing water resources in the communities.

Table 4: Awareness of Water related Institutions among Households

Water Related Institutions		**Districts in the Study Area**			**Whole Sample**
		Itezhi-Tezhi	**Kafue**	**Mazabuka**	
Water Users Association	yes	8.7%	8.1%	9.0%	8.6%
	no	91.3%	91.9%	91.0%	91.4%
Catchment Council	yes	12.6%	4.7%	5.4%	7.7%
	no	87.4%	95.3%	94.6%	92.3%
Sub-Catchment Council	yes	11.7%	7.0%	6.3%	8.3%
	no	88.3%	93.0%	93.7%	91.7%
Water Utility Company	yes	5.6%	12.1%	11.1%	9.6%
	no	94.4%	87.9%	88.9%	90.4%
Ministry Energy and Water Dev.	yes	8.7%	18.6%	19.8%	15.6%
	no	91.3%	81.4%	80.2%	84.4%
Ministry of Agriculture and Coop	yes	50.7%	37.9%	54.9%	47.9%
	no	49.3%	62.1%	45.1%	52.1%
Ministry of Livestock and Fisheries	yes	42.4%	40.0%	50.7%	44.4%
	no	57.6%	60.0%	49.3%	55.6%
Zambia Environmental Mgt Agency	yes	6.2%	10.7%	18.1%	11.7%
	no	93.8%	89.3%	81.9%	88.3%
Zambia Wildlife Authority	yes	47.2%	22.9%	44.4%	38.3%
	no	52.8%	77.1%	55.6%	61.7%

The implication of these findings is that it is not the formulation of new water policies or policy reforms that matters for the achievement of the desired changes in the water sector, but the effective implementation of the policy reforms. Implementation in this instance should start with awareness creation on the policy reforms and support in the establishment of institutions which serve as vehicles for implementation of the policies.

4.5.2 Presence of Water Governance Institutions at Basin-level

Apart from trying to document the level of awareness of the water governance institutions, the survey also attempted to establish or document the actual presence of water governance institutions which support and management of water resources of households' livelihoods at basin level. The survey findings show that only about 17% of respondents acknowledged having received water related productive support from the Ministry of Agriculture and Livestock at basin level. The presence and support from other institutions was negligible or was almost non-existent. About 48% of the respondents acknowledged absence of basin level institutions and that they did not receive any support (Table 5). These findings clearly show that the presence of water-related institutions supporting water related livelihoods is limited.

Table 5: Presence of Water Institutions supporting rural livelihood activities

Water-related institutions	Number	Percent
None	145	48.3
Water Users Association	9	3
Ministry Energy and Water Dev.	6	2
Ministry of Agriculture and Livestock	52	17.3
Sub-Catchment Council	3	1
Catchment Council	2	0.7
Zambia Wildlife Authority	11	3.7
Zambia Environmental Management Agency	4	1.3
Water Utility	14	4.7
other	29	9.7
Do not know	25	8.3
Total	**300**	**100**

A total of about 72% of the respondents acknowledged having received no support from central government and the related institutions. However, the central government does support the provision of irrigation infrastructure and boreholes besides the distribution of seed and fertilizer to enhance production of the staple crop (Maize). Although most of the farmers are organized in cooperatives and a handful of WUAs, most WUAs are not formally created legal entities. As such, WUAs engage in collective decisions based on their own needs, and they are governed by the Water Resource Management Act of 2011.

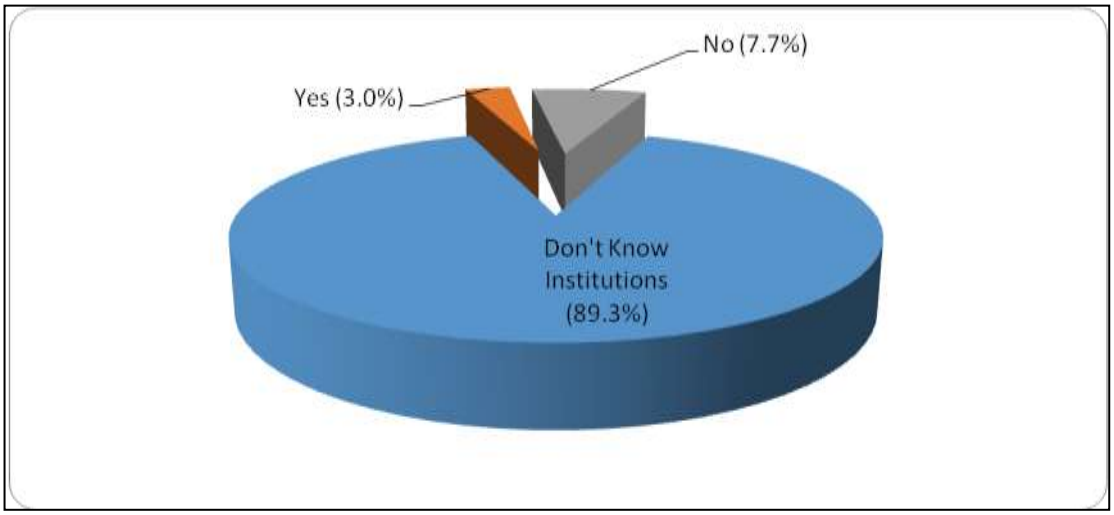
The limited presence of water-related governance institutions is against a backdrop of the government's efforts to promote decentralized water governance to the basin level and enhanced stakeholder participation through formation of locally based water institutions. The discrepancy between policy statements and actual implementation in terms of establishing water-related governance institutions at basin level is likely to negatively affect the rural households' participation in water governance and ultimately in their access to water resources.

4.5.3 Community Participation in Water use Decision-making at Basin level

The main aim of the 2011 Water Act and the 2010 Revised Decentralization Policy is to enhance stakeholders' participation in water use decision-making process and water governance. This study attempted to document the level of community participation in water use decision-making at basin level. The respondents were simply asked to indicate if they have participated in water use decision making in their respective community. The results show that in spite of the well documented decentralized water policy in form of establishing water institutions enshrined in the 2011 Water Act, only about 3 percent of the respondents acknowledged participation in the decision-making process in the new water institutions. The majority, about 89 percent of the respondents expressed ignorance of community participation in water

use decision making process at grassroots level, since they didn't even know the new water institutions (Figure 4).

Figure 4: Participation of Basin-level stakeholders in decision making



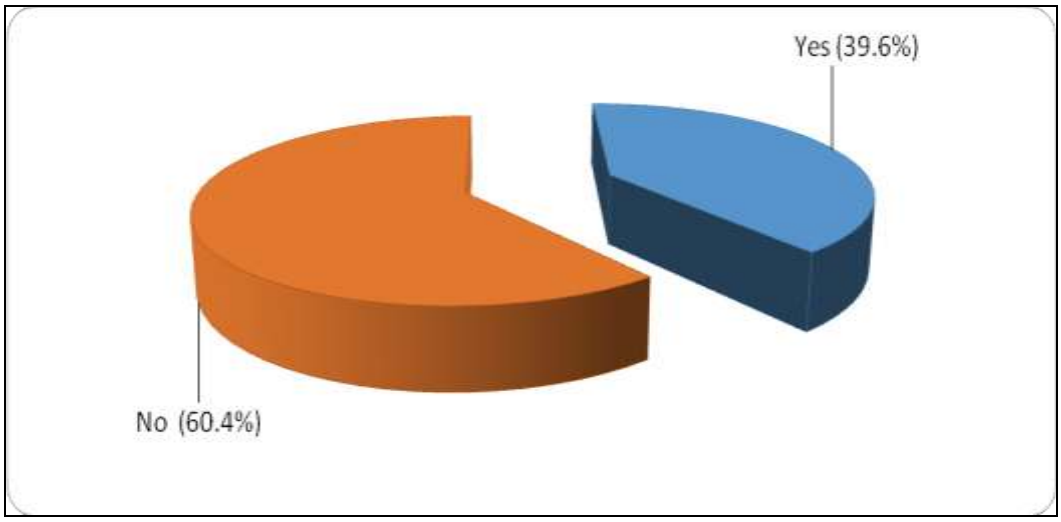
The other 8 percent simply indicated that they have never participated in decision-making in water use despite having knowledge of the presence of water institutions in their community. This low participation of rural communities in water use decision-making process, calls for intensified efforts in community sensitization and implementation of the new Water Act and Policy at basin or grassroots level.

4.6 Involvement of Water Governance Institutions in Resolving Water related Problems

The study also attempted to document the effectiveness of the decentralization initiatives at the basin or end users level. This was determined by assessing the involvement the local-level water governance institutions in resolving water use conflict related problems. The survey respondents were simply asked to identify institutions that are have been involved or intervened in resolving water related problems in their community.

