

**POLICY IMPLEMENTATION UNDER MULTIPLE INSTITUTIONS:
AN ASSESSMENT OF WATER ALLOCATION PROCESSES AND
CONFLICTS IN SELECTED TANZANIA'S IRRIGATION SCHEMES**

By

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Fulfilment of the Requirements for the Award of Doctor of Philosophy Degree of
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CERTIFICATION

We, the undersigned, certify that we have read and hereby recommend for acceptance by the Mzumbe University a dissertation entitled Policy Implementation under Multiple Institutions: An Assessment of Water Allocation Processes and Conflicts in Selected Tanzania's Irrigation Schemes, in fulfilment of the requirements for award of a Doctor of Philosophy Degree of Mzumbe University.

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ABBREVIATIONS AND ACRONYMS

BRITEN	Building Rural Income through Enterprises
BWO	Basin Water Officer
BWOs	Basin Water Offices
C&SCWCs	Catchment and Sub-Catchment Water Committees
CBOs	Community Based Organisations
CDO	Community Development Officer
CODTZ	Community -Oriented Development Action
CPR	Common Pool Resource
CPRs	Common Pool Resources
DADP	District Agricultural Development Plan
DAICO	District Agricultural, Irrigation and Cooperative Officer
DALDO	District Agricultural and Livestock Development Officer
DP	Development Partners
FAO	Food and Agricultural Organisation
FBOs	Faith Based Organisations
FDGs	Focus Group Discussion
GDP	Gross Domestic Product
GIZ	<i>Deutsche Gesellschaft für International Zusammenarbeit</i>
GOT	Government of Tanzania
IAD	Institutional Analysis and Development
ICWE	International Conference on Water and Environment
IGs	Irrigators Groups
IUCN	International Union for Conservation of Nature
IWRM	Integrated Water Resource Management
IWRM&D	Integrated Water Resource Management and Development
JICA	Japanese International Co-operation Agency
KIS	Kiroka Irrigation Scheme

LGA	Local Government Authorities
MDC	Morogoro District Council
MFIS	Mkindo Framers Irrigation Scheme
MIS	Mkindo Irrigation Scheme
MAFSC	Ministry of Agriculture, Food Security and Cooperatives
MoWI	Ministry of Water and Irrigation
MVDC	Mvomero District Council
NAFCO	National Agriculture and Food Corporation
NAWAPO	National Water Policy
NGO	Non-Governmental Organisations
NIE	New Institutional Economics
NIMP	National Irrigation Master Plan
NIP	National Irrigation Policy
NSGRP	National Strategy for Growth and Reduction of Poverty
NVIDP	National Village Irrigation Development Programme
NWSDS	National Water Sector Development Strategy
O&M	Operation and Management
O&OD	Opportunities and Obstacles to Development
OAF	One Acre Fund
PC	Private Companies
PCU	Programme Coordination Unit
RAS	Regional Administrative Secretaries
SWAP	Sector Wide Approach
TKI	Thomas-Kilmann Conflict Mode Instrument
TOSCI	Tanzania Official Seed Certification Institute
UN	United Nations
URT	United Republic of Tanzania
USAID	United States Agency for International Development

UUMGO	<i>Umoja wa Umwagiliaji Mgongola</i> (i.e. Mgongola Association of Irrigators)
UWAUKI	<i>Umoja wa Umwagiliaji Kiroka</i> (i.e. Kiroka Association of Irrigators)
WARIDI	Water Resources Integration Development Initiative
WDM	Water Demand Management
WOPATA	Women Participating in Poverty Alleviation Tanzania
WRB	Wami-Ruvu Basin
WRBWO	Wami-Ruvu Basin Water Office
WRMA	Water Resource Management Act
WSDP	Water Sector Development Programme
WUAs	Water Users Associations
WUGs	Water Users Groups
ZIO	Zonal Irrigation Office

ABSTRACT

The aim of this study was to assess the effects of multiple institutions in water policy implementation. Four specific research objectives guided the study, namely to assess the actors' roles and interactions in water allocation processes, to explore and assess the water allocation processes and institutions, to identify and assess institutional and non-institutional factors affecting water allocation processes, and to examine prevalence of conflicts and factors contributing to their occurrence in water allocation processes.

The study was conducted in Mkindo and Kiroka irrigation schemes and employed the Exploratory Sequential Mixed Approach, whereby the dominant approach was qualitative, complemented by quantitative techniques. The data collection methods were in-depth interviews, documentary reviews, focus group discussions, direct observations for the qualitative data and questionnaire for quantitative data. Qualitative data were analysed using qualitative content analysis and explanation building techniques. The descriptive statistical analysis technique and Binary Logistic Regression Model were used to analyse the quantitative data.

Findings revealed existence of poor coordination among actors, multiple institutions and lack of adherence to formal allocation principles. Moreover, the study ascertained prevalence of water users' conflicts in the selected schemes and analysed the factors influencing their occurrence. The results indicated that these factors were significant at $p < 0.05$ and $p < 0.01$. Generally, the study has concluded that multiple water resource institutions affect water allocation processes and influence users' conflicts; however, the nature and scope of their effects depend on the physical, material, bio-physical and governance systems in which the resource is embedded. To enhance water allocation processes in the selected schemes, the study recommends strengthening of coordination units and multi-stakeholders platforms, improvement of capacity for the government agents and enhancing government support for the water users.

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CHAPTER ONE

INTRODUCTION

1.1 Overview

Around the globe there has been an increased emphasis on the role of multiple institutions on policy implementation. Multiple institutions refer to the combination of formal and informal laws and practices guiding decisions about a certain course of action in the policy arena (Meinzen-Dick and Nkonya, 2007). This study aimed at unveiling water policy implementation in the contexts where multiple institutions interact. In particular, it endeavoured to assess enforcement of policy instruments on water allocation and conflicts management in the contexts where the informal rules and practices are operational.

The water sector attracts multiple institutions due to water's centrality to the wellbeing of mankind. In Tanzania importance of water is attributable to its role in the development of the country's agricultural sector. Agriculture is the mainstay of Tanzania's economy as it contributes about 23% of the nation's GDP, nearly 30% of the country's exports and employs nearly 66.9% of the country population (URT, 2016). Due to its importance to the national income and people's livelihoods, the government of Tanzania (GOT) has made agriculture one of the top priority activities in its National Strategy for Growth and Reduction of Poverty (NSGRP). Cognisant of the unreliability of rainfall in the country, the GOT decided to embark on improving the small scale irrigation schemes so as to enhance agro-production. Improvement of small-scale irrigation schemes is considered to be an important step in realising food security and poverty alleviation targets articulated in NSGRP. Small-scale irrigation schemes are perceived as appropriate engines for development, particularly rural development, due to their impacts on improving the livelihoods of the rural population. Several examples exist showing how small scale irrigation schemes have been essential for livelihoods

enhancement in different rural areas in Tanzania (Mkavidanda and Kaswamila, 2000; Keraita *et al.*, 2012; Mdee *et al.*, 2014).

GOT's policies on irrigation farming have stimulated engagement of the small scale farmers in irrigation activities and consequently resulted to changes in water use patterns and behaviours in that respect (URT, 2002b). Parallel to irrigation improvement initiatives, some changes in demographic characteristics such as the changes in the size and composition of local populations have also impacted the water use behaviour in communities. Generally, the policies and demographic trends have resulted to evolution of multiple institutions in small scale irrigation schemes, making management of the water resource in such schemes challenging (URT, 2002b; URT, 2010b; IUCN, 2010). One of the challenges is how to establish collective action in the management of water allocation processes and control of users' conflicts in the context where multiple institutions interact.

Two competing theories explain how collective action can be enhanced in management of natural resources, the water resources included. The first is rational choice theory which assumes that actors in resource management always face conflicts of interest thus collective action stems from coercive rules. The second one is institutional theory which recognises the role of explicit formal and informal rules as well as the shared cultural values, norms and practices on collective action. In other words, in explaining collective action, the rational choice theory focuses on explicit rules while the institutional theory acknowledges influence from multiple rules both visible and invisible in policy processes. But the institutional theory is also divided. There is a version which embraces the rational choice ideas referred to as rational choice or conventional institutional theory and another version which provides critiques to the rational ideas known as critical institutionalism (Cleaver, 2001; Cleaver and Franks, 2005). While the conventional or rational choice institutional perspective considers institutions as objects deliberately crafted through formal or informal processes, critical institutionalism sees

them as structures spontaneously evolved as actors mediate different rules from the formal and informal systems. Although theoretically institutions can be demarcated between those deliberately crafted and spontaneously evolved, in practice it is difficult to separate them; thus both rational choice and critical institutional versions were adopted in this thesis's analysis of the effects of multiple institutions on water policy implementation. These theories helped to explore and assess the water allocation processes, institutions and the contexts both institutional and non-institutional in which choices are made (Polski and Ostrom, 2009; Ostrom *et al.*, 2014).

1.2 Background to the Study

One of the issues central to water resource management debates concerns the nature, roles and arrangements of institutions. As indicated in the overview above, the rational choice and critical institutional theories provide insights on how water resource management institutions are viewed. The rational choice institutional theory considers water resource management as a technical and scientific activity which must be under the scrutiny of rational rules. In addition, the rational choice perspective on water resource institutions believes that water should be managed through formal and universal laws integrating different sectors and stakeholders in a unified system. As a result of that outlook, some efforts have been in place to institute the Integrated Water Resource Management (IWRM), a system which is believed to provide a room for a unified and universalised water resource management laws. Before the movement towards the IWRM system, some efforts were in place through the international law organs, in particular the International Law Association (ILA) and International Law Commission (ILC) to formalise and universalise the international customary laws on water allocation across nations (Wolf, 1999). Adoption of the IWRM was part of the efforts to establish universal rules to guide allocation of water resource and address water use conflicts across different users and uses in different parts of the world. The central focus of IWRM is to enhance management of the water 'that we have' through institutional measures instead of seeking new supplies through engineering approaches

emphasised previously (Herbertson and Tate, 2001). Specifically, the IWRM emphasised establishment of the water use permits, tariffs and formal water use groups (WUGs) and associations (WUAs) as instruments for Water Demand Management (WDM) and cost recovery in water resource management.

The emphasis on IWRM strategy was reflected in various international conferences like for instance the UN conference on water at Mar de Plata in 1977, the Environment and the Earth Summit conducted in Rio de Janeiro in 1992, and most importantly the International Conference on Water and the Environment (ICWE) conducted in Dublin in 1992, which endorsed this concept as an internationally accepted strategy for water resource management (Bauer, 2010). To enhance rational approach in management of the water resource, the IWRM emphasises establishment of the River Basin structures. As provided by Wolf (1999), the IWRM proponents consider a river basin or a watershed the most 'rational' and 'scientific' unit to be managed. The argument behind this idea is that water is a fugitive resource resisting the administrative boundaries. As such, it should be managed within its natural settings.

The rational choice view on water resource management and institutions has been disputed by the critical institutional theory on the same. The critical institutional perspective is against the argument in the rational choice idea that institutions managing the water resources are deliberately crafted, universal and static. For the critical institutional scholars, water resource management institutions are open to negotiations by actors with different economic and political interests, capabilities and social and cultural backgrounds. This being the case, such institutions are not universal and static but enacted and re-enacted through actors' mediations taking place as policies are exposed to the action arena (Cleaver, 2001; Cleaver and Franks, 2005).

Like other developing countries around the globe, Tanzania has been caught in a wind of change towards the rational choice institutions emphasised in the IWRM system. A

response towards the rational choice systems is denoted by adoption of various legal and policy reforms which resulted to the birth of the National Water Policy (NAWAPO) in 2002 and Water Resource Management Act (WRMA) No 11 of 2009. The NAWAPO and WRMA adopted the IWRM as an overall implementation strategy for the country goals in water resource management and provision. To adhere to the IWRM system, the national policy and law emphasised establishment of the river basins in place of the regional structures adopted in the early years of independence. In addition, the national policy and law have insisted on adoption of the water use permits and tariffs. These were considered as legal and economic instruments respectively crucial for enhancing Water Demand Management (WDM) and cost recovery in provision and management of the water resource in the country. Generally, policy and legal reforms were regarded crucial for enhancing coordinated efforts that would in turn improve among other things, efficiency, equity, participation and ultimately control of users' conflicts in water allocation processes (URT, 2002a; 2009).

The measures to improve the water resource management in Tanzania have been undertaken side by side with improvement of irrigation schemes managed by the smallholder farmers so as to enhance productivity and efficient allocation of the water resource (URT, 2010). Apart from efficient allocation of the water resource, the reforms in irrigation and water sectors are regarded essential for addressing the users' conflicts in water allocation processes. For example, it is articulated that adoption of water users' tariffs and permits is crucial for preventing free and imprudent exploitation of the water resource which normally lead to conflicts in irrigation schemes (URT, 2002a).

The Wami-Ruvu Basin (WRB) is one of the nine river basins in Tanzania established out of pressure to accommodate the IWRM values and improve irrigation systems exerted by the government, donor countries and international organisations. Apart from the national and international institutional requirements, the changes in water access and utilisation rules in WRB have taken place as a result of internal demographic processes.

Earlier, irrigation water was demanded by only few farmers who wanted to irrigate small vegetable gardens and large scale irrigators like Mtibwa sugar who owned sugar cane plantations, Dakawa Rice Farms and National Agriculture and Food Cooperation (NAFCO) who owned rice plantations (IUCN, 2010). But the Wami-Ruvu Basin (WRB) area is well known in Tanzania for its rich ecological resources such as water and pasture. Due to its rich resources' endowment, the basin has experienced influx of smallholder farmers and pastoralists from different ethnic backgrounds who moved in to the area for the purpose of conducting subsistence agriculture and livestock keeping (IUCN, 2010). The changes in demographic compositions in Wami-Ruvu communities exerted great pressure on water resource systems. Introduction of the water use permits, tariffs and formalisation of the water use groups and associations was regarded as a timely and crucial change that would help to address the water resource management challenges including prevalence of conflicts among the water users in this basin.

Despite some successes in the efforts to formalise management of water allocation processes and users' conflicts, enormous challenges still exist in small scale irrigation schemes across the country and WRB in particular. Some of the common challenges pronounced in water allocation processes, in such schemes are low irrigation efficiency, lack of equity, poor participation of the users in decision making processes and consequently frequent conflicts among the water users (Keraita *et al.*, 2012, van Koppen *et al.*, 2004; Cleaver, 2001; Komakech *et al.*, 2012a). For example, it is claimed that water use efficiency in such schemes is low ranging from less than 15% to 30% (Keraita *et al.*, 2012). Equally, coordination of different actors in the management of the water resource has been weak (URT, 2002a, IUCN, 2010) and equitable allocations have not been realised since adoption of NAWAPO and WRMA (URT, 2011; 2013). Furthermore, water use conflicts have been prevalent in small scale irrigation schemes in the country, those in WRB included, despite establishment of conflict resolution platforms close to the people (van Koppen *et al.*, 2004; IUCN, 2010; Komakech *et al.*, 2010; Komakech *et al.*, 2012b; Komakech and van der Zaag, 2011). Several factors

might have affected the water allocation and conflicts management processes in the country and particularly WRB. However, institutional multiplicity and mediations by the actors seem to be at the centre. Due to overly emphasis on top down and rational choice ideas (van Koppen *et al.*, 2004; Komakech *et al.*, 2012a, b; Cleaver, 2001), there is a likelihood that the reforms in the country have overlooked the existing cultural institutions and agency exercised by actors in water policy implementation. In other words, such reforms have overlooked existence of multiple institutions in the environments where the water policy is implemented. In addition, there is a possibility that such reforms have been adopted without attention to contextual factors in particular the material, physical and bio-physical conditions and governance systems in which the water policy is implemented. Possibly, the existing gaps in water policy implementation, particularly in management of water allocation processes and users conflicts have emerged due to lack of adequate attention on institutional multiplicity and actors' agency and how they are mediated by the contextual factors mentioned above.