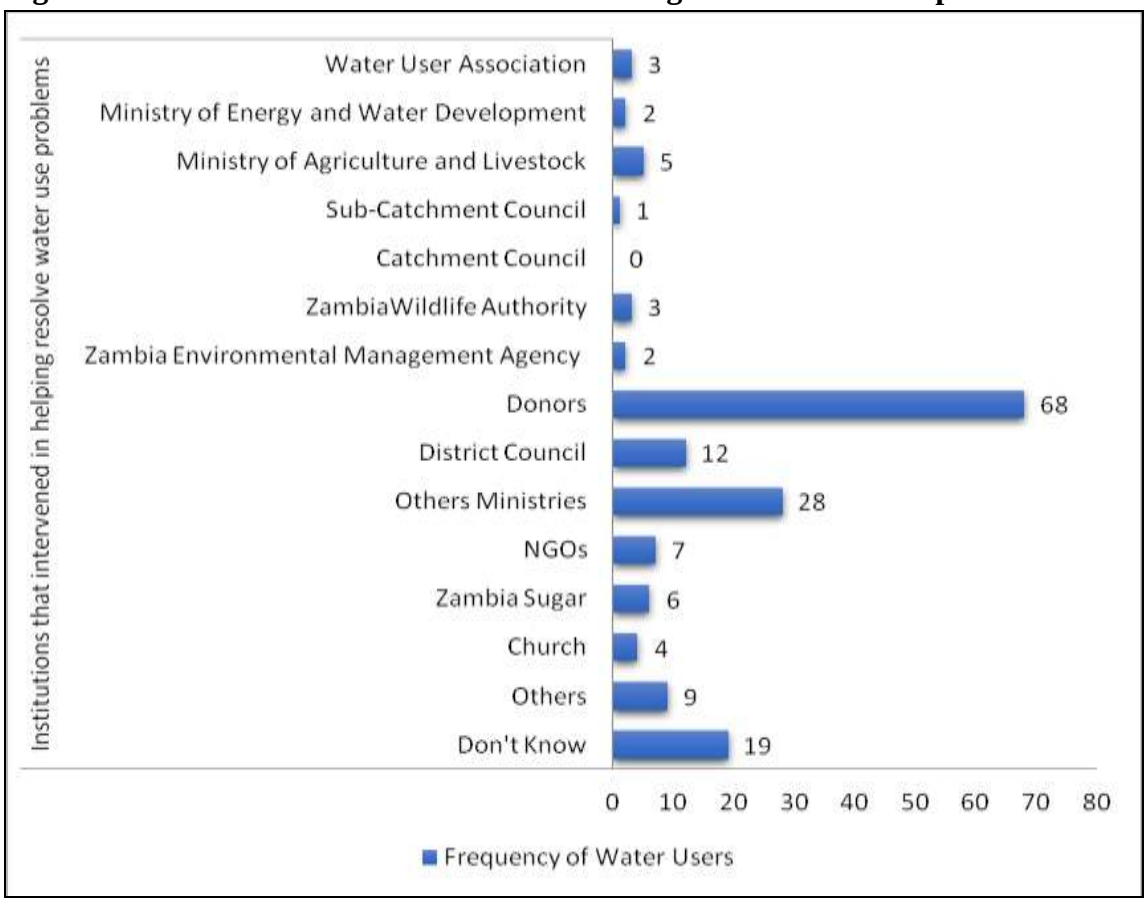
The survey results show that among the respondents who encountered water related constraints, about 60% reported that no institution came to their aid in helping them resolve the water use related problems (Figure 5). This implies that the presence of water governance institutions at grassroots level is limited as the majority of water users have no access to their services.

Figure 5: Institutional Intervention in water related problem resolutions



The results further show that among the 40% who received help in resolving water use related problems, the involvement of the known water institutions in resolving water related problems was not satisfactory (see Figure 6). About 5% of the respondents indicated that water use problems were resolved by the Ministry of Agriculture and Livestock; 2% by the MEWD and Zambia Environmental Management Agency (ZEMA) respectively. About 28% of the respondent further indicated that other ministries were involved in effectively intervening in water related problems, while 3% and 1% of the respondents identified Water User Associations and Sub-catchment Council, respectively, as having been involved in resolving water problems in their community. Nonetheless, the donor agencies appear to be the major actors that intervene in cases of water use problems at the end-users level. In fact, a majority (68%) of the respondents indicated that the donor agencies were the ones resolving water problems in their respective communities.

Figure 6: Institutions that Intervened in resolving water use-related problems



Generally, these finding suggests that the awareness and the impact of the newly enacted national water institutions at the end-users level are limited, and that donor agencies are still the major source of direct support in the water sector. Effective implementation of the 2011 Water Act, which espouses the decentralized national water institutions, is envisaged to provide solutions to all water use related problems and enhance stakeholder participation in water governance especially at grassroots level. However, as is evident from the findings of this study, the new institutions are hardly known, and even the few known ones offer limited solutions to water use problems at community or end user level.

4.7 Enforcement of water rights at the Basin-level

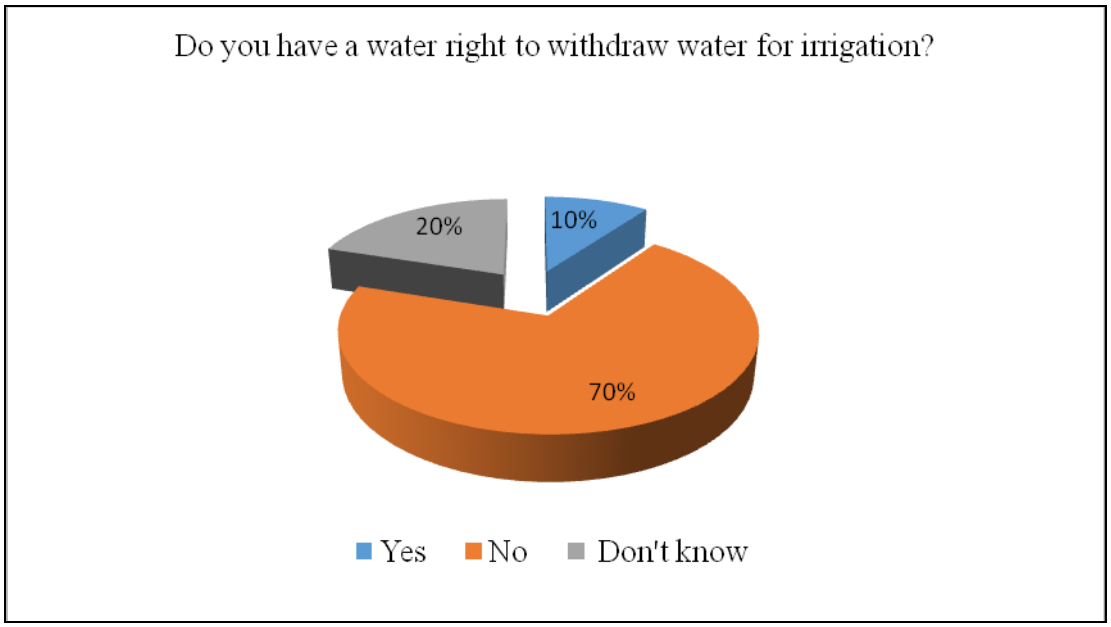
This study also tried to document the regulatory role of central government institutions at the local community level through the operation or enforcement of water rights at the basin level in the lower Kafue River Basin.

The 2011 Water Act in Zambia stipulates that water resources; surface or underground are state property and constitute a public domain. In this regard, any individual or institution has to apply for water rights in order to access huge volumes of water. In case of the lower Kafue River Basin, the consumption of water resources is not only affected by water rights, but also by the opportunistic behavior of some consumers, and by the common pool nature of natural resources.

Water requirements for satisfying domestic needs in the Kafue River Basin, does not attract water right permits, but water use for commercial purposes requires a water right permit. Water use for domestic purposes requires that users do not make use of highly mechanized means to extract the water, while the opposite is true for commercial purposes. Water use for commercial purposes depends on a water right permit or concession, implying that no one can use large volumes of either surface or underground water above the domestic needs without permission. In other words, domestic water use is done without government permission, while commercial use is regulated by issuance of water right licenses (Water Act, 2011).

The respondents interviewed both through the survey and key informants acknowledged unlicensed water use in the Kafue River Basin. The majority of users expressed ignorance of water rights (90%) and hence the high incidence of use of water without authority (Figure 7).

Figure 7: Enforcement of Water Rights in the study Area



However, most of the projects operating in the Basin have water rights, though they abstract water above the authorized volumes because there is limited monitoring. The majority of respondents lacked information on water rights and consequential penalties for offenders using water for commercial purposes without official permission

4.8 Financial Sustainability of the Basin-level Water Governance Institutions

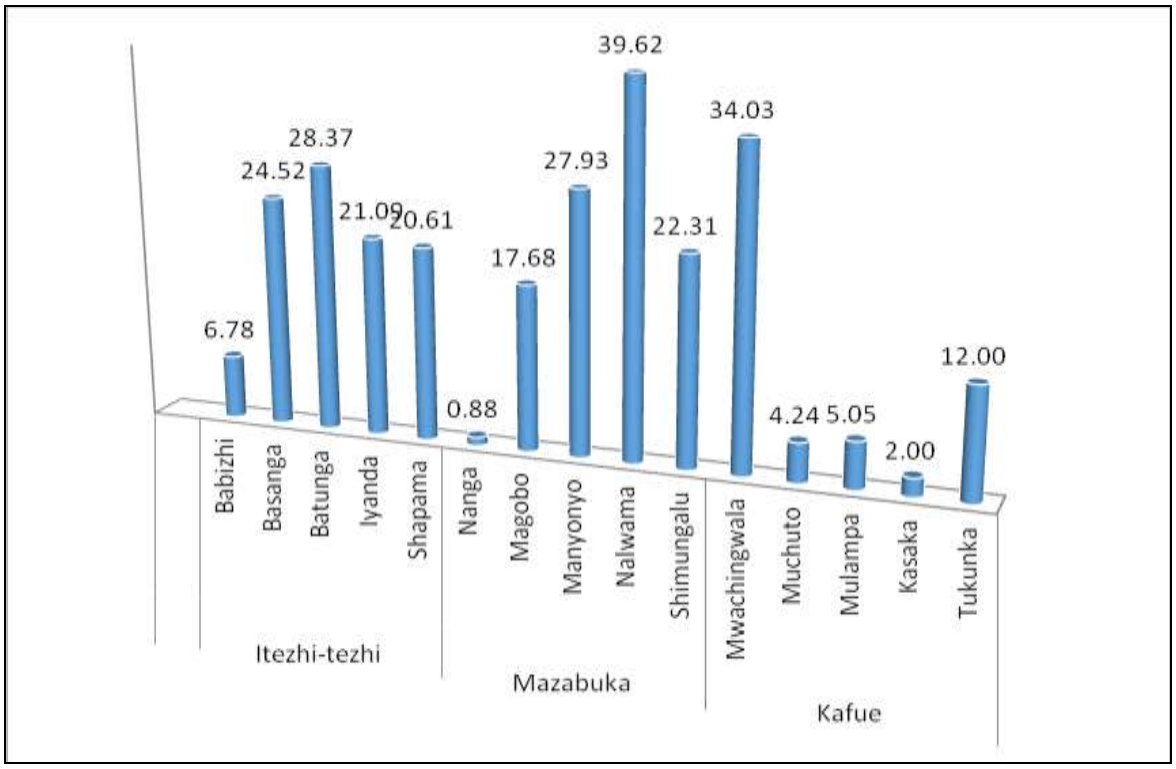
This study also tried to document the level of financial sustainability of the newly established basin level governance institutions. This was done by simply finding out the farmers' willingness to contribute towards the cost of water supply in their community.