1.3 Statement of the Problem

As indicated in the background above, Tanzania has been striving to address the challenges facing water allocation processes in small scale irrigation schemes. Particularly, the Tanzanian government has been striving to address low irrigation efficiency, poor participation of the water users in water management processes, lack of equity in water distribution and prevalence of water users' conflicts in such schemes. In response to the above challenges, the government of Tanzania and donors have adopted the IWRM instruments and strategies in management of water allocation processes and control of users' conflicts. While the donors and government emphasise on adoption of the IWRM instruments and strategies, their efficacy has been questioned by scholars in critical institutionalism due to their tendency to focus on rational choice traditions and ignore multiplicity of institutions guiding communities in the management of water resource allocation and users' conflicts (Cleaver, 2001; Cleaver and Franks, 2005). Apart from that, the rational choice approaches emphasised in the IWRM are questioned

due to excessive emphasis on economic incentives and assumption that such incentives only determine behaviours in water policy domain. The critical institutional scholars view rational theorists' lack of attention on agency in actors' decisions and influence of shared social and cultural values as a serious flaw in understanding of water policy implementation and particularly management of water allocation processes and the resulting conflicts.

Examined closely, the critical institutional theory places emphasis on the interfaces between formal and informal institutions in water resource management. Additionally, this theory indicates diffusion between the cultural and economic motives influencing choices towards the water policy instruments which are critical in natural resource management. Different studies have confirmed existence of the formal-informal institutional interfaces in the management of the water resource policies in Tanzania and beyond (Sokile *et al.*, 2005; Cleaver and Franks, 2005; Mbeyale, 2009; Katani, 2010; Komakech and van der Zaag, 2011; Merrey and Cook, 2012). These studies have also indicated agency in the way that actors utilise institutions to address water resource management issues. Despite their useful insights, most of these studies do not indicate clearly how the formal-informal institutional interfaces and exercise of agency evolve from the contexts, both institutional and non-institutional, in which the water policy implementation processes are embedded. This study, aimed to assess contextual factors influencing evolution of multiple institutions and actors' agency, and their effects on management of water allocation processes and users' conflicts in Mkindo and Kiroka irrigation schemes of Wami-Ruvu Basin in Tanzania.

1.4 Research Objectives

The main objective of this study was to assess the evolution and effects of multiple institutions on water policy implementation in small scale irrigation schemes in Tanzania.

The specific objectives are:

- i. To explore actors' roles and assess their interactions in water allocation processes.
- ii. To explore and assess the water allocation institutions and processes in the selected schemes.
- iii. To identify and assess institutional and non-institutional factors affecting water allocation processes.
- iv. To determine prevalence of conflicts and factors influencing their occurrence in water allocation processes.

1.5 Research Questions

- i. What are the actors' roles and how do they interact in water allocation processes?
- ii. How are the water allocation processes conducted and institutions developed and enforced in the selected schemes?
- iii. How do the institutional and non-institutional factors affect water allocation processes in the selected schemes?
- iv. To what extent do water allocation conflicts occur in the selected schemes?
- v. What are the factors influencing their occurrence in these schemes?

1.6 Research Hypothesis

The quantitative analysis of water use conflict was guided by one hypothesis which is:

Water use conflicts in small scale irrigation schemes are more prevalent when the physical, bio-physical, material and governance conditions are poor than when they are better

1.7 Significance of the Study

This study is important in different ways; but generally, it adds some new insights about public policy formulation and implementation processes with respect to the following aspects:

(i) Water allocation Institutions and Processes

Acquisition of knowledge on water allocation institutions is crucial because institutions are central to effective water policy implementation and particularly, achievement of effective and efficient allocation processes. By identifying and analysing the paths through which institutions in water allocation arenas have evolved, the study has shed some light on policy makers and implementing agents on the nature of institutions and their interactions in the policy processes. Through understanding of the nature of institutions and their interactions, the policy elite can control the policy outcomes and associated obstacles. Understanding of the nature of institutions is also important for drawing strategic plans which reflect the realities in the grounds. Moreover, in assessing the water allocation processes in the selected schemes, the study has indicated how practices diverge from the plans thus providing some insights on what interventions can be designed to improve water policy implementation.

(ii) Analysis of the Actors' Roles and Interactions

By analysing the role of key actors in water resource allocation the study has added knowledge on how the policies can be designed in relation to the local preferences and capabilities. That is, the study has widened the horizon within which the policy makers can understand participation of key actors in water resource management and in particular water allocation processes. Moreover, analysis of the actors' roles and interactions has provided insights about the capacity and limitations facing the actors in various courses of action.

(iii) Assessing the factors affecting water allocation processes

In this aspect, the study focused on identifying and assessing the factors affecting water allocation processes in the selected schemes. By assessing these factors the study has added some knowledge on the challenges and prospects in the management of water allocation processes and achievement of the water policy goals.

(iv) Analysis of water allocation conflicts

Analysis of water use conflicts in water allocation processes is crucial for determining the efficacy of water policy in the country. The knowledge that has been generated by this study concerning prevalence and factors contributing to water allocation conflicts may help policy makers to make judgement on whether the strategies articulated in the policy have been effective or not and the kind of improvements that need to be done. Assessment of the nature of water use conflicts in the selected small scale irrigation schemes can also help to understand the subjects mostly involved or affected, where the conflicts are concentrated and why.

1.8 Scope of the Study

This study focused on assessing the implementation of the National Water Policy (NAWAPO) of 2002 with respect to the management of agricultural water in selected small scale irrigation schemes in WRB in Tanzania Mainland, namely Mkindo and Kiroka irrigation schemes. Specifically, the study focused on assessing formal-informal institutional interfaces and role and interaction of actors from the national to the scheme levels in water resource management and allocation processes. With respect to the formal institutions, attention was paid to policy instruments stipulated in NAWAPO, particularly the water use permits, tariffs and associated procedures; while the informal institutions targeted were the norms, beliefs, values and informal practices guiding water allocation. Apart from the water allocation processes, the study also focused on exploring and assessing the prevalence and factors contributing to occurrence of water users' conflicts in the allocation processes in the selected irrigation schemes.

1.9 Limitations of the Study

Initially, the qualitative case design was focused in this study. However, in assessing the prevalence of water users' conflicts in water allocation processes, some methodical limitations were encountered. Therefore, some quantitative approaches had to be employed to complement the qualitative research processes. The second limitation that

the study faced was delays in availability of data which happened due to bureaucracies or sometimes difficulties in retrieving the data as a result of poor record keeping in the government offices. This limitation was managed through making frequent follow-ups to the concerned officials. In some incidences, the data that were given had some omissions or ambiguity. To enhance understanding of the data, efforts were made to seek clarifications from the officials. The third limitation emanated from the people who participated in the study. Some of them were not open enough while others were not articulate in their explanations. To enhance communication, the respondents were repeatedly educated on the objectives of the interviews and sometimes were given more time to decide on whether to participate in the interviews or not. In some cases, replacements had to be made to get only those individuals who were knowledgeable of the study issues and were willing to participate in the study.

1.10 Operational Definition of Key Terms

In this study different terms have been used. This section provides their operational definitions within the context of this study.

Policy Implementation

In this study policy implementation is defined as a process whereby water policy decisions are executed within the realms of multiple institutional frameworks.

Institutions

Institutions are defined as formal rules, regulations, mechanisms as well as values, beliefs, practices and normative frameworks from informal systems.

Multiple institutions

Combination of rules, regulations, mechanisms from formal systems and values, norms, beliefs, practices from informal systems jointly acting up on a certain policy issue in this case water allocation.

Institutional Bricolage

A process whereby water users modify water policy instruments and socio-cultural norms and practices basing on their beliefs, life experiences, understanding and interests.

Water Allocation

A process whereby water is accessed by the users who have the formal rights and those who do not have the formal rights to abstract water for irrigation and watering livestock.

Water Users Conflicts

These refer to active clashes, disagreements or grievances arising during or after allocation and distribution of water to different users.

Actors

These are individuals, groups or organisations that affect or are affected by water allocation processes in irrigation farming.

1.11 Organisation of the Thesis

This thesis is divided into nine chapters which are arranged as follows:

Chapter one is an introductory chapter. It introduces the subject matter under the study, the context within which the problem has been grounded, justification for the study, research objectives, research questions and hypotheses, scope and limitations encountered.

Chapter two presents the reviews which were done to different theoretical concepts related to the study. In addition the chapter provides a snapshot of related studies conducted previously in the same research area. The chapter also provides the conceptual framework which guided this research.

Chapter three describes the study areas and provides justifications for their selection. The chapter also discusses methodological approaches that have been employed in the data collection and analysis.

Chapter four presents and discusses the findings relating to the second objective. These are the findings concerning the roles of different actors in water allocation processes from the national to the scheme levels.

Chapter five presents and discusses the findings relating to the first objective. These are the findings concerning water allocation processes and institutions in the study areas.

Chapter six provides the findings and discussions for the third objective. These are the findings which identify and assess factors affecting actors' roles and interactions in water allocation processes.

Chapter seven presents and discusses the findings concerning the fourth objective. The chapter aims to demonstrate the prevalence of water users' conflicts resulting from the water allocation processes and the factors contributing to their occurrences.

Chapter eight shows the institutional and water allocation patterns that are similar across the schemes and those which are different. The rationale is to come up with the conclusions which are grounded from the broader empirical experiences.

Chapter nine is the final chapter in this study. It provides a summary of the major findings and the overall conclusion from the study, recommendations and areas for further study. This chapter also provides some theoretical and policy implications from the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

This study as indicated in the introductory chapter intended to assess how multiple institutions affect implementation of policy instruments on water resource allocation and was guided by two versions of institutional theory: conventional or rational choice and critical institutional theories. This chapter was set to provide a review of institutional theory and its versions so as to gain some theoretical insights on what the term institution means and how institutions and actors interact and affect water policy implementation. Moreover, the chapter provides a review of the concepts of collective action, water allocation and water users' conflicts. The aim here is to provide some theoretical insights which help to show how water policy implementation arena looks like. To begin with, the chapter provides some discussions about the concept of policy implementation to show how it is linked to institutions.

2.2 Concept of Policy Implementation

Like many other concepts in social sciences, policy implementation has no particular definition. According to Ikechukwu and Chukwuemeka (2013), policy implementation is a process in which policy decisions are put into actions so as to achieve the intended goals. Similarly, Sabatier and Mazmanian (1980) define policy implementation as execution of a basic policy decision, usually made in a statute. Theodoulou (1995) considers policy implementation to be a directed change that happens after adoption of policy decision. According to Theodoulou policy implementation is more than just undertaking certain activities; it is also a transformation from the old to desired states. We buy into Theodoulou's definition as it provides a broader view of the concept however; we add to this definition that such changes are framed within the realms of multiple institutions and actors instead of the statutory laws only.

Classical scholars considered policy implementation as a rational, technical, linear and sequential process. The main assumption under this view is that, once policy decisions are adopted implementation proceeds rationally and in a linear and sequential manner through a process which involves problem identification, agenda setting, alternatives evaluation, alternatives adoption and finally decisions implementation according to the plans (Smith and Larimer, 2009). In this view, the influence of actors and institutions in lower level structures has been ignored.

An alternative rational choice view also considers policy implementation as a linear process but, bottom-up rather than top-down. As Birkland (2011) points out, the bottom-up approach relies heavily on the idea of “backward mapping”, where the policy chain starts by examining those at the lower levels who implement the policy. In this approach, the implementing agencies at the lower levels are regarded as having power to influence policies towards or away from their original goals. The implementing agencies alternatively known as “program operators” “front-line workers” or “street-level bureaucrats” (Lipsky, 1980; Weaver, 2010) are keenly considered due to their dynamic images and characters in the policy processes. By focusing on the power of the policy agents to change the policy directions, the bottom-up approach has considered agency in policy implementation, however, only actors holding formal titles have been considered. The actors from the informal systems have been ignored. Generally, in the above views policy implementation is regarded as a rational and linear process moving in either a top-down or bottom-up direction.

The view emerging from what is called “A Third Generation of Implementation Research” (Birkland, 2011) considers policy implementation as both the top-down and bottom-up process. Thomas and Grindle (1990) who see policy implementation as an interactive process buy into this line of thought. According to Thomas and Grindle (1990) policy implementation is interactive rather than linear because it involves some forward and backward decisions and interactions. Such forward and backward

movements take place as a response to the reactions by the target populations or implementing agents happening due to changes in the status quo triggered by the policy.

The views above explain public policies through their processes. According to Lowi (1972), cited in Smith and Larimer (2009), policy processes provide only description of the stages but they do not provide empirically falsifiable hypotheses. To understand public policy scientifically we need to look on the level of government coercion needed in a policy decision. This view propounds that public policies can be understood through their typologies, which are denoted by the level of government coercion exerted to make implementation proceed as planned. Lowi argues that understanding of the policy typologies is crucial because it helps in designing effective strategies for policy implementation (Lowi, 1972) cited in Smith and Larimer (2009).

Close examination of the above views on policy implementation shows a bias towards the instrumental approaches. Such instrumental outlook considers only the influence of the rational rules and mechanisms in policy processes. As institutional theory has indicated such rules and mechanisms form only a part of institutions influencing policy implementation processes. Another part of institutions informing the policies comprises of the informal laws, mechanisms and practices existing in the communities in which the policies are implemented. In the coming sections, the chapter focuses on how the formal and informal institutions influence policy implementation in water arenas. Before understanding how institutions affect implementation of the water policy, it is important to gain general insights about institutions.

2.3 Institutional Theory in a Nutshell

Institutional theory explains the nature and assumptions underlying institutions guiding production and provision of various life necessities. This theory emerged as a protest against the classical view that actors' behaviour could be regulated in an economic way (Scott, 1995; Pettit, 1996). Despite being under the umbrella of this theory, institutional scholars have no common way of defining an institution. As a result of the

existing conceptual differences, different theories on institutions have emerged, but generally they can be categorised as rational choice or critical institutional theories.

According to Bandaragoda (2000) and Polski and Ostrom (1999) sometimes the term institution is used to refer to organisations such as schools, companies, hospitals and others of the like. While it is normal to refer to entities such as those mentioned above as institutions, Selznick argues that such entities become institutions only when they are infused with values beyond the technical structures (Selznick, 1957). In this light, North, one of the prominent scholars in New Institutional Economics (NIE), defines institutions as “rules of the game or humanly devised constraints” (North, 1990). In this definition an actor is considered a passive recipient of the institutional prescriptions.

In his definition, Scott (1995) groups a wide range of institutional elements in three levels namely regulative, normative and cognitive levels. He defines institutions as cognitive, normative and regulative structures and activities that provide stability and meaning to social behaviour. This definition differs from North’s because it recognises actor’s agency through cognitive processes. Another broader view on institutions recognises widely understood rules, norms, practices, habits, or strategies that encourage behaviour in a repetitive way (Polski and Ostrom, 1999). These spread as actors imitate behaviours or actions that are believed to be appropriate across a wider community (Scott, 1995). This definition and that of Scott (1995) are adopted in this study because they encompass the range of institutional characters that are focused in the study. Generally, the institutional theory has emerged as a reaction to classical views that policies can be reduced to a set of universal legal rules and behaviour can be explained in an economic way (Scott, 1995; Pettit, 1996).

2.4 Institutional Influences on Policy Processes

As pointed out by Scott (1995), institutions have three major pillars; regulative, normative and cognitive. These are the pillars in which the policy implementation processes rest. The regulative pillar puts strong emphasis on explicit rules both formal

and informal. This version of institutional theory demonstrates most of the rational choice ideas emphasised in conventional policy literature as highlighted above and further expounded below. In the first place, the theory emphasises the application of penalties and rewards so as to induce compliance towards the rules. Compliance to the rules is believed to be automatic because it is assumed that the actors understand that it is good if they comply than defect given the available consequences (Scott, 1995). In other words, the actors are considered as rational individuals influenced by instrumental logic which normally asks: what are my interests in each of the available alternatives? (March and Olsen, 1995)

The regulative institutional perspective considers the policy arena as a market place where the self centred actors participate in bargaining and exchanges in order to maximise their economic interests (March and Olsen, 1995). The actors in policy implementation are regarded as rational decision makers who always choose the best means to achieve economically viable policy ends. To enhance exchange among the actors, explicit and rational rules are insisted along with penalties for those who defect and rewards for those who comply (Pettit, 1996). To them, rules minimise uncertainty because they induce obedience from the actors (March and Olsen, 1995). Moreover, regulative institutionalism assumes that formal rights and rules are central to rational solutions and such rights and rules are independent of conscious and unconscious influences of the actors. To enhance cooperation, monitoring of the policy action arena by the government or private agent is emphasised. The government or private actors' capabilities to control the action arena are determined by range of factors such economic, social or political resources (March and Olsen, 1995).