The survey results show that farmers are willing to contribute towards the cost of water supply, but their contributions are meager; the average contribution from all of the 15 villages did not exceed ZMW40 per month[1] (Figure 8). Hence, they do not

[1] ZMW stands for Zambian Kwacha, the local currency and legal tender in Zambia. In September 2014, the exchange rate was about 6ZMW = 1US$

have the financial capacity to maintain the rural water supply infrastructures, such as mono pumps and irrigation canals. This result to a large extent reflect concerns raised in a study done by Dinar *et al*., (2005) who noted that decentralization processes only stand a higher chance or probability of achieving sustainable success in basin areas which have the capacity to contribute financial resources for sustainable continuation and consolidation of the process.

Figure 8: Household Monetary contribution (ZMW) towards Water Use by Village



The few water users registered in selected irrigation schemes like Manyonyo Water Users Association in Mazabuka area are aware that, with decentralization, they have to take the full responsibility of repairing mono pumps for domestic water supply. At the same time, the WUAs also have the responsibility of maintaining irrigation infrastructure such as tertiary canals to individual farmers in the irrigation scheme. Devolution of power and responsibility to the lowest possible organ is the main thrust for decentralization and the only way to achieve IWRM, the globally accepted

best governance practice to manage water resources. However, if such powers and responsibilities are given to the lowest possible institution such as WUAs without the matching financial resources required to execute such responsibilities, the effectiveness of the water reform process of decentralization might be compromised. In most instances, the revenue from crop sales is insufficient to enable farmers contribute economic rates towards the cost of sustainable water supply.

4.9 Summary of Findings

The major water policy reforms that have taken place under the period under review include the establishment of the 1994 water policy and the revision of the policy in 2010 in order to align it to the new widely accepted water management practice of IWRM. The major water policy reforms are decentralization by devolution of powers to local level institutions and separate regulatory and executive functions from Water Supply and Sanitation. the National Water Supply and Sanitation Council (NWASCO) is mandated by the Water Supply and Sanitation Act of 1997 to regulate and to carry out executive function while, appointing local authorities to implement WSS services. To enhance community participation at basin-level, the 2011 Water management Act was enacted by parliament to govern the decentralized water institutions up to grassroots level. The new water institutions include: Water Resource Management Authority (WRMA), Catchment Council (CC), Sub-catchment Council (SCC) and Water User Association (WUAs). The WUAs are the grassroots water institutions that manage water resources at Basin-level.

The major thrust of the water sector reforms is anchored on decentralization with emphasis on stakeholder participation, however, the reality is that the new institutions are hardly known at basin-level and even the few known ones offer limited solutions to water use problems. The results show that 90% of respondents are not aware of the newly introduced water governance institutions while, 97% of respondents expressed ignorance on community participation in water use decision-making processes at grassroots level. Nonetheless, the donor agencies appear to be

the major actors that intervene in water use problem resolution at basin-level. The central government still does provide support to rural communities in terms of provision of irrigation infrastructure and boreholes, but support towards water use is limited. Study findings further show that basin-level stakeholders have limited information on water use rights and very few water users have water rights or permits to use water for irrigation.

Acquisition of relevant and appropriate information about the new water governance institutions give confidence and impetus to participate in water governance issues. Accessibility to full information and knowledge about any issue is a form of power. Therefore, if the grassroots stakeholders are equipped with appropriate knowledge and information about the 2011 Water Act, Water Policy, Catchment Councils (CCs), Sub-Catchment Council (SCCs), Water User Associations (WUAs) and their functions, participation in making appropriate decisions with regard to water resource governance would be enhanced. Thus it will be worthwhile for the government through National Water Supply and Sanitation Council (NWASCO), CCs, SCCs and WUAs to sensitize and communicate the information about the new water governance sector reforms to all stakeholders.

The study also found that despite their willingness to pay for water services, the respondents do not have the financial capacity to pay economic amounts that could maintain the rural water supply infrastructure. In terms of institutional support from water institutions, the majority of respondents reported having received no support. The results also show limited existence of such institutions at basin-level.

CHAPTER 5
RURAL HOUSEHOLDS' WATER USE PATTERNS TO SUPPORT LIVELIHOODS IN THE LOWER KAFUE RIVER BASIN

5.1 Introduction

This chapter presents and discusses the results of the survey conducted on the livelihoods and water uses of households in the lower Kafue River Basin. The chapter is divided into two sections. The first section is on the social-economic characteristics and sources of rural livelihoods. It provides a descriptive analysis of the sampled households in terms of age, level of education household size and the occupation of household heads. This section also makes comparisons of the different economic activities undertaken by households. The second section presents the characterization of domestic and productive water uses to support rural livelihoods. Section two is divided into three sub-sections which include: domestic water use, water use for agricultural production and non-consumptive water use for fishing. This chapter also compares the findings of the study with other studies done within the area and elsewhere. The chapter ends by highlighting the constraints faced by water users in pursuit of rural livelihoods.

5.2 Social and Economic Characteristics of the Sample Households

The sampled households had the majority of household head at their optimal productive age of 40 years with the average age of 46 (see Table 6). Despite the majority of the respondents being at optimal productive age, they have not attained the basic level of education (Grade 9). Survey results show that about 8% of the respondents are illiterate implying that they can neither read nor write. While, the highest proportion (57%) has only attained primary school level education. Thirty two percent of the respondents have attained secondary level education and only 2% has attained tertiary level education. The respondents have an average family size of

7 members. This implies that there is a high family burden among the respondents who have to depend primarily on farming and fishing as their major source of livelihoods. The majority of households are male-headed (82%) with only 18% being female-headed, who are widowed, divorced or never been married before.

Table 6: Basic Descriptive Statistics of the Sampled Households.

Variable Names	Districts in the Study Area			Whole Sample
	Itezhi-Tezhi	Kafue	Mazabuka	
Gender of the HH head				
Male	84.70%	73.60%	87.40%	82.00%
Female	15.30%	26.40%	12.60%	18.00%
Age of the HH head	Mean	Mean	Mean	Mean
Years	48	42	46	46
Household (HH) Size	Mean	Mean	Mean	Mean
Number of People	8	6	7	7
Level of HH Education				
None	4.90%	7.90%	10.50%	7.70%
Primary	60.40%	55.70%	54.50%	56.90%
Secondary	31.90%	31.40%	32.20%	31.90%
Tertiary	0.70%	3.60%	1.40%	1.90%
Do not know	2.10%	1.40%	1.40%	1.60%

Farming is the predominant economic/livelihood activity in all the three districts accounting for 69% of respondents, though Kafue and Mazabuka districts, owing to the closeness to the large markets of Lusaka and Mazabuka and the fairly good infrastructure, exhibit a more diverse pattern of economic/livelihood activities. In Itezhi-Tezhi, which is the most rural district, most households are involved in livestock rearing (63%) and farming (94%), with about 31% of respondents undertaking fishing as a livelihood activity. Kafue and Mazabuka have significant percentages (13% and 14% respectively) of respondents formally employed in the private sector (Table 7). Livestock rearing, mainly cattle, is the most important livelihood activity in Itezhi-Tezhi with 63% of respondents, compared to Mazabuka and Kafue with 35% and 15% respectively.

Table 7: Occupation of Household Heads (Economic Activities/Livelihoods)

Livelihood Activities	Districts in the Study Area			Whole Sample
	Itezhi-Tezhi	Kafue	Mazabuka	
Farming	94.4%	52.1%	59.4%	68.9%
Fishing	31.2%	30.0%	31.5%	30.9%
Fish trading	16.0%	11.4%	14.7%	14.1%
Livestock rearing	62.5%	15.0%	35.0%	37.7%
Working - public sector	1.4%	2.9%	2.8%	2.3%
Working -private sector	5.6%	12.9%	14.0%	10.8%
Self-employment	7.6%	15.7%	5.6%	9.6%
Others	0.00%	1.40%	2.80%	1.40%

Agriculture is the predominant activity in the study area with the majority of smallholder farmers practicing subsistence farming and maize being the major rain-fed crop. Gardening is also practiced in the dry season and crops grown include leafy vegetables and tomato. These crops are usually manually irrigated using simple tools such as 20 liter containers, buckets and jerry cans. Other livelihood activities include the non-consumptive use of water for fishing and recreation.

5.3 Domestic and Productive use of Water for Rural Livelihoods

As was reported in Chapter 5, this survey collected information on aspects of water governance and the households' awareness of water institutions as well as their participation in these institutions at the local-level. In addition to this, the survey collected information on patterns of water use to support livelihood activities. Some of the information collected was on and about the water uses for domestic purposes; water use for farming and the non-consumptive water use for fishing.

5.3.1 Water use for Domestic Purposes

The average amount of water used for domestic purposes, which includes the water used for drinking, bathing, laundry, cleaning, cooking and for the watering of small gardens around the house, ranges between a minimum of 12.76 liters per capita per day in Mulampa and a maximum of about 29.53 liters per capita per day in Muchuto (Table 8).

Table 8: Average Water use by Village**.**

Districts	Village name	Mean (lt/day/c)	Median (lt/day/c)	Standard Deviation
Itezhi-Tezhi	Babizhi	17.33	16.67	9.23
	Basanga	20.52	19.47	10.09
	Batunga	16.22	16.00	8.48
	Iyanda	24.01	20.00	17.57
	Shapama	19.82	15.14	19.07
	Avg. Itezhi-Tezhi	*19.54*	*16.67*	*13.13*
Kafue	Kasaka	19.64	18.75	9.38
	Muchuto	29.53	20.00	48.35
	Mulampa	12.76	10.00	9.40
	Mwanachingwala	19.56	16.00	16.13
	Tukunka	22.67	20.00	14.65
	Avg. Kafue	*20.93*	*16.00*	*23.05*
Mazabuka	Magobo	28.67	18.00	22.90
	Manyonyo	19.32	17.14	8.01
	Nalwama	22.62	16.33	16.23
	Nanga	17.83	14.64	10.76
	Shimungalu	29.51	22.94	22.82
	Avg. Mazabuka	*23.51*	*20.00*	*17.75*

Eight villages, three in Kafue, three in Itezhi-Tezhi, and two in Mazabuka reported using or consuming an average of less than 20 liters per capita per day. This clearly indicates that, based on the World Health Organization (2003) requirements[2], only a

[2] The World Health Organization (WHO)classifies the requirement for water service level to promote health into:
- No access: quantity collected often below 5 l/c/d and more than 30 minutes total collection time;
- Basic access: average quantity unlikely to exceed 20 l/c/d and between 5 to 30 minutes collection time;
- Intermediate access: quantity about 50 l/c/d and water delivered through tap or within 5 minutes collection time;
- Optimal access: average quantity 100 l/c/d and Water supplied through multiple taps continuously.

basic access to water can be ensured and that the achievement of optimal hygiene conditions and the possibility to bath and laundry are difficult to undertake unless carried out directly at the water source. It is interesting to note that in none of the villages the average consumption of domestic water exceeds 50 liters per capita per day. This seems to suggest that the accessibility to water might not be satisfactory in the Lower Kafue River Basin. In addition, among the respondents with basic access to water, a few have access to clean and safe water from public boreholes and taps. As a result, child mortality continues to be exacerbated by diarrheal diseases caused by lack of clean water and adequate sanitation. Among adults diarrheal diseases lead to productivity losses, thereby exposing the vulnerable households to the vicious cycle of poverty. This result is consistent with descriptive analyses done by Nyambod (2010). Furthermore, among the minority with access to safe water, several constraints such as drought, competition amongst users, pollution, and re-current mechanical breakdowns undermine the reliability of water supply to their households.

The survey results also highlight a paradox; in a water abundant area where the Kafue River discharges large amounts of water into the Zambezi, problems of unreliable water supply, let alone competition among users, still exist. Water availability at rural household level is not assured throughout the year and such problems affect the livelihoods of most of the water users in the lower Kafue River Basin.

Most of the rural households in the study area do not have access to clean water and the most reliable sources of clean water, such as piped water from the tap, is uncommon and accessed by only 7.2% of the respondents. Water from the tap is considered clean because it is usually treated, while borehole water is also considered clean because boreholes are deep and water is pumped by a mono-pump, hence are not exposed to contamination. The most common sources for domestic water are public boreholes, followed by public wells and the rivers (Table 9). About 40% of

the respondents draw water from public and private boreholes, which are within 15 minutes of walking distance.

Table 9: Water sources and accessibility of water (percentage of users)

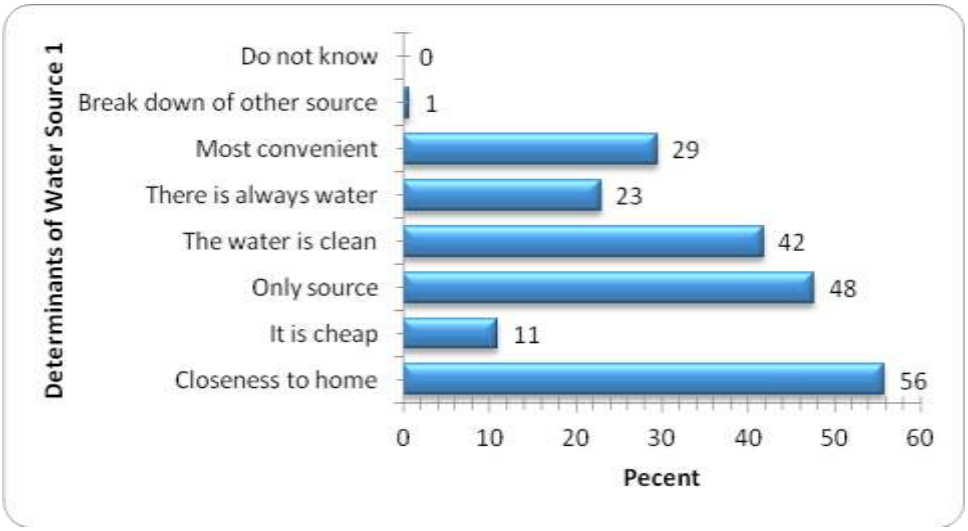
Source of Water	**Time taken to and from the Water Source (Walking)**			***Total by Source***
	Less than 15 minutes	**15 minutes < time < 1 hour**	**More than 1 hour**	
Spring	0.2	0.2	0.3	0.7
Canal	0.5	0.2	0	0.7
River	5.3	5.3	4.7	15.4
Stream	0.8	2.2	1.0	4.0
Private Well	11.2	2.0	0.3	13.5
Public Well	11.0	2.7	3.0	16.7
Private Borehole	0.7	1.8	0.7	3.2
Public Borehole	17.4	15.0	4.2	36.6
Tap	2.0	4.3	0.8	7.2
Dam	0.2	0.3	0	0.5
Other	1.0	0.7	0	1.7
Total by time	**50.3**	34.7	15.0	100

Public boreholes are preferred as source of water because of the high quality standard of water, but the users or respondents reported that they experience frequent breakdowns that require the need to use alternative sources because it is difficult for rural households to meet the cost towards repairs of broken down mono pump water systems. Public and private wells are frequently used, but siltation during the rainy season and drying up of the source were frequently reported as problems. In more than 15% of the cases, users directly draw water from the river. This is often the case in large villages located on the banks of the Kafue River and where boreholes or wells are particularly rare. Such practices has negative consequences for public health, as the Kafue, besides being the exclusive source of drinking water, is also used for washing clothes, for personal hygiene and for sanitary services.

Time taken to and from the water source was used as a proxy for measuring water accessibility. Results show that 50% of the respondents use a water source that is located not further than 15 minutes of walking distance. This result implies that half of the respondents have to walk for more than 15 minutes to have access to water.

There are several factors that determine where households access water for domestic use. Therefore, it is important to know such factors as they would help guide formulation of appropriate water policies that would make water resources more accessible to rural households. Survey results show that the first determinant of first choice of water source is the closeness to home with about 56% of respondents (Figure 9). The second determinant is only source with about 48% of respondents. The cleanliness of the water, despite it being the most important, is the third determinant of choice of water source with 42%. Other potential determinants of first choice of water source include: most convenient and that there is always water with 29% and 23% respectively.

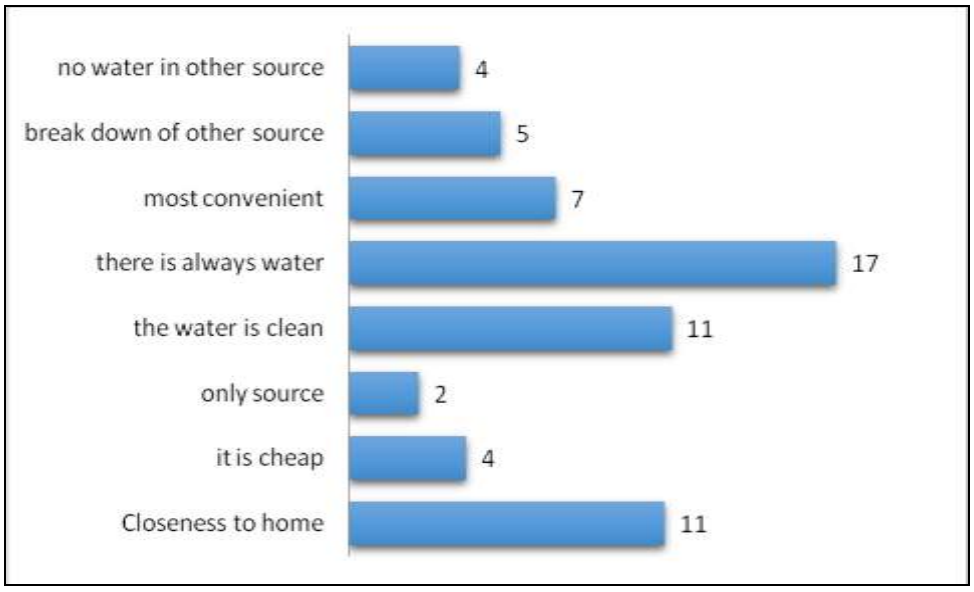
Figure 9: Determinants of First Choice of Water Source (% of respondents)



However, economic considerations are rarely taken into account, since few people pay for the operation and maintenance of the water sources and in cases where payments are made; they are not considered as excessive and are usually negligible.

The first determinant of Second Choice of Water Source is "there is always water" with 17% of respondents (Figure 10). The percentage of respondents acknowledging second choice of water source is low mainly because very few water users had a second choice of water source. This result is rational, because when water users find no water at their first choice water source, they will always choose a second choice where there is always water regardless of quality. Closeness to home and cleanness of water with 11% respondents are the second determinants of second choice of water source. Other determinants are breakdown at other source and most convenient.

Figure 10: Determinants of Second Choice of Water Source (% of respondents)



This study defines the unreliability of the water supply as lack of water at source. The problems reported to cause unreliability in water supply include: mechanical breakdowns of mono pumps, depletion of water by competing users and lowering of ground water. The problem appears to affect the three districts uniformly with the

villages of Iyanda, Mulampa, Nanga, and Shimungalu reporting unreliable water supply in more than half of the households. Interestingly, the phenomenon is strongly correlated to the choice of the water source: public boreholes appear to be the most unreliable source of water with about 31% respondents, while rivers and streams 1% and 2% respectively, which are mostly perennial, are amongst the most reliable water sources (Table 10). The public boreholes are reported to be unreliable sources of water mainly because of the unexpected mechanical breakdowns, while, this is not the case with rivers and streams.