Generally, the regulative pillar is guided by the assumptions which reflect the economic man emphasised in conventional economics. Such assumptions are first, absence of moral values in the goals the actors want to attain, second, existence of freedom of choice basing on knowledge about the available consequences, third, ability to choose

options which actors believe will best achieve their goals, fourth, the rational choice theory believes in simplified and abstract models of reality (Morrow, 1994) in Kiflemariam (2001).

The second institutional pillar in which the policy processes are conducted is normative. This pillar criticises the regulative pillar for its bias towards the explicit formal rules. In the view of the normative institutionalism, institutions constitute also the social roles and cultural norms instead of the explicit and formal rules alone (Scott, 1995; March and Olsen, 1995; Polski and Ostrom, 1999). The normative pillar assumes that policies include also norms which specify how roles should be performed and values defining what the community should expect from the role holder. Its main argument is that actors in policy processes are intendedly rational but limitedly so (Polski and Ostrom, 1999, Kiflemariam, 2001), in their decisions about different alternatives. This is due to the fact that in most cases the actors face some constraints in information acquisition emanating from the social-cultural, economic or any other conditions which are beyond their capacity to control.

The normative pillar also assumes that actors act rationally towards the policy goals; but under the influence of cultural norms and values. Despite having a focus on social and cultural institutions influencing policies, this version of institutional theory has been criticised due to its tendency to view culture instrumentally. As contended by Cleaver (2001), normative institutionalism or popularly known as the New Institutional Economics (NIE) considers culture as something existing exogenous to actors' creations. The actors, in this view just like the regulative pillar, are assumed to be under the influence of external forces from the cultural environment which they have no capacity to control. The regulative and normative pillars constitute what is called conventional or rational choice institutional theory (Cleaver and Franks, 2005).

The last but not least institutional pillar is cognitive pillar. While the conventional institutional theory ignores agency in policy implementation, the cognitive pillar sees it

central to various decisions the actors make in political action. This pillar assumes that actors exercise agency by interpreting and assigning meanings to different objects they come across in decision arenas (Scott, 1995; March and Olsen, 1995). The cognitive pillar assumes that the actors have identities defined within broader cultural scripts of the community. Instead of the uncertain consequences, cognitive institutional view assumes that actors' identities determine their interpretations of issues including those related to policy outcomes and strategies, and decisions that they finally take about them. The question that an actor asks before any action is; who am I? Given my identity what are expected of me in this situation? (March and Olsen, 1995). The cognitive view of institutions forms what is known as critical institutionalism which focuses also on habits and conceptions that spread as actors imitate behaviours or actions that are believed to be appropriate across a wider community (Scott, 1995).

Generally, institutions shape actors through enabling or constraining their behaviours and actions in policy arenas. The role of institutions in shaping actions in policy processes is central to all three pillars of institutions however what differentiates them is the way the place of an actor is conceived. The regulative pillar assumes that the actors always respond to structures of rules which are explicit and rational. In normative pillar the actor is considered to also act under the influence of the cultural and social norms, values or beliefs in addition to explicit rules. In these two pillars the actor is regarded to be a passive creature who always acts under the influence of rules and norms, without capacity to act up on them. The cognitive pillar places the actors at the centre of policy processes. The actor is shaped but also capable of interpreting the existing regulative or normative structures in relation to the broader cultural frameworks.

The critical and conventional institutional frameworks seem to be different in their theoretical theses but in most policy arenas, it is common to see elements from both views informing policy processes although not in equal extent. In this study therefore, institutional elements from both, the rational choice or, conventional and critical

institutional theories have been used eclectically to explain institutional effects on water policy implementation. The rational choice or conventional institutional perspectives are reflected in the Ostrom's principles for enduring institutions, IAD and SES frameworks while the Institutional Bricolage (IB) concept provides critical views of institutions.

Before the onset of IAD, SES and IB frameworks, the Ostrom's principles of enduring institutions were famous in analysis of the natural resource management policies. Publication of such principles by Ostrom (1990) was one of the reactions against the argument in the classical Common Pool Resource (CPR) literature that community members are not capable of devising collective action rules on resource management because their choices are primarily motivated by individualistic economic incentives. The puzzle on the nature of collective action compelled extensive research which resulted to development of the principles of enduring institutions and subsequently the IAD and SES frameworks to explain the nature and influence of institutions in natural resource management including management of water and conflicts ensuing from its usage. Before understanding what these frameworks advocate, it is better to highlight the inherent challenges in collective action in natural resource including the water resource management setting.

2.5 Collective Action Dilemma in Common Pool Resources Management

The term collective action is defined in different ways but generally, it refers to the joint action by the group conducted either directly or indirectly in order to achieve a common good (s) (Vanni, 2014). As Vanni (2014) provides collective action is defined by three major features; the involvement of a group of people, shared interests and common and voluntary actions to pursue such interests. For shared interests and voluntary actions to exist some sort of assurance is needed to make the members believe that they will benefit from what they contribute toward a common good. Collective action is crucial for management of the CPRs such as commonly used canal water and conflicts emanating from their usage however its practice is normally problematic. According to Acheson, collective action problem in CPRs and other action arenas occurs when there

is a difference between the individual's interests and those of the general community (Acheson, 2011). In this situation actors normally choose to defect than cooperate thus leading to sub-optimal or even worst results for the self and others. Although collective action challenges are common to various resource management settings, they seem to be more salient to CPRs arenas due to the nature of these resources.

The CPRs constitute those types of goods and services in which it is difficult to exclude others from using them (low excludability) and their use by one person reduces the amount available for others (high subtractability) (Acheson, 2011). Irrigation water is one of the CPRs because its usage by one person reduces the supply available to others and also it is difficult to exclude potential users through means such as fencing or any other physical barriers or regulative measures such as licensing. Due to low excludability, irrigation water is a good which is difficult to manage because it is always open to free riding by those who do not want to contribute to its production and provision (Polski and Ostrom, 1999). Also, as a result of having high subtractability, irrigation water faces high level of depletion, making sustainable supplies of this resource difficult to achieve.

The success of CPR policies, water policies included, depends on the extent to which institutions are practiced to address the management challenges and enhance collective action. In grappling with the dilemmas of collective action, the classical CPRs literature just like the conventional or rational choice institutional theory insisted the use of external coercive measures (Ostrom, 2003). The classical scholars were influenced by the group theorists like Olson who posited that, unless the group is small in size free riding on a public good is difficult to control (Olson, 1965). In the view of Olson a rational actor will not choose to contribute to the public goods if the chances for consuming them freely are available. Thus, to induce positive behaviour towards such goods the government must severely punish the free riders (Olson, 1965).

Hardin is one of the classical scholars whose views indicate pessimism about collective action in CPRs management. In the view of this scholar, the resource users in communities are selfish creatures who always seek to maximise their economic utilities without regard to capacity of the resource to provide (Hardin, 1968). Using the analogue of the grazing field, he showed how tragedy of the commons is an inevitable phenomenon due to the tendency by the resource users to overexploit the resource to fulfil their selfish interests. In the perspective of the classical CPR literature, it is difficult to achieve collective action toward resource management in communities without enforcement of autocratic and top down resource management rules (Acheson, 2011). Generally, the group and classical CPR theorists were influenced by the rational choice view in explaining actors' behaviours. In water resource management, the focus on rational choice view has led to introduction of formal institutions for restriction of access and utilisation in place of the customary rules used in pre-modern societies.

The famous illustration of the rational choice behaviour on collective action in resource management is the game theory (Wade, 1987; Acheson; 2011). Basing on this theory, collective action dilemma is like a dilemma faced by two criminals who face sentences due to crime they jointly committed. The only rational decision for both of them is to remain silent, because by doing so the police will have no evidence to convict them. The second available choice is for both of them to confess and consequently face heavy penalty. The third choice is for one to remain silent while the other confesses where the former will receive heavy penalty while the defector will go free. Both of them will unknowingly confess for the expectation of being free. As a result, both of them will receive heavy penalty contrary to if both would cooperate.

In the perspective of the rational choice institutionalism the resource users are like prisoners who face a dilemma in making a choice on whether to comply or defect from the collective action rules. According to Wade (1987) the resource users, seem to face a dilemma in making a choice from among four major options in collective action

situation: (i) To enjoy unlimited exploitation while everyone else follows the rule that restrict access, (then they become free riders) (ii) All follow the rules (iii) All defect; and (iv) An individual follows the rules while everyone else defect then he/she becomes a sucker. To avoid becoming a sucker, the third option is the stable outcome for each individual. The second option is desirable for attaining collective action but it is not a stable equilibrium because the incentives to cheat and go back to the first option (free riding) is high among the individuals. All individuals feel that it is better if they will all defect than one being suckered for following the rules which everyone else violate. It is out of this reality that the rational choice theorists disapprove the role of actors in production of collective action rules in natural resource policies. According the rational choice scholars such as Olson (1965) and Hardin (1968), in the situation of dilemma, like the one explained in the game theory there is no likelihood that rules will be followed in resource management policies without coercive measures from external authority.

It is true that the communities' face dilemmas in arriving at certain decisions in natural resource policy arenas. But this does not mean that economic incentives (Savenije and van der Zaag, 2002) should be the only means to rectify the situation and induce collective action. In addition, this should not justify exclusion of communities in resource management processes. After all, some studies have indicated that in repetitive games and open communication situations, the chance for cooperative behaviour may exist (Ostrom, 2003, Wade, 1987).

As different experiences have indicated, local people can effectively participate in resource management processes thus their inclusion is essential for effective management of the resources. The evidence that communities are capable of producing optimal resource management institutions is extensively provided in the literature (Ostrom, 1990; Cleaver, 2001; Cleaver and Franks, 2005; van Koppen *et al.*, 2007, Meinzen-Dick and Nkonya, 2007; Komakech and van der Zaag, 2011; Komakech *et al.*,

2012a). As contended by Acheson (2011), pioneers are the NIE scholars especially Ostrom, who in collaboration with several colleagues managed to collect evidence from different parts of the world, indicating success in normative CPRs management systems used by communities. The research work in this area as pioneered by NIE scholars like Ostrom indicates that normative systems can as well lead to achievement of enduring resource institutions if certain principles are met. As an effort to contribute to such understanding, Ostrom (1990) has provided general eight principles under which the communities can establish enduring resource management institutions.

2.5.1 Principles for Enduring CPRs Institutions

The first principle insists establishment of clear boundary rules. The boundary rules are crucial for specifying those who are eligible to use the resources and the accrued benefits and those who are not eligible. These rules also define the geographical boundaries of the resource so as to enhance administrative activities geared to manage it. The second principle advocates matching the appropriation and provision rules with the local conditions where the rules are applied. This principle emphasises compatibility between the rules and the social-cultural, economical, and political contexts in which they are implemented. Participation of the affected individuals in making and changing of the rules is the third principle insisted by Ostrom. According to Ostrom (1990), participation of the affected communities or groups will enhance support for the rules and ability of the beneficiaries to change them whenever the need arises. The fourth principle emphasises selection of monitors who will be accountable to the users or are themselves users of the concerned resources. This principle aims to address free riding problem and also to enhance prudent use of the resource by those who are eligible. The fifth principle emphasizes administration of graduated sanctions to those who break the rules. In this principle the need for coercive approaches is insisted just as it is in the classical CPRs literature (Olson, 1965; Hardin, 1968). The only difference is that the sanctions in this principle observe the collective action of the communities rather than unitary mechanisms of the state only. The sixth principle advocates the need to establish simple, rapid and low cost arenas for conflicts resolutions. Emphasis in this principle is

in establishment and utilisation of the local structures for conflicts resolution so as to enhance responsiveness of the leaders and empower the people to solve problems before they become impossible. The seventh principle articulates the need to have minimal recognition of the right to organise. This principle recognises the rights for civic engagement among the local people with regard to all affairs related to resource management and development. The eighth and last (but not least) principle emphasises establishment of the nested enterprises.

According to Ostrom (1990) the principles number one up to seven relate with small and simple resource governance systems. The eighth principle relates mostly with large and complex resource systems in which several layers of nested enterprises act toward the resource. In water resource arenas, management normally starts with the grassroots levels in which different water users groups (WUGs) are found. These are nested within the Water Users Associations WUAs, situated within district, region and finally national levels. While nesting of water enterprises is advocated, in practice it has been difficult due to institutional over-lap and ambiguities existing at sub-catchment levels, or what Mehta (1999) in Komakech *et al.* (2012c) calls the ‘messy-middle’. The messy situation at the middle levels according to this writer prevents effective nesting of the local users’ entities to higher resource governance levels.

Despite their useful insights the above principles have been criticised by the critical institutional scholars. The central argument in critical institutionalism is that the Ostrom’s principles have overlooked agency in the manner that actors utilise institutions to pursue their goals in resource management settings. In addition, such principles have been criticised for treating institutions as deliberately and consciously crafted objects. For critical institutional scholars institutions are elusive therefore difficult to configure through deliberate policy processes (Cleaver and Franks, 2005). Instead of standardised and deliberate efforts institutions evolve spontaneously through bricolage processes. These processes are discussed in the next section.

2.5.2 Institutional Bricolage Processes

Institutional bricolage or alternatively known as critical institutionalism or post-institutional theory, has developed out of the critique for the rational choice ideas embraced in the conventional institutional theory. This concept has evolved from the Levi Strauss's concept of intellectual bricolage used to describe the practical aspects of the "mythical thoughts" (Fuglsang, 2010). As pointed out by McKague *et al.*, (2009: 4), bricolage is a process of doing something by "applying combinations of resources at hand to new problems and opportunities and facilitating the entrepreneurial creation of something from nothing". Cleaver, who pioneered the use of this concept in explaining natural resource management systems, has defined it as the process of "gathering and applying analogies and styles of thought that are already part of the existing institutions to the new situations" (Cleaver, 2001: 29). In this idea, Cleaver is against the view in conventional institutional and CPR theories that institutions can be deliberately crafted to improve resource governance. Rather than deliberately designed structures, institutions are what people do in their daily interactions (Cleaver and Franks, 2005). Institutional bricolage also criticises the view that actors' individualistic interests guide their behaviour in a collective action in natural resource management. Instead of the individuals, it is the institutions which do the thinking (Cleaver, 2001). Hence, institutional bricolage is against the view in rational choice perspective that people are rational and economic resource users. In the thinking of institutional bricolage, resource users are conceived as conscious and unconscious agents who are deeply embedded in cultural structures and who can analyse and act up on the situations facing them:

Rather than seeing people as rational and essentially economic-resource appropriators, we can reconceptualise them as conscious and unconscious social agents, deeply embedded in their cultural milieu but nonetheless capable of analysing and acting upon the circumstances that confront them" (Cleaver, 2001: 29).

The concept of institutional bricolage has gained wide support in resource management literature. One of the scholars buying into Cleaver's ideas is de Koning (2011) who has identified three major processes describing Cleaver's concept of bricolage. These

processes are articulation, alteration and aggregation. In this study these processes have been adopted to explain the institutional bricolage processes in the selected small scale irrigation schemes.

Articulation is a process that involves interpretation of the new institutions within the framework of the existing ones. This process can normally lead to either adaptation to fit with the new institutions or rejection of such institutions and reinforcement of the existing rules, norms and beliefs as a result of disagreement with new institutions. In addition, in articulation processes individual actors can exercise agency through questioning of the widely held rules, norms, beliefs or values (Cleaver, 2001). In African water resource arenas, rejection of formal institutions is common because of their incompatibility with the local norms, values and peoples' life experiences in general. For example, Lloyd *et al.* (2005) has shown how attempts to make the Maasai pay cash for water have failed in Rufiji Basin in Tanzania. According to these authors the Maasai's attitude towards water use fees are influenced by long standing cattle based exchanges. This culture has made them develop low preference toward cash economy used in the formal governance systems.