Table 10: Unreliability of Water Supply

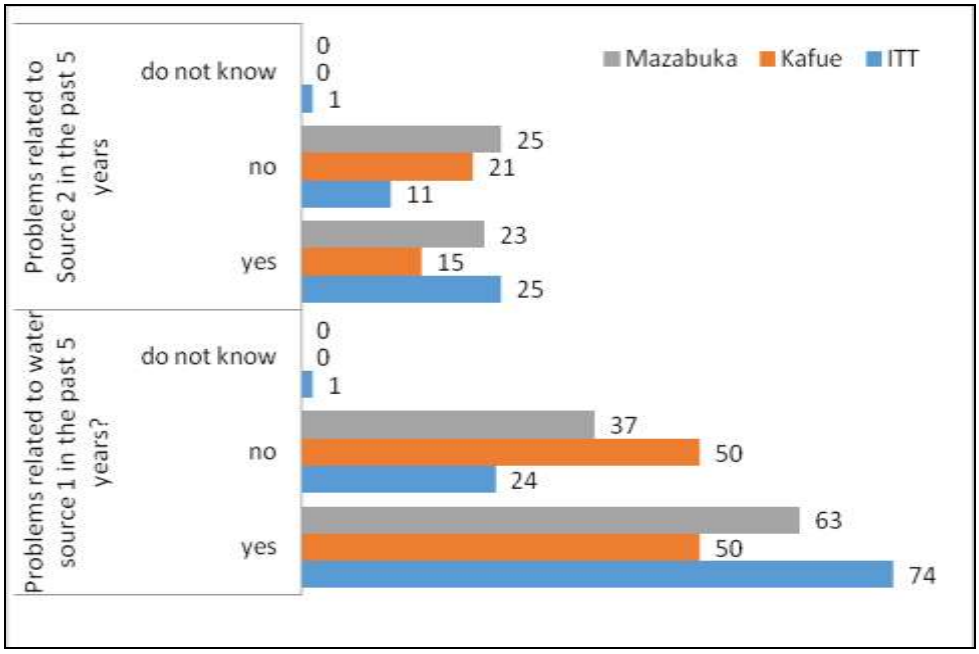
Source of water	Percentage of respondents	Number of respondents
Spring	0%	0
Canal	0%	0
River	1.2%	3
Stream	1.6%	4
Private Well	17.2%	44
Public well	23.0%	59
Private Borehole	7.0%	18
Public Borehole	30.5%	78
Tap	12.5%	32
Rainwater	4.7%	12
Dam	0%	0
Other	2.4%	6

The unreliability of water supply was not the only problem encountered by water users in the study area. Therefore, this section analyses the unique problems water users encounter in accessing water from water source one and two over the past five years. Survey results show that Itezhi-Tezhi has the highest prevalence of problems related to the first choice water source with about 74%, compared to Mazabuka and Kafue with 63% and 50% of respondents respectively (Figure 11).

In case of second choice water source, few respondents reported as having had encountered problems mainly because the majority of respondents reported having no second choice of water source. However, the highest in problems encountered

again is Itezhi-Tezhi with 25% compared to 23% and 15% respondents for Mazabuka and Kafue Districts respectively.

Figure 11: Problems Related to Water Sources (% of respondents)

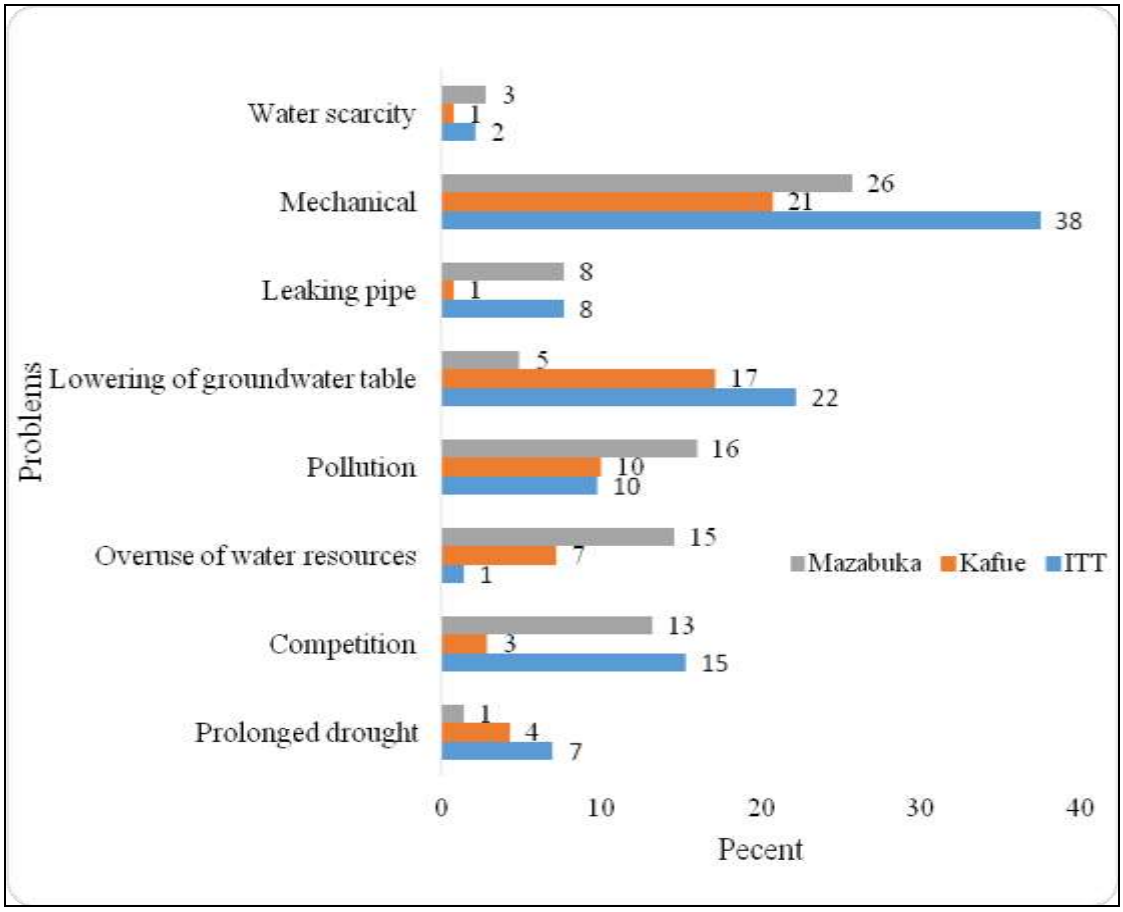


Access to clean and safe water is regarded as important for healthy living, however, survey results show that more than 50% of the respondents in the study area are constrained with several bottlenecks in accessing water resources. This result has a negative bearing on government interventions to improve rural household water supply and livelihoods.

The new water policy, water act and several government interventions all target at improving both rural and urban household's access to water resources and resolve water accessibility problems. This section analyses the specific constraints encountered by water users related to water source 1. The study results show that accessibility to water resources seems to be mired in several constraints for a number of respondents. Depletion of water resources due to lowering of the groundwater table is most significant in Itezhi-Tezhi affecting about 22% of water users,

compared to 16% and 17% in Kafue and Mazabuka respectively (Figure 12). The problem is compounded by not only the construction of the Itezhi-Tezhi Dam, but also the recurrent of droughts and diminishing rainfall patterns. Overuse of water resources is most pronounced in Mazabuka (15%) mainly because of the presence of a large sugar estate which uses a lot of water. Mechanical breakdown is prominent in Itezhi-Tezhi and constitute a problem for 38% of the water users because boreholes are the main source of water and mono pumps are susceptible to breakdowns.

Figure 12: Water Use Problems for Water Source 1 (% of respondents)



Competition for water amongst users, mainly expressed in quarrels and queues, is most prominent in Itezhi-Tezhi with 15% water users affected (see Figure 13). Compounding this problem is the fact that domestic animals such as cattle and goats

are watered from the same source as humans. However, most of the rural communities within the study area generally consider queuing, quarrelling and sharing of water source with domestic animals as normal, mainly because they have

Figure 13: Children wait for their turn in the queue to draw water from a Mono Pump in Itezhi-Tezhi

lived like that for a long time[3]. Water scarcity was the least problem experienced in the study area and the highest incidence being recorded in Mazabuka by 3% of users. Leaking of pipes and prolonged droughts were among other problems encountered by water users in all the three Districts of the study area.

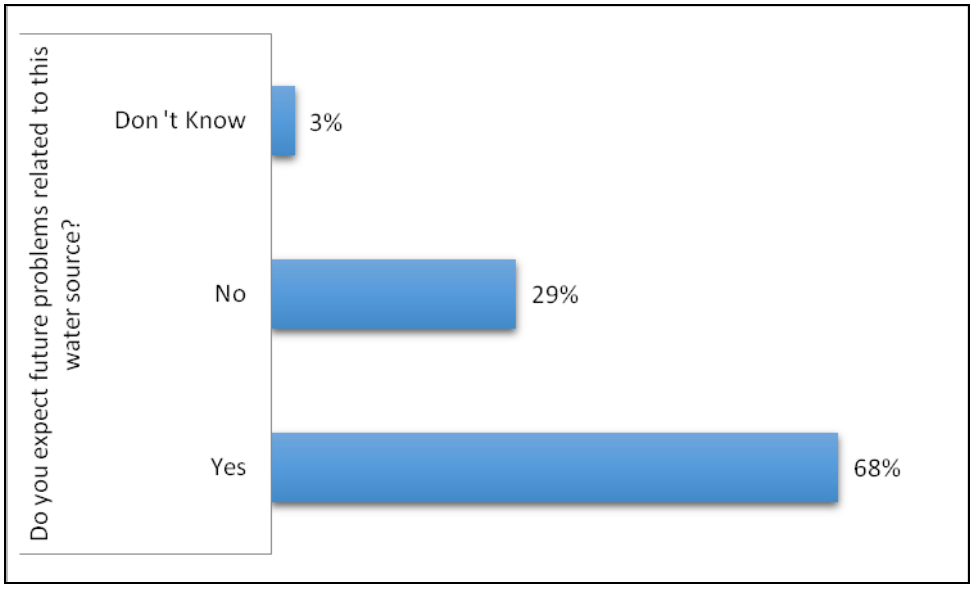
5.3.2 Perceptions of Respondents on Water Access Problems in the Future

It is important to determine the perception of the respondents about the extent to which water access problems would affect them in the future, in order to recommend

[3]Williams (1984) noted that the Ila tribe of Namwala, were at one time said to be the richest cattle keepers in Central Africa. Cattle herding is a significant part of the livelihood of the people especially in areas like Itezhi-Tezhi which is near to Namwala District.

appropriate policy interventions. The perception of respondents about the future water accessibility problem is not the same. According to the survey results more that 67% of respondents perceive that water accessibility problems would persist to affect them even in future, compared to about 29% who perceive that the current water problems would not affect them in future. A few respondents were ignorant about the effects of the current water access problems in future (Figure 14).