It is not only the bureaucratic institutions that can be articulated but also the socially and culturally embedded institutions as a result of interference with some external systems. As cultural norms and values interact with external environment they sometimes lose their original meanings. This happens when the actors from a group borrow cultures from external systems or when some meanings in a particular institution undergo leakage after coming into contact with the external worlds with similar patterns (Cleaver, 2001). Leakages happen as actors understand and imitate ways that they think are appropriate. Generally, articulation of institutions is guided by what Scott (1995) calls orthodox logic. Such logic helps to choose which ways are conventional and thus appropriate and which ways are not.

Institutional bricolage also involves alteration of bureaucratic and the culturally and socially embedded institutions in order to make them fit with specific contexts. As stated by Cleaver (2001) and de Koning (2011), actors are influenced by their perception of the right ways of doing things. Through alterations, institutions gain forms that reflect the needs and expectations of the people sometimes opposite to what the policies emphasise. The alteration process differs between the bureaucratic and the socially embedded institutions. While the former involves more deliberate designs, the later takes place more spontaneously and unconsciously as the actors interact.

Aggregation is a process of combining and recombining the various bureaucratic and culturally and socially embedded institutional elements. Through the aggregation process various norms, rules, and beliefs are mediated before they are combined and recombined to suit a new purpose. Aggregation process also involves creation of multiple purpose institutions. Unlike the single purpose institutions of the formal arrangements, the multiple purpose institutions help to accommodate the varying discourses of the actors or bricoleurs. These three processes are summarised in *Table 2.1*.

Table 2.1: The institutional bricolage processes

Process	Description
Articulation	Accentuation of local institutions • Claims on tradition and culture • Rejection of bureaucratic institutions • Leakage of meaning
Alteration	Adaptation of bureaucratic and social institutions 1. Alteration of socially embedded institution • Less conscious more gradual • Reshaping and re-interpretation 2. Alteration of bureaucratic institutions • Conscious • Renegotiation, rule bending • Ignoring or negation of bureaucratic institutions
Aggregation	Recombination of various institutional elements • Mediation between different rules, norms and beliefs • Creation of multipurpose institutions

Source: de Koning, 2011

Generally, institutional bricolage implies existence of multiple institutions in resource management systems. This concept underscores the need for embracing flexibility in the manner that we design the policies in natural resource management. As Meinzen-Dick and Nkonya (2007) pointed out, the sources of law in resource management are variant including but not limited to communities, central government, local government, international bodies and within such sources different types of laws exist. Through bricolage processes actors negotiate these laws to find those which fit their circumstances. The decision to negotiate institutions does not emerge from nowhere but induced by certain forces operating within the actors. Such forces might be cultures, routines, or structures in which the actors are embedded. Although it is difficult to manipulate the decisions that the actors can undertake, it is possible to create facilitative environments to induce positive cultures towards the policy goals. It is in this light that Merrey and Cook (2012) introduced the facilitated bricolage idea in natural resource policies.

2.5.2.1 Facilitated Bricolage

Despite their influence, the practices of institutional bricolage processes depend on the existing power relations. Power relation or play of power can be defined as “political interaction through which people control each other” (Lindblom, 1980) or what enables who to do what to whom (Rath (1997) in Mbeyale (2009)). As indicated in this definition, power is not equally exercised by all actors.

Given the existing asymmetrical power relations, it is obvious that engagement of the actors in decision making processes is eschewed towards those with power. This affects development of effective collective action rules in water allocation and conflicts resolution arenas. It is out of this reality that Merrey and Cook (2012) have called for what they call ‘facilitated bricolage’ in water resources governance. With facilitated bricolage it means that innovative actions and behaviours evolve out of facilitative policy and legal frameworks. With facilitated bricolage, it is possible to mediate relations among the actors with different powers and influences in favour of the policy

goals. The concept of facilitated bricolage implies that not all formal guidelines are undesirable (Merrey and Cook, 2012). What is undesirable is using such guidelines or principles as blue prints applicable to all kinds of situations or to put it more straight, to stick to preconceived ideas even when they do not prove to be realistic. Generally, the facilitated bricolage idea indicates that innovative abilities of the actors are not emerging from a vacuum but rather they are inculcated within the existing policy contexts. Although Cleaver (2001) and de Koning (2011) do not dispute the importance of external facilitation, they do not indicate clearly how this can be achieved.

This study buys into the line of argument that emphasises facilitated bricolage. It assumes that innovative institutional bricolage practices require facilitation from the external environment both institutional and non-institutional. To understand such environments, the study has used the Institutional Analysis and Development (IAD) and Social Ecological System (SES) frameworks. Although these frameworks base on static rational choice view, in this study, they have been used flexibly to reflect dynamisms involved in water policy implementation.

2.5.3 The Institutional Analysis and Development (IAD) Framework

According to Polski and Ostrom (1999) the IAD framework is a useful tool for analysing the nature and efficacy of institutions in a policy process. The first step in using the IAD framework in institutional analysis is identification of the policy issue or a program of a concern and analyse what is going on with respect to such issue or program. After exploring the important events, it is also crucial to know the patterns of interactions and actors which constitute the policy action arena. In the same view, after exploring the action arena, it is crucial to analyse the action situations and the outcomes intended by the policy.

2.5.3.1 Patterns of Interactions

Patterns of interaction show how the action arena is structured and what roles are performed. In this case different strategies that the actors use to harness their roles are also important. The IAD framework believes that the policy outcomes just like the means used to achieve them are predictable. For example, Polski and Ostrom (1999) argue that, in circumstances where policy processes are tightly controlled, it is possible to predict types of outcomes that will follow certain patterns of interactions. In critical institutional thinking however, it is difficult to predict how the patterns of interactions produce certain outcomes due to unpredictability of such outcomes and interaction patterns. Institutions shaping interactions are hardly static and predictable, neither are the outcomes. Cleaver and Franks (2005) contend that institutions elude designs therefore present difficulties for policy elites to correctly put them in their lenses. After understanding the patterns of interactions, it is important to ask who the actors are, who is doing what and how.

2.5.3.2 Actors

In this component, the focus of the analysis is on the decision making capabilities of the key actors involved in the action arena. Basing on this framework, the choices that actors make in an action arena are influenced by the resources that they possess. As such, technological, social, material and all other types of resources define the strength or position of the actor against others in the policy process. According to Polski and Ostrom (1999), besides resources the decisions that actors make depend on their beliefs and the way they evaluate policy strategies and outcomes. The value that actors place on a policy decision influences their attitudes and ranking of preferences towards policy strategies and outcomes.

In the thinking of a rational choice institutional scholar valuation of policy decisions on resource management is a function of rewards or penalties that an actor gets from such decisions. The argument that users' dependence on natural resource for their livelihoods

motivates their support for government programs designed to govern them (Sesabo, 2007; Keraita *et al.* 2012) reflect this view. In this argument the resource users support resource governance programs because they have some economic returns for them. But, natural resources have both economic and symbolic values (Katani, 2010), thus as insisted in critical institutionalism, preferences towards policy strategies and outcomes may also stem from cultural frameworks of the people.

In connection to this the IAD framework has indicated how actors in action arena are influenced by the rules- in- use (whether formal or formal) rather than those articulated in the statutes. So, policy strategies may be preferred not because they are economically sound, but because they fit within the rules widely used by the people. This argument is somehow similar to what the critical institutional scholars advocate. However, the IAD framework lacks flexibility in its view about culture and the way it influences actors' valuation of the policy goals. Implied in the IAD framework is the idea that culture is "a static 'resource bank' from which social capital may consciously be drawn to smooth and facilitate the implementation of good resource-management decisions" (Cleaver, 20001: 28). It is not clearly explained in this framework how actors mediate culture. This outlook is disputable in the eyes of a critical institutional thinker because in critical institutionalism, actors exercise agency towards cultural and other elements in the action arena.

Apart from valuation processes, actors' choices also depend on the quality and type of information that they can access before making decisions. The importance of information is not only in accessing it but also processing and utilising it for various decisions (Ostrom, 1998; Gordon *et al.*, 2013). Access to information and capacity to utilise it in decision making helps to achieve what Court *et al.* (2006) call, evidence based civic engagement. Additionally, access to information helps to coordinate actors from different centers so as to pursue collective goals. In the pure rational thinking, actors are considered to be capable of accessing all crucial information before they

choose different policy options. The critical institutional theory opposes this assumption on grounds that perfect information model does not exist in real decision making situations due to obstacles that actors face in accessing information. Generally, the critics see actors as intendedly rational but limitedly so (Kiflemariam, 2001). Finally, it is important to understand the criteria used by the actors to filter different alternatives before making selection. This process is also not rational, as it is affected by different factors such as personality traits, level of education, cultural backgrounds and all other elements existing in the physical and material world in which the actors interact.

Analysis of actors and patterns of interactions leads to understanding of the action arena. According to Kiflemariam (2001) the action arena is a social space in which the actors (individuals and groups) fight, collaborate, exchange resources and interact among themselves and with institutions to provide certain policy outcomes. The action arena in the rational choice institutional thinking is constituted by actors who are not emotionally bound, as a result; they can even apply immoral strategies such as cheating, stealing, or deceiving in order to meet their self centered economic interests (March and Olsen, 1995). In the thinking of critical institutionalism, action arena is influenced not by individuals' desire to maximise economic interests, but the need by actors to maintain good relations. People choose to interact not entirely because of the material incentives but also the need to mend relations and help each other (March and Olsen, 1995; Cleaver, 2001; Cleaver and Franks, 2005).

Although the IAD framework is based on rational choice view it recognises existence of relational interactions in the policy action arena. By considering the rules-in-use, this framework accepts the idea that the action arenas are sometimes shaped by widely held cultural or social rules rather than their individualistic gains. But, as it has been indicated above, the rules-in-use are considered statically in this framework. The assumption is that, the action arena always conforms to community rules which are passively followed by the actors because they are widely accepted by the people. As it has been pointed out

above, this assumption overlooks the actors' capacity to mediate their environment before making decisions.

2.5.3.3 Action Situations

This is the context in which the actors interact to achieve the intended goals. The action situation consists of actors who occupy different positions and who are participants in various policy processes. In rational actor traditions, the actors considered are only those who are legally recognised. These are the actors who occupy formal positions and hold formal roles (March and Olsen, 1995). In critical institutional view however, actors do not necessarily occupy formal positions and hold formal roles (Cleaver, 2001; Cleaver and Franks, 2005). In this view actors in political action have multiple roles and as such identities. As assumed in critical institutional perspective, one actor can hold different diffused roles for example, a wife, a church member or a public servant. Diffusion of roles, as Riggs (2006) points out, is a phenomenon common to substantive governance systems, characterising most of the societies in developing countries. In such societies, it is difficult for actions to be controlled through formal procedures. In this regard, Cleaver (2001) denounced the emphasis placed on formal positions and roles saying that such structures do not adequately describe identities that actors have in policy processes. Instead of the formal roles and positions alone, actors also derive their identities from roles and positions embedded within the social and cultural systems of the communities that they are part of and/or interact with.

Other important aspects in action situation are functions that process inputs to outputs, set of information available to the participants in each stage of the inputs transformation process, and payoffs indicating the costs and benefits for different actions and outcomes. It is important to note that in the rational choice thinking all these elements are viewed as being shaped by sets of expedient rules (Scott, 1995). In the critical institutional thinking, however, the action situation is regulated by sets of rules which are constantly mediated by actors.

2.5.3.4 Outcomes

Another element in the IAD framework is the policy outcomes (Polski and Ostrom, 1999). Basing on this framework, policy outcomes can be evaluated using various criteria, some of which include economic efficiency and equity in terms of fiscal equivalence and distributional equity. In addition, participation is an important factor for policy evaluation (Ostrom, 1990) although it has not been stipulated in the IAD Framework. These criteria are discussed in details.

Economic Efficiency

The policy outcome is said to be economically efficient if the marginal cost for producing a unit of output is equivalent to the price charged for that unit (Ford *et al.*, 2001). From the social welfare point of view, an outcome is said to be efficient if the marginal social benefits are equal to marginal social costs. In a more strict sense, policy outcomes are said to be economically efficient if the costs for producing the outputs are at the lowest possible level. Similarly, UN (2000) provides three dimensions for understanding economic efficiency in water allocation processes. The first dimension is economic effectiveness. In this dimension, efficiency is said to exist when water resources are allocated to users with high economic values instead of those with low value. The users with high economic values are those in which high productivity is achieved with minimum waste of water. Economic effectiveness can also be assessed by looking at the costs and benefits of implementing the water allocation policies (FAO, 1995). In this regard, efficiency is considered to exist when economic benefits of implementing the allocation policies are higher than the costs involved in such processes. For example, the conservation measures are said to be efficient if the value of the saved unit of water exceeds the cost of providing it (FAO, 1995).

In addition to economic criteria, efficiency in water allocation can also be evaluated by looking at the existing resource monitoring systems (Ostrom, 1990). In water arenas monitoring is done by recording and observing the water resource data in the form of the volumes abstracted by the users and the water levels in different sources. Water use

monitoring is usually done for two major purposes; to determine the volumes of water used so as to get the data for planning, reporting and evaluation of the water allocation plans, and to control water abstractions to ensure that they are within the prescribed conditions (UN, 2000).

Another dimension for assessing water allocation efficiency focuses on physical transportation of water from its source or storage point to the point where it is used. Allocation system is said to be inefficient if massive losses of water occur en-route due to the use of inappropriate systems to deliver water from its sources to the point where it is utilised. Equally, it is important to consider how water is managed at point of use. Keraita *et al.* (2012) provide that, most of the farmer managed irrigation systems have inefficient allocation practices due to poor on farm management of the water resource. Apart from control of water losses, efficiency in agricultural water uses depends on utilisation of efficient farming methods, use of appropriate seeds and regulation of water users' behaviour through policies and legislations (FAO, 1995; UN, 2000).

In the rational choice view, efficiency can be enhanced if effective systems of rules and rights are in place to provide incentives to invest in resource monitoring systems and also encourage conservation culture (Meinzen-Dick and Nkonya, 2007). With respect to social stability, rules are also essential because they constrain behaviours which may harm others in allocation arena. But rules, as it has been pointed out earlier, are not automatically followed; therefore in the eye of critical institutionalism, efficiency also depends on how people perceive them. The more the rules reflect the existing social and cultural systems, the more the possibility that they will be understood and practiced by the people. In most policy arenas in developing countries, the rules to enhance efficiency have based on western rationality principles, hence incompatible with people's cultural and social systems which mostly focus on meeting livelihood needs (Cleaver, 2001; van Koppen *et al.*, 2004; 2007; Meinzen-Dick and Nkonya, 2007). In critical institutionalism

observation of the people's livelihoods is central to effective resource allocation processes.

Moreover, efficiency, as emphasised in rational choice traditions, involves development and maintenance of infrastructures. For example, in most cases, monitoring methods require existence of some technical devices such as flow meters, abstraction gates, cleaner production technology just to mention a few. This means that promotion of efficiency through control of water loss also depends on availability of effective technological facilities. In critical institutionalism, however, most of the attention has been paid on how people mediate their environments both institutional and technical to enhance resource management. Although technological developments are important for shaping peoples' capabilities to negotiate their environments, the critical institutionalism does not clearly discuss their role in actors' behaviours. In this study, technological advancements are considered crucial for empowering the people to innovatively negotiate and utilise institutions in water resource management and in particular allocation. Generally technological developments are considered essential in facilitation of bricolage practices as emphasized by Merrey and Cook (2012).

Equity

Apart from economic efficiency, equity is another criterion for evaluation of policy outcomes. One way of analysing equity is by looking on fiscal equivalence. Fiscal equivalency entails that costs paid by beneficiaries in production and provision of goods or services is equivalent to the benefits that they get from such goods or services (Polski and Ostrom, 1999; UN, 2000). Basing on this principle, beneficiaries' willingness to pay or share cost for production and provision of good or service is determined by the accrued benefits. Another principle for evaluating equity of policy outcomes is known as distributional equity. This principle advocates contributions which reflect people's ability to pay. To some extent this principle contradicts the fiscal equivalence principle where the individuals are compelled to pay proportionately to the benefits that they get

from the goods or services. If the ability to pay is considered, some people may receive goods and services in qualities and quantities which do not match their contributions thus causing loss to the provider or may receive goods or services with poor qualities or quantities just to meet their contribution levels. This principle ignores the real costs for producing goods and services. Unless government subsidies are available to complement what people contribute, this principle may not result to improvement of water allocation processes in small scale irrigation schemes.

According to Meinzen-Dick and Nkonya (2007) equity can be defined in terms of equality of access especially for meeting the basic needs or distribution of rights in proportion to the investments that people make in provision and management of the resource or combination of elements from the two criteria. Similarly, Lele and Jayaraman (2011), define equity as a 'fair' distribution of benefits and costs of a particular public policy, or a fair allocation of public funds, resources, including natural resources.

The concept of equity is popular in human rights approach, in which achievement of higher standards of development for all is insisted and is one of the rational choice ideas in management of water allocation processes. Scholars, in critical institutionalism like for instance Cleaver (2001), disapprove the rational choice conceptions of equity in water allocation processes. Their argument is that the concept of equity ignores asymmetrical power and gender relations in local communities. The policy makers, in the view of critical institutionalism have always strived to institutionalise equity values but they never come up with the strategies to address the gender and power gaps in their plans.

In addition to efficiency and equity, participation is an important measure for evaluating performance of a policy. In the situation where multiple actors and institutions interact it is important for the policy to include some mechanisms for integration of the actors and their world views so as to enhance collective action. In water resource arena,

participation has been insisted in the Agenda 21 in which decentralisation of governance structures to lowest possible levels has been advocated. Creation of grassroots structures such as the WUGs, WUAs, and Catchment and Sub-catchment Water Committees reflect the requisites of this principle.

Despite great deal of efforts by the government and donors' community, participation of the water users has not been effective especially in developing countries (Cleaver, 1999). Different factors contribute to poor participation of the actors in water resource management, however, resource constraints, elite capture and asymmetrical power relations are highly pronounced. Elite capture is a situation where by the few elites control or manipulate development processes to suit their self-serving interests (Wong, 2010). Enhancing abilities of the rural poor populations in raising voices and taking appropriate actions in the policy circles is critical in overcoming the problem of elite capture and promoting meaningful participation in development. The main assumption is that the poor and marginalised groups must be empowered to develop a well informed and organised civil society that will in turn provide checks and balance and prevent asymmetrical power relations in their communities. Generally, participation should not be followed by total withdrawal of the statutory bodies in management of the resource. As argued by Bruns (2007), governments should always strive to strengthen collaboration among the community, private and state action through co-production, co-management or regulated autonomy strategies.

Generally, the above criteria for assessing the efficacy of a policy have based on the western definition of rationality. The critical institutional scholars however see such criteria incompatible with the environment in which resource users especially in developing countries interact. Instead of wasting resources in introducing such systems in these countries, the critical institutional scholars encourage understanding of the lived experiences of the people so as to know their actual needs and expectations.

2.5.3.5 Factors Affecting Policy Action Arena

The above discussions indicate the policy outcomes and processes in the action arena leading to such outcomes. The policy processes and outcomes are not only affected by factors internal to the action arena but also from the external environment. Like the internal factors, the external environmental factors are both institutional and non-institutional. These factors include; physical and material conditions, community characteristics and rules-in use (Polski and Ostrom (1999).

(i) Physical and Material Conditions

These refer to conditions existing in resources required in provision and production of a good or service. According to Polski and Ostrom (1999) and Ostrom *et al.* (2014), these resources include production inputs such as capital, labor, and technology. Others are sources of finance, storage, and distribution channels. The first step in analysing these conditions is to identify the economic nature of a resource. Economic nature of a resource determines the investments that will be made in its physical and material inputs needed for managing it. From the economic point of view, economic nature of a resource is determined by degree of excludability and subtractability. By excludability, it means the extent to which potential users can be excluded from using a resource while subtractability refers to the degree to which use of resource units by one person make them unavailable for others (Acheson, 2011). This means that the more difficult to exclude ineligible users to access and utilise the resource and the more the resource units are open to subtractability by one user, the more the material, financial and technological resource will be needed for controlling and monitoring of the resource.

Basing on the above discussions, goods and services, in which exclusion of potential users is difficult and uses by certain people prevent others from using them have high economic costs. As Polski and Ostrom (1999) have contended CPRs, irrigation water included, have low excludability and high subtractability. This being the case this resource is economically expensive to manage.

In the IAD framework technological investments are regarded important for enhancing control of access to the resources (Polski and Ostrom, 1999). The same emphasis is found in Tanzanian policy framework for water resource governance (URT, 2002 a; URT, 2010 a; URT, 2010 b). However, role of technology in CPRs management is still debatable. To scholars with rational choice idea, technology may be a key resource for enhancing compliance towards the rules. For example, it is argued that technological resources play important role in excluding the ineligible users and promoting efficiency in water allocation processes (Ostrom, 2003, Keraita *et al.*, 2012). In critical institutionalism the role of technology is not openly emphasized, however, this does not mean that this theory disapproves the need for technological investments in natural resource management. Although technological developments are crucial, some scholars see them as means used to promote marginalisation of the weak by the powerful (Montouri and Purser, 1996). In irrigation farming this can happen if farmers use unequal technologies in storing and conveying water from sources to the farms.

Apart from physical resources, policy processes can also be affected by the material conditions in particular the financial and human resources for carrying out the planned activities. The financial and human resources determine the actors' capabilities to select different courses of actions in the policy arena. For example, to enhance monitoring of water resource to identify the illegal users, the water basin authorities must have enough financial resource to meet travel costs and also human resource for conducting inspections. Generally, material resources are essential for enabling participation of actors in production and provision of goods and services (Polski and Ostrom, 1999).

(ii) Rules-in Use

Rules are shared prescriptions consisting of enforcement mechanisms and sanctioning systems to punish those attempting to break them. The aim of rules is to clarify on the actions that are required, prohibited or permitted. According to Cleaver and Franks

(2005), shared meanings are crucial for enforcement of rules rather than sanctioning or rewarding powers of actors. The authors insist on the understanding of both formal and informal rules rather than limiting our knowledge to the formally designed rules alone, referred to as rules-in-form or rules-in-design. Their central argument is that effectiveness of the rules depends on the manner that they are actually used rather than how they are formulated.

According to Polski and Ostrom (1999) in analysing the rules the focus should be directed on the rules-in use both formal and informal rather than those in design but are not used by the participants. Like the action arena itself, rules do not operate in single situations. In most cases, rules are nested in deeper layers which define how lower-level rules should function. Although several types of rules exist, they can be categorised in three major levels (Ostrom *et al.*, 2014). The first level is operational rules affecting the day to day decision making processes among participants interacting in specific economic and political contexts. The second level consists of collective choice rules which determine how the operational rules can be changed and who should participate in crafting them. The third and final level comprises the constitutional rules which determine which collective choice rules should be enacted, how they can be changed and who should participate in formulating them.

Principally, both conventional and critical institutional theories emphasise on rules whether normative or regulative. However what differentiates these theories is the degree of flexibility in their conception of rules and norms. The conventional institutional theory tends to think of rules as if they are fixed stones (Meinzen-Dick and Nkonya, 2007). Such outlook has been disapproved in critical institutionalism where rules are flexibly considered.

(iii) Characteristics of the Community

According to Ostrom (2000a) in Acheson (2011), there are some attributes that are crucial for actors to establish effective resource norms, rules, and property rights that can

enhance collective action. The ways that the community is organised, i.e. its size, nature of its population, shared norms, and availability of social capital are important factors in its ability to develop effective norms for governance of the CPRs. According to Acheson (2011), the communities which are small, homogenous, with strong sense of community, rich in social capital, having mutual trust, capable of changing the rules, are dependent on the resource and have a low discount rate (i.e. willingness to sacrifice current payoffs for higher payoffs in the future) have greater possibility of devising effective collective action norms than those without such attributes.

The community attributes as conceived in the IAD framework reflect mostly the rational choice thinking. In rational choice perspective, effective communities are those which are stable, homogenous and have members who share common interest over resources. Such conception has been disputed in critical institutionalism. For the critical institutional scholars like Cleaver (2001) the possibilities of having homogenous communities are rare due to diversities in terms of economic level, ethnicity, wealth, education level and other characteristics existing in modern societies. As a result of communities heterogeneities diverse cultures, capabilities and interest have always characterised the modern CPR systems.

Currently there is no straight answer on how heterogeneity affects development of collective action values. To some, heterogeneity is an obstacle to collective CPR management while to others it is an advantage. For example, evolution of trust, reciprocity and positive emotions as core components of social capital may not be possible in a situation where people have unequal power endowments. To others heterogeneity creates interdependencies which can in turn facilitate collective action among the people (Komakech *et al.*, 2012b). Similarly, Cleaver (2001) sees cultural heterogeneity as an opportunity for the resource users from different ethnic backgrounds to learn new values through leakage of meanings from different cultural systems. But, heterogeneity in terms of extreme ethnic differences is difficult to manage thus regarded as a challenge in resource management (van Koppen *et al.*, 2007). Generally

heterogeneity can provide opportunities or distortions in resource management depending on the prevailing circumstances.

According to Ostrom *et al.* (2014), the IAD framework is a useful tool for identifying and analysing important institutional, physical and material elements that interact to produce some policy outcomes. In addition, Ostrom's principles provide useful insights for explaining enduring institutions. Despite their usefulness, these frameworks provide no room for analysing the bio-physical and governance systems in which institutions are embedded. Analysis of these aspects is important because it shows a relationship between the resource and its socio-political and natural contexts in which it is managed and utilised. The governance and bio-physical systems have been defined in the Socio-Ecological System (SES) Framework.

2.5.4 The Socio-Ecological System (SES) Framework

The SES is a framework for understanding the socio and ecological elements which have influence on resource management (Ostrom *et al.*, 2014). The framework consists of four major components namely; governance systems, users, resource systems and resource units. The social aspects of SES Framework consists of resource governance systems which comprise eight sub systems namely; property right systems, governmental organisations, non-governmental organisations, network structure, operational rules, collective choice rules, constitutional rules and monitoring and sanctioning processes. The ecological part of the SES addresses the bio-physical elements such as resource systems and units while the users are the actors mediating the social and ecological systems of a resource. This section has focused only on bio-physical or ecological aspects of the resource and governance systems in particular the property rights. The other aspects in particular rules, users, organisations and monitoring systems have been covered in the IAD model while the network structures are beyond the scope of this study.

2.5.4.1 River Basin as an Ecological System

According to Molle *et al.* (2007:588) River Basins are the “geographic areas contained within the watershed limits of a system of streams and rivers converging toward the same terminus, generally the sea or sometimes an inland water body”. The River Basin comprises the sub-basins which are more limited in size known as watersheds (in American English) or catchment in British English (Molle *et al.*, 2007). As a bio-physical system, a River Basin comprises the water resource system and units. The water resource system can be understood as stock variable of the resource which is capable of producing flow variable (resource units) under favourable conditions without harming the resource system or stock Kiflemariam (2001). In the general CPR literature, different examples of resource systems and resource units have been identified some of them including; forestry catchment and tons of wood harvested from such catchment and a fish pond and tons of fish harvested from it (Kiflemariam, 2001). In relation to water, the resource system can be a River Basin and units in cubic meters of water withdrawn from such basin. Bio-physically, the River Basin system has characteristics such as ecological boundaries, size, location, human constructed facilities, productivity and storage characteristics (Ostrom *et al.*, 2004). This system is connected to different nested sub-systems. Apart from river system and sub-systems, the bio-physical characteristics of the River Basins also include its water resource units.

When control of water resource systems and units are considered, different factors are important, one of them being its physical form or state. As it has been indicated in Mehta (2000) water has dynamic physical states or forms (fluid, vapour, solid) and is fugitive in nature therefore difficult to be under control of any particular governance system (Mehta, 2000). That is to say, water is so dynamic in its spatial and temporal distribution thus requiring more flexible programs in its management. At one point water can be scarce causing struggles for those who want to access it. At another, it can be so plenty that it becomes the source of destruction and commotion among the users. Unfortunately, measures to improve water resource governance have been adopted

without attention to such dynamic characteristics. For example, it is not uncommon to find blanket taxation systems in the areas where the supplies are highly uneven (van Koppen *et al.*, 2004). This situation normally leads to rejection of the taxes by those who do not get enough from the resource system.

Another important aspect to consider is how much can the resource system such as the River Basin or an irrigation scheme provide. In this case, it is crucial to understand how scarce or abundant the resource is and how do such situations affect the users and strategies available to policy makers. In addressing scarcity for example, the policies have directed most of their attention on climatic or environmental challenges (Lecoutere *et al.*, 2010). It is true that natural trends such as droughts contribute to scarcity but distributional and political systems can also be the sources (Lecoutere *et al.*, 2010). The blanket measures such as tariffs or licenses have normally been used to address the distributional challenges. But the political and social-cultural circumstances normally make implementation of such instruments difficult. Furthermore, most of the policy measures have focused on scarcity of water but the challenges are also on preventing problems related to abundance (Green, 2002; Tamas, 2003). Basing on a WIDER study (1998) cited in Tamas (2003), resource abundance causes laxity in control of the resource which normally leads to low investments and unsustainable use of the resource. In irrigation farming, water abundance is normally a challenge for on-farm water management and in most cases leads to poor productivity (Keraita *et al.*, 2012).

Understanding of the ecological systems is important for this study because they help to analyse the context in which water allocation institutions are utilised in policy processes. Although, as insisted in critical institutional theory, the actors have capacity to mediate institutions before using them, they do so within the environment which is biophysically and politically constrained.

2.5.4.2 A River Basin as a Social System

Apart from the bio-physical attributes a river basin comprises the social systems in particular the governance arrangements at different levels. As far as governance arrangements are concerned, the focus of this study is on property rights and rules governing how the water resource can be accessed and utilised by the concerned users.

According to Kiflemariam (2001:46) a property right “is a claim to a benefit stream that the state will agree to protect through the assignment of duty to others who may covet or somehow interfere with the benefit stream”. Specifically, property rights define individuals’ rights, privileges and associated duties for a specific resource use (Komakech *et al.*, 2012). They provide ability to the right holder to access and utilise the resource and exclude others who lack such rights. According to Bromley (2006), there are four types of property rights regimes namely; public, private, common and open property right regimes. In river basin setting, these regimes define pattern of interactions among actors as well as their legitimacy. Generally, property rights can be defined in the national policy documents or evolve spontaneously through various local processes such as ownership of hydraulic infrastructures or participation in their maintenance (Komakech *et al.*, 2010).

Apart from the regimes used to govern them, property rights can also be differentiated basing on the scope of the benefits that the holder can enjoy (Schlager and Ostrom, 1992). Depending on their benefits, the property rights can be divided in five categories namely; access, withdrawal, management, exclusion and alienation rights. Access rights allow only entrance to the resource premise but not abstraction of any unit. The participants having such rights are called authorised entrants. The good examples are the rights to hike, canoe, sit in the garden and the like (Schlager and Ostrom, 1992). According to Schlager and Ostrom (1992), withdrawal rights allow the users to obtain some units or products from the resource systems; for example, the rights to harvest timber from the forest or divert water from the river. These rights are granted to the authorised users. Management rights enable the users to regulate different aspects of

access and utilisation of the resource so as to improve it. The exclusion rights allow elimination of those who are not eligible from accessing and using the resource and finally, the alienation rights are those allowing the holders to sell or lease their rights to exclude others, manage or withdrawal the resource. The management and exclusion in addition to the access and withdrawal rights are normally granted to the full owners and proprietors of the resource while the alienation together with all other rights are possessed only by the full owners of the resource.

In rational management systems, the users' rights are clearly differentiated and stipulated in statutory documents. Such documents clarify the obligations that the right holders have as well as their privileges. While theoretically the users' rights are clarified and differentiated in practices such differences are not always honoured. For example, it is common to find users with management rights excluded in management processes and those with withdrawal rights denied access and the chance to utilise the resource. Generally, as it is indicated in Kramm and Wirkus (2010), possession of any of the above rights is important but does not automatically enable a person to participate in utilisation and management of the resource. Participation in water resource management and utilisation depends on other factors existing in the social, cultural, economic and political environment in which the resource users are embedded.