Figure 14: Perception of Respondents about Future Water Problems



5.3.3 Water use for Agricultural Production

The three study districts show slightly different water use patterns. Besides domestic water use, which takes first priority in all the three districts, water use for agricultural production takes central importance in all the districts. Nonetheless, rain-fed agriculture is predominant in the three regions. Statistically, Itezhi-Tezhi district has the highest number of respondents practicing rain-fed agriculture accounting for 94%, followed by Mazabuka with 59% and the least Kafue with 48% (Table 11). Maize is the first priority crop in rain-fed agriculture in all the three districts, followed by sweet potatoes in Kafue, and groundnuts in Itezhi-Tezhi and Mazabuka.

Irrigation farming is rarely practiced by most of the respondents. Irrigation for subsistence crops is practiced by 24% of respondents in all the three Districts, while, and 4% and 7% irrigate commercial crops in Kafue and Mazabuka Districts, respectively. Irrigation for commercial crops is generally very low in the study area, but Itezhi-Tezhi has the lowest with 1% of respondents.

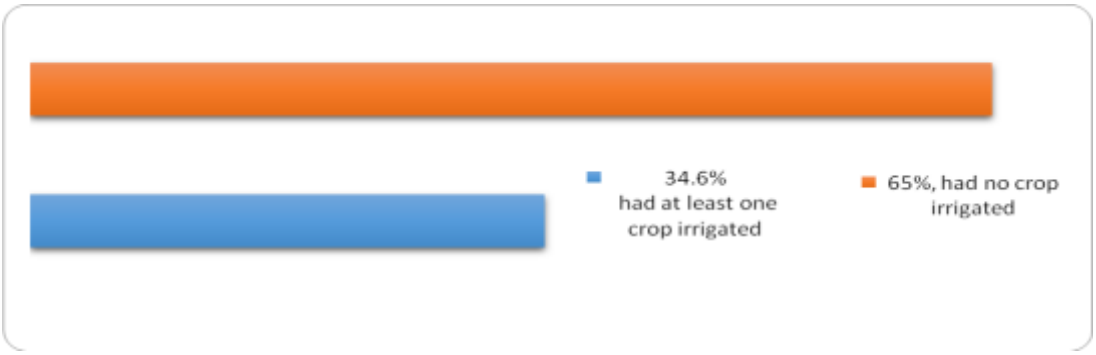
Table 11: Water Use to support Livelihoods in the Study Area

	Districts from the Study Area			
Water Uses	**Itezhi-Tezhi**	**Kafue**	**Mazabuka**	**Whole Sample**
Irrigation of subsistence crops	24.3%	23.6%	24.5%	24.1%
Irrigation of commercial crops	0.7%	3.6%	7.0%	3.7%
Rainfed agriculture	93.8%	47.9%	58.7%	67.0%
Livestock watering	68.1%	25.0%	39.2%	44.3%
Fishing	31.9%	30.0%	32.2%	31.4%

However, Itezhi-Tezhi shows the highest percentage of respondents using water for livestock watering (68%). This is because livestock is a key source of livelihood and household prestige, especially among the Ila ethnic group. In the case of Kafue District, water use for fishing takes a more important role as compared to livestock watering.

Despite the Government through the Ministry of Agriculture and Livestock (MAL) having developed an Irrigation Policy to promote irrigation farming among small-scale farmers, empirical evidence shows that only about 35% of all the respondents had at least one crop irrigated in 2010 growing season (Figure 15).

Figure 15: Irrigated Agriculture in 2010 Growing Season



Irrigation farming is considered as a remedy to the effects of climate change such as erratic and unreliable rainfall patterns which cause food insecurity among rural households. However, considering the current low water utilization in irrigated farming, this solution to the effects of droughts and climate change among the smallholder farmers, appears to be unlikely in the short to medium-term unless there is investment in irrigation infrastructure and farmer training to encourage the uptake of irrigation practices.

Not only is there low practice of irrigation farming among the respondents, but the irrigation practices are equally not mechanized. It is mostly traditional and manual irrigation. The manual irrigation practiced by most households involves the use of buckets to irrigate the fields and accounts for about 100% of the respondents in Itezhi-Tezhi, 56% in Kafue, and 86% in Mazabuka (Table 12). Surface furrow irrigation is only practiced in Kafue (29%) and Mazabuka (15%) and localized sprinkler is an uncommon method adopted by only 6% of respondents in Kafue. Manual irrigation, though the most popular method, is labour intensive and not water conserving. Thus, irrigation is only practiced on small pieces of land with mainly vegetables and tomatoes as the major irrigated crops.

Table 12: Irrigation Practices by Respondents

Irrigation Methods	Districts from the Study Area			Whole Sample
	Itezhi-Tezhi	Kafue	Mazabuka	
Manual	100.0%	55.9%	85.3%	80.6%
Surface - furrow	0.0%	29.4%	14.7%	14.6%
Surface - Basin	0.0%	5.9%	0.0%	1.9%
Localized - sprinkler	0.0%	5.9%	0.0%	1.9%

5.3.4 Non–Consumptive Water use for Fishing

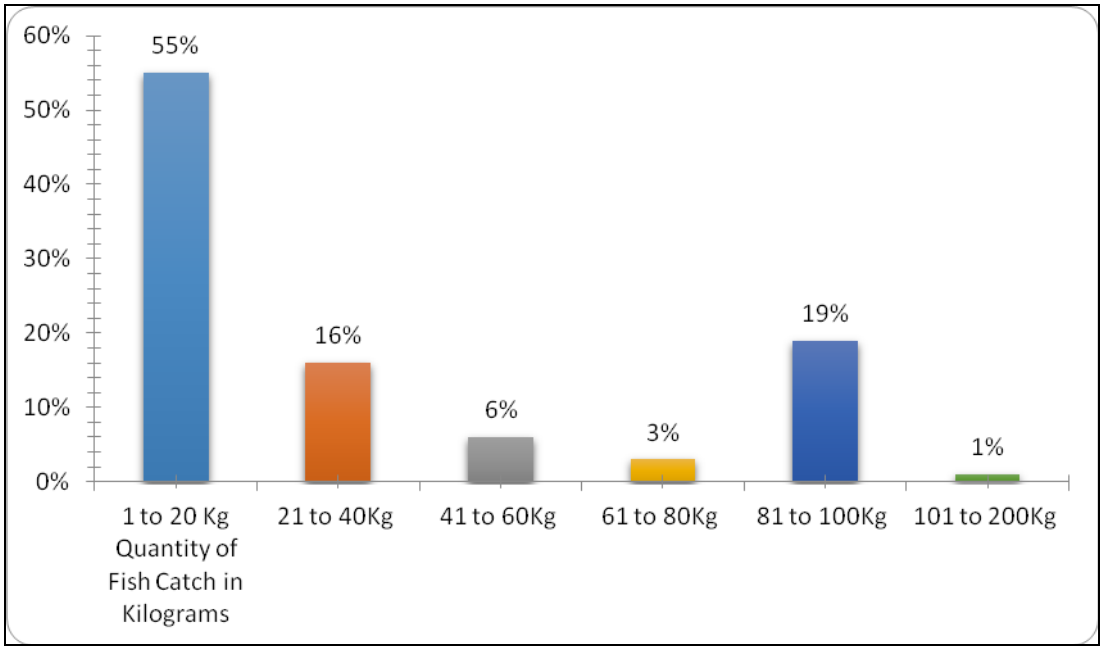
Fishing is a non-consumptive water use and constitutes an important source of livelihood for the majority of rural communities. Fishing has the potential to generate income and contribute to improved rural livelihoods. However, survey results show very low utilization of water for fishing (Table 13). Itezhi-Tezhi is one of the most remote districts sampled and it has limited economic activities, as such, fishing could be the main source of livelihood for most of the respondents. However, 20% of respondents use water for commercial fishing purposes and it is the highest percentage compared to 18% and 17% for Kafue and Mazabuka respectively. Subsistence fishing accounts for 15% of respondents in Mazabuka, with 12% and 11% for Itezhi-Tezhi and Kafue respectively. Results further show that the predominant reason for engaging in fishing activities is commercial (fishing for sale to both local and city markets). The second reason for fishing activities is for subsistence or household consumption.

Table 13: Reasons for Engaging in Fishing Activities

District	Commercial Fishing (for Sale to local or city market)		Subsistence Fishing		Recreation	
	N	Percent	N	Percent	N	Percent
Itezhi-Tezhi	29	20%	17	12%	0	0%
Kafue	25	18%	16	11%	1	1%
Mazabuka	24	17%	21	15%	0	0%

Fishing is one of the main occupations for some of the respondents and the main source of livelihood. However, despite fishing being one of the main sources of livelihood to several respondents, the amount of fish catch is low. Results show that about 55% of the respondents have fish catches in the range of 1 to 20 kilograms per day, 19% with fish catches between 81 to 100 kilograms per day and 16% with fish catches between 21 to 40 kilograms (Figure 16). The low level of fish catches in the study area impact negatively on their livelihoods.