The Ostrom's principles of enduring institutions, IAD and SES frameworks explain the policy processes through the rational choice perspective. In short, these frameworks provide the instrumental view about institutions. In these frameworks, institutional and non-institutional factors influencing behaviour emanate from the external worlds and are independent of the actors' creativities. That is, institutional and non-institutional factors such as the material, physical and bio-physical conditions influence the actors' decisions to act but the actors do not have any influence on these factors. This view about resource management institutions has been criticized in critical institutionalism. Critical institutionalism, in resource management conceived as institutional bricolage, considers

agency in the way institutions are utilised by actors in natural resource management. Despite useful insights, the concept of institutional bricolage is also not sufficient enough to guide the study because it provides no room for analysing the non-institutional factors from the surrounding environment. It is due to this reason that this theory has been used eclectically with the Ostrom principles, IAD and SES framework to provide the framework for analysing water allocation processes. After understanding what these frameworks propound it is important to gain general insights about water allocation processes. In discussion of the water allocation processes the focus is also on understanding how they reflect the theoretical insights from different institutional frameworks.

2.6 Water Allocation Processes

At the outset, it is important to define the concept of water allocation and water right. As it has been pointed out in Le Quesne *et al.* (2007) water allocation refers to “the process whereby an available water resource is distributed to legitimate claimants and the resulting water rights are granted, transferred, reviewed, and adapted”. It involves distribution of water from the source to the points of use. Water allocation is an arena in which actors of different identities, capabilities and interests affect decisions and processes on who should get what, how and when through utilisation of multiple institutions.

The growing interest on water allocation and users rights is a result of the changes in socio-economic and demographic characteristics taking place in different societies. In communities where resources are plenty, populations are low, and economic activities are not extensive, the allocation systems and rights are not as strongly defined as it is for the societies where populations are higher and economic activities are complex. In short, water allocation mechanisms and rights become important as multiple water uses and users emerge and demands for water increase competitions and possibilities for users to harm each other (Meinzen-Dick and Nkonya, 2007).

In water allocation processes, property rights are linked to three types of water allocation mechanisms; public, market, communal or open (Meinzen-Dick and Nkonya, 2007; Dinar *et al.*, 1997). The public allocation mechanisms are hierarchical in nature and associated mostly with public property right regimes. In these mechanisms, the final authority over the access and utilisation rights rests with the government or its agents. The public mechanisms conform mostly to the rational choice theories. In these mechanisms, institutions and the material, physical and bio-physical contexts in which they are utilised are considered in a static way. Physical resources such as technology, material resources such as finances and human resources, and bio-physical resources such as resource stock are considered in terms of their role in enforcement of policy goals such as efficiency, equity and participation (Polski and Ostrom, 1999). In critical institutional thinking however, importance of such elements is considered flexibly in relation to their role in enabling the actors to negotiate their environments and enhance their livelihoods (Cleaver, 2001).

In market mechanisms, relations are horizontal, taking place among the parties which are thought of as equal and impersonal. These mechanisms are regulated through private rights held by individuals or corporate bodies such as companies. The water market through which the private rights regulate allocations can be formal, backed up by codified laws or informal basing on rules developed by the involved parties without codification. Such rules always respond to market forces and normally allow access and withdrawal of water but not decisions to allocate water to others. Like the public mechanisms, the market allocations operate in the environment which is constrained by the material, physical, bio-physical and governance systems (Polski and Ostrom, 1999). Such factors prevent effective implementation of the market rules, as a result, with the exception of Chile where water users have the autonomy to sell their rights to others in most parts of the world pure water markets are difficult to find (Bauer, 2010). The key challenge of market systems according to Acheson (2011) is how to control externalities due to challenges in sanctioning of the users mostly emanating from the factors above.

Like the public mechanisms, the private allocation mechanisms embrace the static view about the relationship among actors, institutions and material, physical and bio-physical environments in which they are processed. Actors in these mechanisms do not have any influence on the manner that the physical and bio-physical forces interact with market institutions to produce outcomes in policy processes. Basing on their characteristics the public and private allocation mechanisms reflect mostly the rational choice traditions in which the actors are considered passive recipients of the external institutional and non-institutional forces. Such mechanisms, however, are different from the communal based allocations where actors are considered to have active role in shaping the institutional and non-institutional environment in which the water allocation processes are conducted. In critical institutional view the actors in public or market processes do not just make reference to institutional, material, physical and bio-physical factors in their decisions to act up on the institutions, but they can also act upon such factors. For example, the water users may invent some local mechanisms to deal with scarcity or technological challenges without any government support.

Communal or community based allocation mechanisms are typically reciprocal, taking place through horizontal channels and controlled through communal rights. Unlike the market or public systems, the communal mechanisms are personal and relational in nature. Like the public and private rights, the communal water rights differ depending on the material, physical and bio-physical environments in which they are used, however, in Africa; there are some elements which are common in many areas (Meinzen-Dick and Nkonya, 2007). One of the common elements is the widespread notion that any one has the right to access water for basic needs such as domestic as well as some productive uses to meet basic human needs. In this principle, not only human beings but animals are also entitled to water as reflected in Kalengin proverb in Kenya that “*even hyena is entitled to water*” (Meinzen-Dick and Nkonya, 2007). In Islamic law such right is formalised as the right to thirst (Meinzen-Dick and Nkonya, 2007).

Another element common to African water laws is flexibility. In most cases rights regardless of their importance are socially negotiated at individual or group levels. In this way, the community based water rights manage to adapt to changing local circumstances. For example, instead of fixed laws on who should get what when and how, such rights have the room to accommodate issues depending on the existing circumstances. Moreover, in African water right systems, as Meinzen-Dick and Nkonya (2007) contend, control of the management, exclusion and alienation rights is normally in the hand of the chief, individuals or groups who incurred the costs to develop the sources. This aspect is advantageous as it motivates local investments on water infrastructures. The problem however, is the danger of excluding those who in one way or another may fail to make any contributions in resource management systems. Finally, most African community water laws do not allow alienation of the rights to others although they encourage collective sharing of the resource. This element reflects the African traditional view that water can be given out but not sold to other people.

The ‘no rule’ interaction systems relate with the open resource regimes. In such situations, the actors are free to do whatever they wish regardless of the effects to others (Meinzen-Dick and Nkonya, 2007). In conventional institutional theory the open access mechanisms are generally regarded as inappropriate. These mechanisms are regarded as undesirable outcomes emerging as a result of weaknesses in public or private governance systems (Ostrom, 1990). However, in critical institutionalism, such systems are sometimes supported especially when the basic rights to livelihoods are considered. In that case, access may be left unregulated to allow those who do not have rights and whose livelihood are endangered to get water.

As it has been pointed out earlier, the water allocation processes are managed through right systems which are formally or informally established. Ideally, the formal property rights are regarded legitimate institutions for managing the water allocation processes (URT, 2002a). But, as Komakech *et al.* (2012a) have contended legitimacy is interpreted

differently by different people. For those embracing the rational choice view, legitimacy is obtained through possession of the right documents while for the critical institutional scholar, legitimacy is considered in relation to the way the programs or decisions reflect the social and cultural environment of the users. In addition, legitimacy for the critical institutional thinker depends on the way the users interpret the issues with respect to the existing cultural symbols. Generally, as Komakech *et al.* (2012a) have contended, definition of legitimacy is in the minds of the actors. The water users for example, normally perceive a policy instrument legitimate only when it serves their interests.

In considering legitimacy of the formal water rights, the focus should also be on power relations existing in the communities in which the resource is allocated and utilised. Although property rights make the resource users legitimate, their capacity to access the resource and participate in management processes depends on the manner that power relations are structured in the groups or communities. In the next section the concept of power relations is discussed to gain insights on how it affects access to water resources.

2.6.1 Power Relations in Water Resource Allocation

As it has been pointed out earlier, power relations shape action in policy processes. As it has been indicated in different studies (Mbeyale, 2009; Kramm and Wirkus, 2010), power relations have significant influence on water allocation processes especially in African countries (Cleaver, 2001). In the formal allocation mechanisms attention is always directed on defining the property right systems as insisted in Coase Theorem (McCloskey, 1998), believing that a well-defined set of property rights will always lead to the most efficient use of resources. However, the critics of the formal property rights systems (for example, Ribot and Peluso (2003) cited in Kramm and Wirkus, 2010, Cleaver, 2001; van Koppen *et al.*, 2004; Komakech *et al.*, 2012) find property rights as just one category of institutions and social- political relations that regulate water allocation processes. As Kramm and Wirkus (2010) contended, in the situation of

asymmetrical power relations, the bundle of rights seems to be less important compared to the bundle of power possessed by the parties in allocation arenas.

The bundle of power regulating access to resources such as water is regulated through relational and structural mechanisms. The structural and relational mechanisms which include the “technology, capital, markets, knowledge, authority, social identity and social relations” assign the actors different positions which in turn shape their abilities to access the resource and influence others in the web of power (Kramm and Wirkus, 2010). According to Lindblom (1980), the main method of control that the actors use in the power plays is the use of reward both financial and non-financial or penalties. Through such means the actors can threaten, manipulate or persuade others to abide with what they want. The above mentioned resources help the actors to strengthen their positions against others in bargaining, rewarding or sanctioning processes.

As one can see water allocation is a contentious activity. The competitions and tensions involved in allocation processes expose the users to disputes which sometimes escalate to active conflicts. In the next section, review of literature focuses on understanding of the theoretical knowledge about water users’ conflicts.

2.7 Water Users’ Conflicts

As it has been indicated in the literature above, water allocation is a process influenced not only by the formal regulative institutions, but also institutions from the informal systems. As a result of being under the influence of multiple institutions and actors, water allocation is a process prone to users’ conflicts. In this section, review of literature related to water allocation conflicts is done. The aim is to gain insights on the meanings, nature and factors that contribute to emergence of conflicts in water allocation arenas.

2.7.1 Meaning and Nature of Conflicts in Water Use

As it has been indicated in the literature (Mbeyale, 2009; Bijani and Hayati, 2015; Komakech and van der Zaag, 2011; Lecoutere *et al.* 2010; Maganga *et al.*, 2004; Maganga *et al.*, 2003), conflicts are common features to most water allocation arenas. Upreti (2004b) defines conflict “as a clash of interests, complaints in public, protests, and filing cases with the local administration and courts” (Upreti, 2004b) cited in (Nkonya *et al.*, 2009: 3). In this study, conflicts are regarded as disagreements over access or use of the resource that can lead to violent or non-violent encounters among or between individuals or groups. There are different levels at which conflicts can be manifested. According to Sanginga *et al.* (2007) and Edossa *et al.* (2007) in Nkonya *et al.* (2009) resource use conflicts can be found at community, inter-community, or supra community levels. With respect to the land or water resources, users’ conflicts can be found also at the farm level involving individual farmers or an individual farmer with a group of other farmers or between groups of farmers (Nkonya *et al.*, 2009). According to Warner (2000) cited in Mbeyale (2009), conflicts can be classified as intra-micro micro, inter micro- micro and inter micro-macro. The intra micro-micro conflicts are those conflicts happening within a resource utilisation context involving for instance users claiming access to resource basing on different resource regimes for example, between private or government and communal rights holders. The inter micro-micro conflicts take place between the resource owners and users or indigenous and non-indigenous users and are induced mostly by clash of interests between groups having cultural differences. Other conflicts in this category are those arising out of wealth disparities, non-cooperative behaviour of the resource use groups and exclusion from decision making systems. The inter-micro macro are those conflicts happening between community groups and outside project sponsors or managers and those caused by political influence.

The above typologies are useful not only as analytical frames but also as guides for practical approaches in conflicts management. In short, such typologies help to

understand the nature of conflicts before developing intervention mechanisms. For example, the intra micro-micro conflicts may easily be amenable to customary resolution mechanisms because they are internally contextualised. The same mechanisms however may not be suitable for the inter micro-micro conflicts because of the cultural diversities that may exist between the parties. As argued by van Koppen *et al.* (2007) conflicts involving parties with heterogonous ethnic cultures are best solved through government mechanisms. In a way, this line of argument reflects the classical CPRs scholars who saw that government interventions are essential for effective resource management. The only difference is that, while the authors above insist flexibility for both government and communal conflicts management approaches the classical view reject any possibilities of resolutions outside the government coercive measures. Apart from their nature, conflicts need to be analysed to understand the factors that influence their occurrence. The existing literature however, does not provide a common understanding about such factors. In the next section, reflections are done from the institutional literature to see how institutions are linked to water use conflicts.

2.7.2 The Institutional Bricolage and Water Users Conflicts

In the thinking of rational choice institutionalism, conflicts in resource use are anomalies in governance processes and thus should always be avoided. In bricolage or critical institutional thinking however, conflicts are not regarded as harmful aspects which always need to be avoided (Cleaver and Franks, 2005). The actors buying this view take conflicts positively and instead of suppressing them, they encourage open discussions and shared agreements in dealing with conflicts. Generally, bricolage theory acknowledges diversities in actors and institutions involved in water policy processes and views conflicts as inevitable effect of such diversities.

Bricolage concept is useful for explaining the conflicts related to institutional multiplicity. But findings from the study show that institutional multiplicity lead to conflicts when coupled with other factors, institutional and non-institutional, from the

environments in which the actors and resource are embedded. These factors are explained through the IAD and SES frameworks.

2.7.3 IAD and Water Users Conflicts

As stipulate in the IAD framework, policies are influenced by some environmental factors both institutional and non-institutional. Like the institutional bricolage concept, the IAD is also a useful framework for analysing water use conflicts. The institutional factors in particular the community characteristics and rules in-use as articulated in this framework have great potential for causing conflicts if not adequately monitored. It is generally argued that communities which are homogenous, small, having members with mutual trust and understanding about the resource allocation rules, have the capacity of avoiding clashes than the communities lacking such attributes (Ostrom, 2000, Ostrom, 1990). Although Ostrom focuses on stable, small and homogenous communities, in reality they are difficult to find. In most cases community members differ in their social-economic and demographic backgrounds. These differences may act as driving forces for conflicts to happen.

One of the factors that trigger diversities in community compositions is in-migrations (Carius *et al.*, 2004). More often than not, in-migrations create heterogeneity in communities sometimes leading to clash of interest over the resource niches (Green, 2002; Mbeyale, 2009). Such clashes are sometimes disguised in resource scarcity conflicts while in reality they happen out of value differences over the resources. Apart from value diversity, in-migrations normally result to population boom which at the end fuel pressures and consequently resource degradation and conflicts in destination communities.

In traditional irrigation systems, increased population pressures exacerbate encroachment behaviours among the resource users. As a number of resource users in particular resource stock increases, the possibilities for trespassing behaviour and consequently conflicts also increase. To prevent free riding or encroachment behaviour,

literature insists the use of boundary rules which define who are the eligible users and who are not (Ostrom, 1990; Ostrom *et al.*, 1994). Due to low enforcement capacity in most cases such rules have remained idle. Generally, in-migrations destabilise the economic and social equilibrium of communities through exacerbation of population pressure and intensification of competitions which consequently breed conflicts over scarce resources.

Despite having negative effects in-migrations can also create heterogeneities in terms of ethnicity and bring together people who are unequally well off. In this way, in-migrations are useful because they can create the potential for cultural borrowing and interdependencies among the community members. As Cleaver (2001) has contended cultural borrowing helps to devise multipurpose institutions which in turn enhance collective action among the actors with ethnic diversities. On the other hand, in the context where the rich and poor resource actors interact, both can benefit from each other paving the way for collective action. For example, the rich users can depend on the poor for labour and poor depend on the rich for financial investment on water projects.

Another institutional factor stipulated in the IAD that may influence water use conflicts are the rules-in-use. While the formal and rational rules are insisted by the administrators, communities may reject them and focus on spontaneously evolved rules. Clashes between the rules-in-use and those in design (Schlager and Ostrom, 1992) over access and usage of the water resource are widely documented (Komakech and van der Zaag, 2011; van Koppen *et al.*, 2004; Komakech *et al.*, 2012a). Such clashes however may be minimised through involvement of the people. Through participation in rule making processes the water users become aware of such rules and how they should be used, hence minimizing the possibility of opposition, violation and consequently conflicts (Ostrom, 1990). As argued by Sesabo (2007) awareness about the rules enhance compliance in resource policy enforcements and maximize community support for their enforcement. In this way, the possibility for emergence of rules-in use which are prone to conflicts can be minimised. Awareness on processes affecting one's life

courses may sound important factor that can discourage growth of conflicts; however, the opposite is also possible. In some circumstances, awareness may lead to emotional encounters that may result to conflicts especially when one's rights are violated.

Valuation processes are also important institutional factors that can influence water users' conflicts. With regard to this, both the rational and critical-institutional scholars explain how people normally support courses of actions they regard valuable, and reject others which do not meet their value definitions. Their difference however is on definition of value. For the rational institutionalists, instrumental gains make the policy option valuable while for the critical institutional scholars value definitions base mostly on cultural and social affiliations. Thus, cultural or instrumental values may expose the users on conflicts, especially when parties fail to reconcile differences in interests. Conflicts over resource between groups with different ethnic and economic backgrounds provide a good example in this regard.

Apart from the institutional factors, the IAD framework also stipulates non-institutional factors influencing water users' conflicts from the environment external to action arenas. The first of these factors is the physical and material conditions in which the production and provision of the water resource is conducted. The physical conditions such as the storage and transportation technologies can create an environment for water users' conflicts to emerge. It is imperative that technological advancements in storage and transportation of the water resource have significant role in its availability, but it is also important to consider the challenges imposed by technology in irrigation farming (Keraita *et al.*, 2012). Through technological development resource may be overexploited leading to scarcity which can in turn lead to conflicts. In addition, technological advancement may help certain group of users to augment their share while reducing flows to others who use crude technologies. Despite the existing challenges, there is general understanding that effective technology is crucial for management of water allocation and control of users' conflicts (Green, 2002).

Apart from technology, the material resources such as financial resources needed for capital and other investments in resource management system determine the level of conflicts in allocation arenas. When such resources are not adequately available there is a great possibility that services will be poor. For example, due to lack of adequate resources, investment on infrastructures will be affected thus affecting storage and transportation for the resource. Poor funding for storage and transportation of the resource normally leads to scarcity which sometimes force people to fight.

2.7.4 The SES Framework and Water Users' Conflicts

From the SES Framework, institutional and non-institutional factors that can trigger water use institutions can also be explained. The institutional factor from the SES framework targeted in this study is governance systems. Governance systems as stipulated in the SES can also create an environment for water use conflicts to prevail. There are various governance aspects with conflicts potential, one of them is how water users' rights are configured. The water use rights are designed to exclude those who do not contribute to production and provision of the resource, normally without attention to historical abstractions that the people had (Meinzen-Dick and Nkonya, 2007). As it is widely indicated in the literature (van Koppen *et al.*, 2007; Ostrom, 2008; Komakech *et al.*, 2012), the indigenous communities in developing countries have relied on customary allocation arrangements throughout their lifetime. Due to various factors, majority of these users have failed to adapt to the modern allocation arrangements. As a result most of them are excluded from the resource or receive less shares of the resource than their counterparts who abide with the modern rules (van Koppen *et al.*, 2004). Most of those excluded from the resource are pro poor village dwellers who rely mostly on natural resources for their livelihoods. As a result of being excluded the water users in local areas have always negotiated the formal rules and explored their own ways of accessing the resource even if the rules do not allow them. By doing this, such users usually enter into conflicts with the government or the formal right holders.

The non-institutional factor from SES having the possibility to cause conflicts is the bio-physical characteristics of the resource. With respect to bio-physical conditions the central issue focused in this study is flow of resource units. In many areas in the world water resource is claimed to be scarce. As Gleick (1993) in Mehta (2000) has pointed out, only 0.3 percent of water is available for human consumption around the world while the rest is locked in ice caps of Antarctica and Greenland or deep in underground aquifer. Although water scarcity is widely claimed in the literature, its link with water users' conflicts is still not clear. For example, the traditional Malthusian theory has warned that human consumption of the natural resources will exceed its availability and lead to scarcity that will cause disasters such as hunger, diseases and wars (Green, 2002). The environmental security literature also sees scarcity triggered by environmental degradation as a major source of water users' conflicts (Lecoutere *et al.*, 2010). The political ecology theory, however, rejects the static view that perceives water resource conflicts as necessarily a result of water scarcity (Lecoutere *et al.*, 2010). This theory focuses on broader picture of water conflicts. It directs its attention to some contextual factors such as power relations, social-cultural or historical issues. Moreover, some studies have reported peaceful abstractions of water even during acute scarcity (Meinzen-Dick and Nkonya, 2007; Lecoutere *et al.* (2010). Such positive experiences challenge the argument that scarcity is the main cause of conflicts among the users.

Another bio-physical factor that may contribute to conflicts is resource abundance. In a normal circumstance resource abundance is a blessing that the users must celebrate. But the "honey pot" of resource abundance has turned to be a disaster in many parts of the world (Tamas, 2003). In most cases abundant supplies of water stimulate unlawfully migrations which normally result to outbreak of conflicts over resources in destination areas. Moreover, in irrigation farming, excessive supplies of water normally lead to some challenges which influence occurrence of conflicts (Keraita *et al.*, 2012). Generally, resource abundance has induced greed and irresponsible behaviour which at the end leads to civil conflicts (Tamas, 2003). In addition, as reported in the WIDER

study (1998) quoted in Tamas (2003) resource abundance normally lead to less investment by the governments and their agents towards resource management leading to open access. In the long run the open access may result to resource degradation which may in turn trigger competitions and conflicts.

Geographical location of the water resource system is another bio-physical factor that may contribute to water users' conflicts. The resource users located in different geographical location may face different climatic conditions, landscapes and geological features which can affect their capacity to access and utilise water. The conflicts between the head and tail end users are common examples of the location induced conflicts discussed in the literature (van Koppen *et al.*, 2004; Wolf, 1999). In some studies (van Koppen, 2004, Keraita *et al.*, 2012, Tamas, 2003) the upstream users are perceived to have more power to make decisions over access and capacity to exploit more water, thus causing scarcity to lower course users. However, this depends on the existing power relations. For example, despite being at the tail end of the Nile River course, Egypt seems to have more decision making power concerning utilisation of the Nile water than the other states at the upper course. Basing on this experience location becomes an advantage if it is associated with other sources of power in decision making arenas. Conflicts between the upper and downstream users however can be avoided if such users face challenges which need cooperation to overcome (Komakech *et al.*, 2012b). In the other words inter-dependencies between the users facing different bio-physical situations can minimise the chances for hostile relations.

2.7.5 Socio-demographic characteristics and Water Use Conflicts

Although the above institutional, material, physical and bio-physical factors may have contributions on water use conflicts, their influence depends on the social economic and demographic characteristics of the individuals and households in which they are found (Lecoutere *et al.*, 2010; Lecoutere, 2012). In this section various social-demographic and economic factors are discussed to understand how they influence water use conflicts in small scale irrigation schemes.

(i) *Age*

Age is one of the factors believed to have influence on an individual's predisposition to conflicts or conflictive behaviours. As pointed out by Kiende (2013), age indicates experience and wisdom needed to handle various issues in people's lives. It is argued that as people's age increases their disposition to conflictive behaviour decreases. In this case, higher age is associated with increase in the ability to solve problems (Kiende, 2013). Similarly, Bennet and Cao (2013) indicate that presence of youth bulge in a country increases the possibility of conflicts to emerge especially if the available economic opportunities do not meet their expectations. Due to their difficult situations, the youths, especially the poor and uneducated, normally think that they have nothing to lose if they engage into conflicts. Sometimes the youths think that their involvement in violence may bring them some benefits (Lecoutere *et al.*, 2010). While the chance of being violent is greater among the young people, the likelihood of the elderly people to behave in conflictive ways is low because these are normally less competitive and aggressive in their approaches (Kiende, 2013).

(ii) *Gender*

When men and women are compared, differences can be observed in their predisposition to conflictive behaviours. It is generally, assumed that the incentives to comply with the rules that stipulate fairness in resource abstraction is higher in women than men (Lecoutere, 2012). Adherence to fairness is an important factor in avoidance of conflicts in water allocation processes. But this depends on how the rules restricting access and utilisation of the resource affect their livelihood strategies. In the situation where such strategies are jeopardised, women behaviours can also be inclined to rule violation and conflicts. In addition, Lecoutere (2012) contends that, the likelihood of breaking the rules that insist fairness in water abstractions is low among women than men. However, according to this author, this exists when the unfair behaviours are heavily penalized. In addition, as Lecoutere *et al.*, (2010) observed, women fairness in

water abstraction exists mostly when water is abundant than when it is scarce. Generally, basing on the literature, direct link between gender and water use conflicts does not exist. It all depends on the prevailing situations.

(iii) *Education Level*

Similarly, education level in terms of the years that the user has spent in school has significant role in individual's conflictive behaviour (Mbeyale, 2009). It is believed that education is a tool that helps to inject non-violence culture to human beings. It is through education that people are empowered with skills to handle issues diplomatically and avoid conflictive encounters (Kiende, 2013). While education is generally regarded as an instrument of peace, there is also a claim that it is a source of violence in different parts of the world. As argued by Somers (2009), education can stir greed and a sense of superiority, aspects which seem to go contrary to human civilization. Similarly, Bennet and Cao (2013) contend that, when education is attained in the situation of limited economic opportunities for the youths, it has a likelihood of leading them to conflictive behaviours. Generally, education level has both positive and negative influences on youths' exposure to conflictive behaviours.

(iv) *Irrigation Benefits*

Farmer's perception about benefits accrued from the water resource may induce involvement in water use conflicts. How beneficial the resource is depends largely on level of farmer's dependence on that resource. The more people depend on the resource for their livelihood the more beneficial it becomes. As contended by Sesabo (2007), positive attitudes towards governance programs for the resource exist when people expect to get more benefits from the resource through such programs. This implies that benefits induce common understanding towards resource policies among the resource users hence a catalyst for conflicts prevention. But when the benefits are high and the government policies or other external forces seem to jeopardize them, conflicts may

prevail because people will not be ready to see access to the resource which they depend mostly for their survival being threatened. According to Mbeyale (2009) dependence on CPR increases the likelihood of institutional erosions when changes are introduced because the users will always find alternative ways to exploit the resource to meet their needs contrary to the new rules. In doing so, they will increase the likelihood for conflicts to emerge.

Whether the resource will be of great value and to what extent depend on availability of alternative occupational activities. Hasnip *et al.* (2001) argues that peoples' livelihoods are enhanced when they have access to alternative resources. Such resources empower the people and enable them to participate in different economic activities. When people lack alternative resources, their capacity to diversify their economic means is limited thus normally they turn to natural resources existing in their surroundings (Hasnip *et al.*, 2001). In this way, great pressure is exerted on resource leading to competitions which in most cases give birth to conflicts.

(v) *Irrigation Farming Experiences*

Irrigation farming experience is one of the important factors determining the farmer's involvement in water use conflicts. In organizational contexts experience is regarded an important factor for handling recurring conflicts. As managers deal with conflicts repeatedly they gain interpersonal skills which in turn help them in addressing similar situations in the future. It is believed that experienced managers have more interpersonal skills for handling familiar conflicts because they have repeatedly solved them in different situations (Kiende, 2013). As it is for the managers, experience is an important factor for the farmers to handle conflicts situations. In irrigation farming, experience is denoted by long period of interactions a farmer has with others. Through long period of interactions farmers gain skills which can in turn improve interpersonal relations and conflicts handling skills.

Similarly, Ostrom (2000) has contended that as resource users live together for long period of time they develop norms of trust and reciprocity. Such norms are crucial for prevention of conflictive encounters in resource distribution and utilisation. Generally, what is implied in the literature is that, long period of interactions in development activities, irrigation farming included help the actors to manage situations before they escalate to conflicts.

(vi) *Membership to irrigators' Groups*

As Olson (1965) has pointed out, unless the size of the group is small, rational, self-interested individuals will not act to serve the common good. In the other words, collective action is difficult to achieve if the group in which the resource users are organised is big in size. Likewise, Ostrom (2000) is of the view that communities which are small in size and have common interest towards the CPR are in good position to devise collective action rules than those which are big and heterogeneous. The central idea in this argument is that big groups pose some challenges in control of access and utilisation of the resources. In such groups it is difficult to know who is doing what where and when because too many people are involved in resource utilisation. Although the size of the group matters in regulation of the resource users behaviours its effects depend largely on production and allocation functions (Ostrom, 2003). Production function assumption stipulates that instead of the group size, it is what and how members contribute to production of the resource that matter in collective action. As argued by Ostrom (2003), the concave production function indicates increase in members' contributions, benefits and hence motivation for collective action as membership increases. In this case the possibility for conflicts avoidance seems to be high. But this trend is only for short period because as more members join the group decrease in marginal benefits occurs. In convex production function, the increments in contributions and associated benefits are initially small due to small number of contributions but they become progressively higher in subsequent stages due to positive interdependencies amongst members. In this production function the possibility for

collective action and hence conflicts avoidance is higher. In step-level production function the members believe that unless the resource is actually produced there is no chance to free ride on others' contributions. In such situations the individuals may assume that their participation in resource production is crucial. The step-level production function indicates high possibilities for collective action and conflicts avoidance. Apart from membership size and contributions, diversity in terms of people's social-economic and demographic characteristics may also increase or decrease the chance for conflicts to occur in the group (Komakech *et al.*, 2012b).

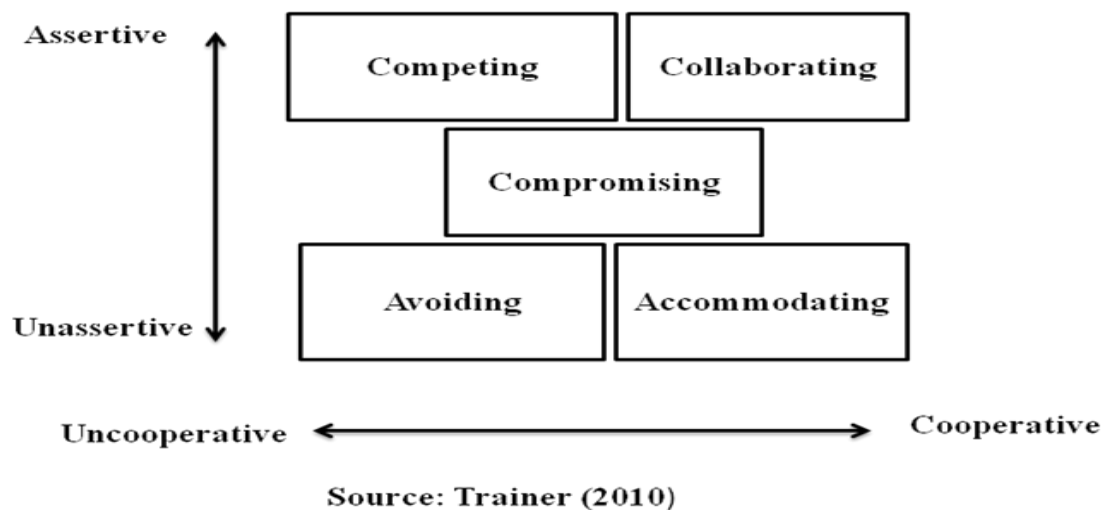
2.7.6 Management of Water Allocation Conflicts

The conventional management literature identifies five major approaches for handling of conflicts namely; competing or confronting, accommodating, avoiding, collaborating and compromising (Trainer, 2010). These approaches can also explain management of the conflicts related to resource allocations.