Figure 16: Fish catch on a normal fishing day in the lower Kafue River Basin (% of respondents)



There is a variation of fish catch between different areas; Mazabuka District has the highest number of respondents (20%) with fish catches in the range of 1 to 20 kilograms per day, followed by Kafue with 16% and Itezhi-Tezhi being the least with 14% in the same category (Table 14). These results could be attributed to the fact that Mazabuka and Kafue's proximity to the market, offers an opportunity for small-scale fishermen to sale their fish either locally or in Lusaka. Furthermore, results show that Itezhi-Tezhi is the only district with a range of fish catches in all the fish

catch categories. Fishing seems to be an important economic activity in Itezhi-Tezhi. This could be attributed to the fact that Itezhi-Tezhi is a remote rural district with limited alternative livelihood activities.

Table 14: Fish Catch by District

	1 - 20 Kg		21 - 40 Kg		41 -60 Kg		61 - 80 Kg		81 - 100 Kg		101 -200 Kg	
Districts	N	%	N	%	N	%	N	%	N	%	N	%
ITT	20	14%	10	7%	6	4%	3	2%	5	3%	2	1%
Kafue	23	16%	7	5%	0	0%	1	1%	10	7%	0	0%
Mazabuka	29	20%	4	3%	2	1%	0	0%	10	7%	0	0%

However, despite fishing being an important economic activity for Itezhi-Tezhi, fish catches are low. Results show that, about 14% of the respondents interviewed catch 1-20 kilograms of fish per day and the trend shows a reduction in number of respondents catching fish per day as the fish catch category increases, with about only 1% fish catches in the category of 101-200 kilograms for Itezhi-Tezhi. In the cases of Kafue and Mazabuka districts, both districts reported no fish catch in the category of 101-200 kilograms.

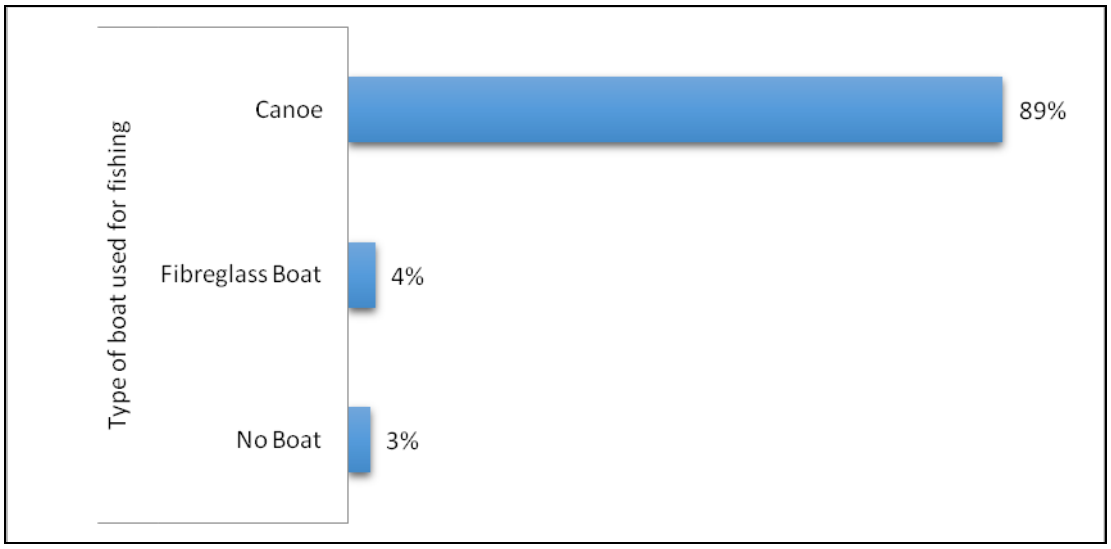
The trend of fish catches over the fishing life span of fishermen was analyzed and the results show that more than 75% reported a decrease in fish catches from the time they started fishing to the time of the interview. While, about 8% reported that there was no change and about 10% reported an increase in fish catches (Table 15). The dwindling fish resource in the lower Kafue River Basin has been attributed to several factors among which is overfishing, use of wrong fishing nets and changes in the flooding patterns following the construction of Itezhi-Tezhi and Kafue Gorge Dams. The dam construction affects the downstream by reducing flooding patterns which in turn reduces fish breeding ground.

Table 15: Trend of Fish Catch over the Fishing life Span of Respondents

Trend of Fish Catch	Districts from the Study Area			Whole Sample
	Itezhi-Tezhi	Kafue	Mazabuka	
Fish catch has been decreasing	54.3%	80.5%	93.3%	75.8%
Fish catch has been the same	10.9%	9.8%	4.4%	8.3%
Fish catch has been increasing	21.7%	4.9%	2.2%	9.8%
do not know	13.0%	4.9%	0.0%	6.1%

The type of fishing boat used also determines the amount of fish catch. It is a common norm in the lower Kafue river basin to find traditional dug-out canoes which are risky, with low capacity to carry heavy loads; being used for fishing. Despite the use of canoes for fishing being risky and dangerous, more than 89% of respondents use canoes for fishing (Figure 17). The main reason fishermen use the canoes is their inability to buy fiberglass boats. Fiberglass boats are used for fishing by only 4% of the respondents.

Figure 17: Types of Boats used for Fishing

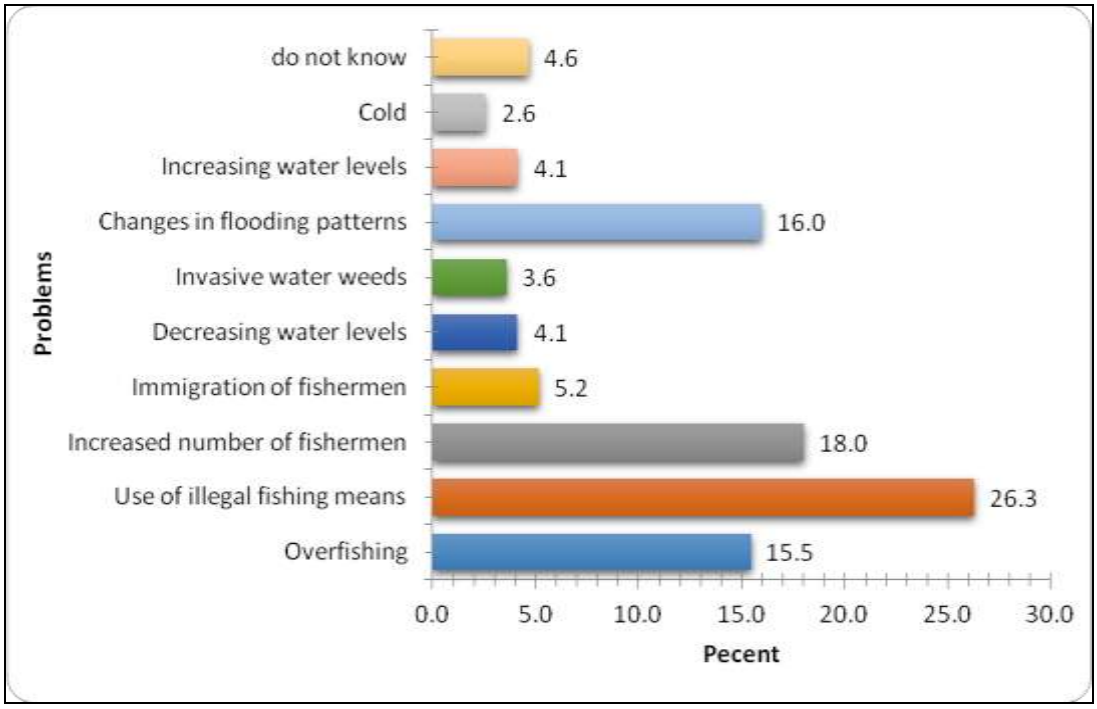


Non-compliance to fishing regulations by fishermen appears to be the major constraint contributing to the decreasing fish catch. Use of illegal fishing means account for about 26% of fishermen (Figure 18). Illegal fishing means implies all the unpalatable fishing methods such as use of poison, mosquito nets and non-

compliance to fishing ban. Use of illegal fishing methods depletes the fish resource from water bodies through indiscriminate fish catches. Overfishing was reported by about 16%, while increased number of fishermen and changes in flooding patterns were reported as problems by 18% and 16% of the fishermen respectively.

Immigration of fishermen from other Districts, though not pronounced, adds to pressure on the diminishing fish resource. The immigrant fishermen are reported to disregard fishing bans, because they usually have no other alternative source of livelihood. Despite fishing being a potential and lucrative source of livelihood for rural households, non-compliance to fishing regulations makes it unviable and unsustainable. Therefore, if fishing has to be a viable and sustainable source of livelihood, compliance to fishing regulations is inevitable. One sustainable way of enforcing the fishing regulations is by involving the local communities in the management of the fish resource.

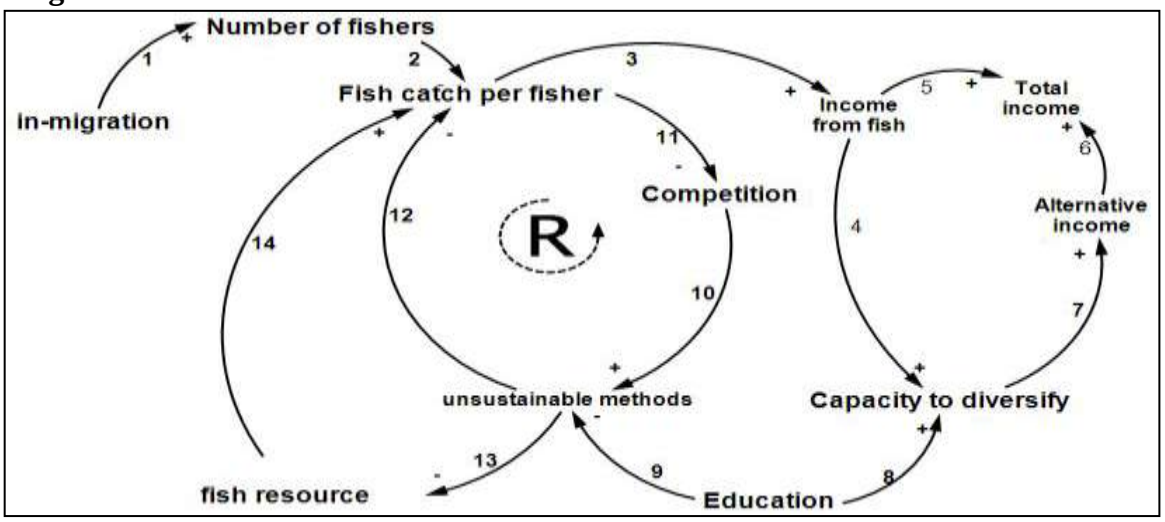
Figure 18: Problems Encountered in Fishing Activities



However, the number of fishermen in the lower Kafue River Basin is growing at an exponential rate (CSO, 2000). It is practically not feasible to exclude immigrant fishermen from using water for fishing, let alone, enforce fish ban laws because of inadequate manpower from both the Fisheries Department and ZAWA. The enforcement of the fish ban is dependent on district officers who are threatened with violence by groups of fishermen and have additional challenges of lack of financial resources to facilitate patrols during fish ban periods. The situation is exacerbated by inability of fishermen to diversify their livelihoods owing to lack of basic education and general poverty in the study area.

The general picture portrayed by key informant interviews suggests a reinforcing loop in the sense that the more immigrant fishermen in the area, the lower the fish catch per fisherman, which results in increased competition among fishermen leading to use of unsustainable fishing methods such as *ifikukula* (fishing nets made from Mosquito Net). The lower Kafue River Basin findings are consistent with the results from Lukanga Swamp on a study of stakeholder interactions in wetlands and implications for social ecological system sustainability by Kachali (2008). The Causal Loop Diagram (CLD) in (Figure 19) below helps illustrate the scenario.

Figure 19: Fish Catch and Livelihood diversification in lower Kafue River Basin



Source: Kachali (2008)

The CLD above shows that the new water users "in-migrant fishermen" (line 1) increases the number of fishermen and reduces fish catch per fisherman (line 2) resulting in reduced income from fish (line 3). Consequently, this negatively affects the ability of fishermen to invest in alternative livelihood activities (line 4) leading to reduced livelihoods and thus alternative sources of income (line 7) with an overall effect of reduced total income from all livelihood activities (line 6). The overall reduction of total income from fish coupled with increased number of fishermen results in increased competition (line 10) which in turn leads to use of unsustainable fishing methods (line 11) leading to reduced fish catch and the overall fish resource (lines 12, 13 and 14). While, lines 8 and 9 unveils that lack of basic education, characteristic of the study area, leads to lack of capacity to pursue alternative livelihoods (diversification) and a higher possibility of using unsustainable fishing methods, respectively.

5.4 Summary of Findings

The results presented in this chapter show that there are variations in household social-economic characteristics and water uses across villages, districts and livelihood activities. Most of the respondents are in their productive average age of 46 years. This is an advantage as most of the households have the potential to pursue multiple livelihood strategies given the productive assets and capital. However, the human capital is very low as most of the respondents' educational level was low, many did not reach secondary school level and some were illiterate.

Domestic water use: Water is life and access to water resources is a human right. However, results show that in none of the villages, the average consumption of domestic water exceeds 50 liters per capita per day. Based on the World Health Organization (2003) requirements, only a basic access to water is ensured. Closeness to homestead is the main determinant of access to first choice of water source or water source 1.

Access to clean and safe water is regarded as important for healthy living, however, results show that more than half of the respondents in the study area are constrained with several bottlenecks in accessing water resources. Some of the constraints include: depletion of water resources due to lowering of water table, overuse of water resources, mechanical breakdown and competition for water amongst users, mainly expressed in quarrels, queues and competition from domestic animals which share the same water source as humans. The majority of respondents (67%) perceive that water accessibility problems would persist to affect them even in the future.

Water use for agricultural production: Besides domestic water use, water use for agricultural production takes central importance. Nonetheless, rain-fed agriculture is predominant in the three regions with maize being the most rain-fed crop. Irrigated agriculture was practiced by 35% of respondents in 2010 growing season. Besides water use for crops, Itezhi-Tezhi had the highest percentage (68%) of respondents using water for livestock watering.

Non-consumptive water use for fishing: Water use for fishing has great potential to generate household income and contribute to improved rural livelihoods. However, study results show very low utilization of water for fishing. Not only is the utilization of water for fishing low in the study area, but the amount of fish catch per day is also low and sometimes uneconomical. In terms of future trends in fish catch, it does not give much hope as more than 75% of respondents acknowledged a dwindling trend in fish catches over their fishing life span. The causes of low levels of fish catch include: use of canoes with limited capacity, use of illegal fishing means, increased fishermen partly resulting from immigrant fishermen, disregard of fishing bans, non-compliance to fishing regulations and changes in flooding patterns.

In addition, the key informant interviews suggest a reinforcing loop in the sense that the more the immigrant fishermen, the lower the fish catch per fisherman, which results in increased competition among fishermen leading to use of unsustainable

fishing methods, which in turn depletes the fish resource. This ultimately results in reduced income and potential to diversify livelihoods.

CHAPTER 6
CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter presents the conclusions and recommendations drawn from the research findings. The conclusions are distilled from the principal findings related to the study objectives. The policy recommendations or implications were then derived from these conclusions.

6.2 Conclusions and Recommendations

The study found that the main thrust of the water sector reforms in Zambia is decentralization with emphasis on stakeholder participation and establishment of new governance at basin-level. In order to enhance community participation at basin-level, the 2011 Water management Act was promotes the establishment of decentralized water institutions up to grassroots level. The new water institutions include: Water Resource Management Authority (WRMA), Catchment Council (CC), Sub-catchment Council (SCC) and Water User Association (WUAs). The WUAs are the grassroots water institutions that manage water resources at Basin-level.

However, the study results show that 90% of respondents are not aware of the newly introduced water governance institutions while, 97% of respondents expressed ignorance about community participation in water use decision-making processes at grassroots level. Nevertheless, the central government still does provide support to rural communities in terms of provision of irrigation infrastructure and boreholes, but support towards water use is limited. The donor agencies appear to be the major actors that intervene in water use problem resolution at basin-level. The study findings further show that basin-level stakeholders have limited information on water use rights and very few water users have water rights or permits to use water for irrigation.

The study further found that rural households in the lower Kafue River Basin exhibit a diverse pattern in water use. Besides water use for domestic purposes, water is used to support livelihood strategies such as agricultural production, livestock watering and for fishing. Water is life and access to water resources is a human right. However, results show that the average domestic consumption of water per capita per day does not meet the WHO standards in the study area and that only about half of the respondents have access to water resources within a short distance, while the remaining half strives to adequately access water. Furthermore, the majority of respondents are constrained with several bottlenecks in accessing clean water, such as, depletion of water resources due to lowering of the water table, overuse of water resources, mechanical breakdown of water pumps and competition for water amongst users, mainly expressed in quarrels, queues and competition from domestic animals which share the same water source as humans.

The study also found that despite farming being the major livelihood activity in the study area, it is dominated by rain-fed agriculture. In cases where irrigated agriculture is practiced, it is mainly at subsistence level, with vegetables and tomatoes as major crops. Production of maize, the major staple food in Zambia, relies on rains. However, the occurrence of erratic rainfall, with droughts and floods has been negatively affecting the food security of the smallholders in the study area.

Fishing is one of the non-consumptive uses of water and could be a major source of income and livelihood for many households. However, results show limited utilization of water for fishing. The limited fishing that takes place in the study area is also dependent on natural water bodies, which poses a risk on the livelihoods of fishers as nature determines their fate in terms of fish catches. There is increased competition among fishermen resulting in the use of unsustainable fishing methods, which in turn depletes the fish resource leading to reduced incomes. Given the dwindling fish catch trends in natural water bodies, the situation requires urgent

redress; otherwise there is a real risk of depleting the fish stocks in the Kafue River Basin.

Based on the results in this study, a number of policy recommendations can be drawn. If sustainable water sector reforms have to be achieved in Zambia, water resource regulations, policies and governance regimes should address the barriers that prevent the rural households from deriving maximum livelihood benefits from the water resource endowments. In order to address such barriers, some of the policy recommendations that should be considered include the following:

- There is urgent need for the government to invest more resources in water sector resource development so that the newly decentralized water policy and the 2011 Water Act can be implemented at grassroots level in order to ensure adequate access to water and improved livelihoods and health conditions in rural areas.

- Low stakeholder participation in water resource administration, particularly among the rural communities needs to be addressed in order to enhance rural water sector development and the implementation of water sector reforms. Stakeholder participation can be improved through information dissemination about the water sector decentralized policies and engaging rural communities through effective participatory approaches.

- In order to enhance sustainable water resource accessibility to rural households, there is need for policy interventions focusing on reducing distances covered to the nearest water source. This can be achieved through development of water infrastructure such as drilling boreholes in communities that can be accessible to a lot of people. Policy interventions that improve the income or wealth levels of rural households so that their capability to pay for water services is enhanced can also assist in improving access. Some rural households are willing to pay for water services, in kind or cash, at a minimum fee. Improved rural income and enhanced

capability to pay for water services will thus make these interventions or water infrastructure or service projects sustainable.

- The low intensity of water use for irrigation by a large proportion of the rural population that depend on agriculture for their livelihoods, suggests that investment in water resources and irrigation infrastructure should be prioritized in order to enhance rural livelihoods.

- There is urgent need to invest more resources in fish pond infrastructure development and sensitization campaigns to promote fish farming. This would reduce the pressure and dependence on natural water bodies for fishing.

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