In the competing approach, parties in conflicts show an assertive and uncooperative behaviour. Their focus is mainly on pursuing their own concerns at the expense of the other competitors. In this approach, the parties normally compete to gain victory over each other, therefore, the conflict normally ends up with a win-lose situation. Accommodating is an approach in which the parties in the conflict show unassertive and cooperative behaviour. The parties in this approach are ready to sacrifice their own interests in order to satisfy the interests of others. It may involve some selfless generosity where one party decides to follow what the other party has decided even if it is against its wishes. Avoiding is a conflict management approach where the parties do not take any action to address the conflict. In this approach the parties in the conflict, neglect their own and other party's concerns and pretend to have no business with what is going on. Collaboration is a conflict management approach in which the parties show assertive and cooperative behaviour. Instead of avoiding the conflicts or competing to win, the parties involved in the conflict collaborate to find a solution that will satisfy all

of them. The last but not least approach for resolving a conflict is compromising. In this approach the aim is to find a mutually acceptable solution that partially satisfies both parties. The parties show their readiness to sacrifice some of their interests so as to achieve the common solution to the problem. All these five conflicts management approaches have been summarised in the Thomas Kilmann's Conflict Mode Instrument (TKI) (Trainer, 2010) presented in Figure 2.1

Figure 2.1: The Thomas-Kilmann Conflict Mode Instrument –TKT



The five conflicts management approaches are used in both the formal and informal conflict management institutions. What differentiates them is whether and to what extent the parties put forward their own interest or the interests of their opponents. Although the above conflict management approaches are used in all conflict situations, collaboration seems to be common in the communal resource allocation arena. For example, as Cleaver and Franks (2005) contend, the focus of most communal conflicts resolution rules is to maintain good relations between the parties in conflicts rather than granting any of them justice or victory over the other. This is different from the remedies which are normally sought by the parties in modern resolution approaches insisted in rational choice systems. Competing seems to be the most common approach for conflicts

management in these systems (Komakech *et al.*, 2011, Cleaver, 2001). Saying that competing is common conflict resolution approach in the rational choice systems and collaboration in the critical institutional thinking does not mean that the other techniques are non-existing. Such techniques operate in both sides but they are not as common as these two.

2.8 Empirical Literature Reviews

The reviews of theoretical concepts helped to gain useful insights for understanding the phenomena under the study. However, to gain comprehensive knowledge about these phenomena, reviews of empirical literature are done in the next section.

2.8.1 Empirical Literature on Water Resource Governance

As it was pointed out in previous chapters contemporary resource governance is characterised by strong emphasis on formal regulation. However, different studies have provided evidence showing how informal institutions are also useful in natural resources management. Generally, extensive research by scholars studying CPRs has shown that resource institutions are more effective when devised by the resource users themselves than when imposed from the government (Ostrom, 2008; Katani, 2010; Cleaver, 2001; Cleaver and Franks, 2005). For example, in her study about how resource management institutions evolve, Ostrom (2008) found that in Nepal the Farmer Managed Irrigation Systems (FMIS) had more effective technical conditions and were more effective in devising collective action rules than Agents Managed Irrigation Systems (AMIS). In this study however, Ostrom does not indicate what has contributed to evolution of effective institutions in the FMIS than AMIS in that country. Similarly, the study by Katani (2010) has indicated how customary institutions have been effective in managing the micro spring forests in Ukerewe Tanzania. Moreover, Mbeyale (2009) has indicated some positive outcomes in resource governance processes controlled through customary rules in Pangani River Basin in Tanzania.

Some studies have indicated how positive institutional interfaces can be forged. For example, in their study about fisheries management arrangements in Papua New Guinea and Mexico, Cinner *et al.* (2011) show how formal institutions and customary practices in fisheries governance are jointly used to enhance sustainability of fisheries resources. According to them, some societies improved their customary systems for controlling fisheries grounds by borrowing from the formal rules and policies and sometimes the government has made efforts to integrate the customary systems within the formal initiatives.

Another experience confirming successful coexistence between the formal and informal institutions in water governance is by Ampomah and Opoku-Ankomah (2008) cited in Merrey and Cook (2012). In this study the researchers provide three categories of both formal and informal institutions that are common in water governance in Ghana. These are; the “value institutions” consisting of traditional chiefs and ritual specialists whose emphasis is on social solidarity and traditional values in water use and management, production institutions which base on western patterns to promote economic development, for example, the NGOs, and the local district assemblies and finally, the “service-asset management institutions” which are indigenous in origin and organisation and they integrate productive and social goals. The examples of these institutions include the WUAs, fishermen and farmers associations, women associations etc.

While formal-informal institutional relations are generally useful, there are some which are detrimental to development of effective resource governance systems. For example, in her study Sehring (2008) has illustrated how entrenchment of informal practices such as unauthorised withdrawal of water has made it difficult for the government conservation plans to be realised in Tajikistan and Kyrgyzstan. The same case applies to the study by Maganga *et al.* (2004). In this study the authors have reported ineffective implementation of water use fees in Rufiji Basin due to entrenchment of informal practices of free abstractions. According to the authors, government officials in this

basin use the existing administrative structures to regularise free abstractions of water due to lack of ability to apprehend those who use the water unlawfully (Maganga *et al.*, 2004). As argued by van Koppen *et al.* (2004), the resource users continue with free abstractions not only because they lack capacity to pay but also due to a long lived belief that water is a gift from God. In addition, the studies conducted by Mbeyale (2009) and Lloyd (2005) in Pangani and Rufiji River Basins respectively in Tanzania show how accentuation of traditional values by the Maasai pastoralists jeopardise government policy on water resource allocation.

Another undesirable informal norm in resource governance systems is patronage. According to Thomas *et al.* (2012) existence of patronage in resource management makes control of resource highly complex processes than the policy experts would assume. To some extent this argument is supported by the findings from the study by Sehring (2008). In this study findings indicate rule bending practices in post Soviet states of Kyrgyzstan and Tajikistan as a result of patronage. In particular the study realised bending of accountability rules by the WUA due to the need to please the local patrons who seem to be economically supportive than the government. This is against the IWRM principle which requires the WUAs to be accountable to the water users and the community in general.

Apart from patronage, power inequality is also an obstacle to integrated CPRs governance. Although governance structures have been reconfigured to provide a chance for participation of all stakeholders, the informal systems existing in the policy action arenas sometimes make realisation of equality difficult. As Sehring (2008) noted in her study about in Kyrgyzstan and Tajikistan, rather than the communities, it is the local elites and the NGOs owners who are mostly capable of participating in water governance re-scaling. Similarly, in her study about conflict resolutions in Mufindi catchment of the Rufiji river basin, Lecoutere (2010) discovered that men and the people who are financially powerful were in a better position to influence decisions in water

disputes than women and the people from the poor households. In addition to that Cleaver (2002) has indicated that the poor and other disadvantaged groups in Usangu catchment area have limited chance to exercise their rights to participate in various water use decisions due to lack of resources such as finances and skills. Unequal power relations are also reported in the study by Thomas *et al.* (2012). This study has indicated how the government supported Kunduz and Baghlan communities utilise the traditional water allocation system *abandaz* to exercise power over the users in lower course communities in water allocation decisions.

Apart from asymmetrical relationships amongst actors, CPRs governance is also affected by government dominations. Although the national and international policy and legal frameworks insist transfer of decision making power and authority to community levels, practically governments have strong voice. With respect to this, in his study about Australia's National Conservation Strategy, Marshal concluded that the relationship between the government and community levels has largely remained that of a purchaser-provider rather than a genuine collaboration among equals (Marshal, 2008) in Reed and Bruyneel (2010). In addition, some studies, for example, that of Norman and Bakker (2009) in Reed and Bruyneel (2010), have revealed that despite increasing the number of actors, rescaling of water governance in USA and Canada did not reduce the power of the state and neither did it increase local institutional capacity. Similar experiences have been recorded in Tanzania and other African countries. Various researchers have noted domination of the government institutions in water governance processes (see for example, van Koppen *et al.*, 2004; Clever, 2001; 2002; Cleaver and Franks, 2005; Merrey and Cooks, 2012; Merrey, 2009) just to mention a few. As the above studies have indicated the powerful actors have mostly imposed their own will over others who are weak. In the situation where the action arena comprises the actors who do not have equal opportunity to participate in decision making, evolution of collective action rules is difficult.

Generally, the empirical studies have provided ample evidence for existence of multiple institutions in natural resource governance. Basing on these studies, neither the formal or informal institutions can on their own govern natural resources. Moreover, the existing studies also provide evidence on how actors exercise agency towards rules instead of acting passively as assumed in rational choice theory. These studies however do not show under which circumstances the formal-informal institutional interfaces and actors capacity to exercise agency evolve and affect resource governance.

2.8.2 Empirical Studies on Water Users' Conflicts

Although formal water allocation processes have been insisted in various national policies and laws, they are not necessarily effective in management of users' conflicts. Different studies have indicated prevalence of water users' conflicts in water allocation processes in Tanzania and beyond resulting from formalisation of resource management. For example, the study by Komakech *et al.* (2012d) has found that transfer of water which was formally used for irrigation in rural areas, to urban areas so as to increase supplies for the domestic users, has intensified scarcity and competitions which have resulted to conflicts among the irrigators. In addition, this study found that, the tendency to ignore prior infrastructural investments during establishment of the formal allocation institutions and mechanisms is a contributing factor to persistence of water users' conflicts in local areas. The study by Komakech *et al.* (2012d) conducted in Pangani River Basin has revealed how rejection of the prior water rights has led to resentments and finally conflicts between the big and small water users. In another study conducted in Kenya, Mutinga *et al.* (2010) showed how excessive exploitation of water for irrigation use from Ewaso Ng'iro River and poor coordination of water resource management activities contribute to scarcity and consequently emergence of water users' conflicts. In this study augment of water supply through rain water harvesting and construction of storage dam has been insisted to meet the demand and reduce conflicts.

Although scarcity has been mentioned as a factor contributing to competitive access and conflicts among the users, some studies have found more cooperative than competition during scarcity. For example, in their study, Witsenburg and Adano (2003) cited in Meinzen-Dick and Nkonya (2007) found reduction in water use conflicts during drought because the farmers faced a new enemy-hunger which they had to fight collectively. Generally, various studies have indicated that, most of the water users' conflicts in irrigation schemes result from attempts to centrally formalise the water users' rights rather than how water is used by the people (van Koppen *et al.*, 2004; Meinzen-Dick and Nkonya, 2007; Komakech *et al.*, 2011; Komakech *et al.*, 2012d). As the study by Weiss (2004) cited in Meinzen-Dick and Nkonya (2007) has shown, local people have been capable of devising collective action towards water even in the situation of heterogeneous ethnic values. Such studies however contravene the argument by van Koppen *et al.* (2007) which indicates that collective action is difficult to achieve in communities with heterogeneous ethnic groups.

Apart from conflicts incidences, empirical studies also indicate approaches used for their resolutions. In most cases the findings from different studies have indicated divergence between the government policies on conflicts resolutions and the actual practices in the local areas. While the national water policies have the focus only on the formal structures and procedures for reporting and resolving the conflicts, the experiences show that conflicts are also managed through informal institutions and mechanisms. The studies by Maganga *et al.*, (2004), Nkonya *et al.*, (2009); Kramm and Wirkus (2010), Komakech *et al.*, (2011) show that, most of the water users in local areas prefer to use informal conflict resolution institutions and mechanisms such as face to face discussions than registering the cases to the formal courts of law. It is only in the situations that such institutions and mechanisms have faced challenge that most water users will send the matter to the courts.

After gaining general understanding about the nature and development of water allocation institutions, it is important to have some understanding about Tanzanian water allocation institutions. Narration of how the water allocation institutions in Tanzania have developed helps to understand the general governance context in which such institutions are embedded. In addition, historical accounts helps to explain why water allocation institutions in small scale irrigation schemes in Tanzania appear the way they appear in the current governance systems. Development of water allocation institutions in Tanzania is narrated in the next section.

2.9 Development of Water Allocation Institutions in Tanzania

As contended by Abrams (1982) current events can be understood well if approached within their historical settings. The water allocation institutions in Tanzania provide no exception. Before codification of the water allocation rules, customary laws were in charge in different parts of Tanzania. Literature provides evidence on how the pre-colonial societies in different areas in Tanzania managed to control access and utilisation of the water resource through customary laws (Komakech and van der Zaag, 2011; Komakech *et al.*, 2012a). Marginalisation of customary systems started since 1900s when the colonial administration imposed the formal rules and mechanisms in control of access and utilisation of the resources in the place of the customary rights used by the people in various local areas (*see Table 2.2*).

The changes started in the areas like Kilimanjaro where intensified water use existed (van Koppen *et al.*, 2004; Bender, 2010). The rationale was to limit the native water users and ensure that the white settlers had adequate access to water. To enhance the formal water rights in the place of the customary systems, the colonial government adopted series of legislations between 1923 and 1959 (Komakech *et al.*, 2011). Initially, the British colonial rule introduced the formal water rights for those who wanted to use the water for economic purposes through the 1923 Water Ordinance. The customary water rights were given a limited recognition by this law (van Koppen *et al.*, 2004).

Adoption of the 1948 Water Ordinance accelerated erosion of the customary water resource systems in the country by imposing more restrictions on the use of customary water resource management systems (van Koppen *et al.*, 2004). The same can be said of the 1959 Water Ordinance as it extended the requirement for formal registration to all types of users including those who had customary rights. Adoption of this law meant that only formally registered rights were legally entitled for water allocation. This decision affected the local water users who for long period of time accessed water through traditional mechanisms. Generally, the colonial Water Ordinances denied majority of the small scale water users, their rights to access and control water resources by rejecting the legitimacy of their customary rights.

Rejection of the customary water resource institutions did not end with the colonial rule. The post colonial government passed various policies which had negative implication for development of such institutions in water management as we will see in the subsequent paragraphs. As a starting point it is imperative to note that Tanzania's adoption of the centralised development policies such as socialism and self reliance (*Ujamaa na Kujitegemea*) through the Arusha Declaration (*Azimio la Arusha*) in 1967 and Centralisation (*Madaraka Mikoani*) and villagisation policies in 1974 and 1972 respectively accelerated decline of the local organisations and institutions towards development (Ngware, 1999). Through these policies, nationalisation and state monopoly in all spheres of development including natural resource management was declared. This monopoly was strengthened through subsequent decisions such as abolition of chiefdoms and adoption of the centrally designed institutions to cater for all development policies in the country.

As a result of the state monopoly, the locally evolved institutions in different development sectors including the CPR sectors were brought to bondage. Although almost all sectors were affected by the control vacuum created by the centralised policies, the CPR sectors faced special challenges due to their nature. Due to low

excludability and subtractability the CPRs are usually vulnerable to free riding (Polski and Ostrom, 1999). Such vulnerability however decreases when effective mechanisms are in place in local areas because that is where access to the resource is arranged. In Tanzania, centralisation policies led to the decline of the *de facto* common property regimes, locally devised by the communities to limit access and usage of the CPRs. Although the government aimed to regulate the resources through the *de jure* public property right regimes, lack of capabilities in the part of state institutions made such regimes ineffective. As a result the *de jure* public property right regimes changed to *de facto* open access regimes (Ostrom, 2000). In short, such early development policies prevented establishment of participatory, effective water allocation systems and created the roots for resource degradation in different parts of the country (Mbeyale, 2009; Katani, 2010; Ngware, 1999).

In 1971 the first National Water Policy was adopted; but no significant changes were introduced with regard to state monopoly in water resource governance. Furthermore, adoption of the Water Utilisation (Control and Regulation) Act No. 42 in 1974 to replace the colonial laws did not bring any significant change with respect to the role of customary institutions in water governance. This Act made a requirement for the formal water use rights mandatory to all users who intended to “divert, dam, store abstract and use” water for different economic purposes (van Koppen *et al.*, 2004). The law made it clear that only formally registered users’ rights were legitimate. The state monopoly in water management was further enhanced by the 1991 National Water Policy.

Despite some efforts by the government and the donors, the post colonial water reforms could not bring any significant improvements in water resource management (Katani, 2010). For example, participation of the water users, collection of the water use fees, issuance of the water use permits and control of water access and utilisation were still not to the level expected by the government and the donors. This situation culminated to poor allocation practices and uncontrolled demand for water. Consequently, the level of

conflicts among the water users continued to raise in different water allocation arenas. The weaknesses in implementation of the post colonial governance measures compelled some amendments in the Water Utilisation (Control and Regulation) Act No. 42 in 1994 and 1997. Through such post-independence amendments the Subsidiary Legislation Act of 1994 and Water Utilization (General) Regulations of 1997 were enacted. Despite enormous efforts, such reforms could not improve management of the water resource. This situation led to adoption of the new National Water Policy (NAWAPO) in 2002 and the Water Resource Management Act (WRMA) in 2009 following a study conducted under the River Basin Management and Smallholder Irrigation Improvement Project (RBM SIIP) started in 1996 under the sponsorship of the World Bank. The major aim of such policy and legal reforms was to shift from the place where “the central government was a sole investor, implementer and manager of the projects” to more participatory, inclusive and coordinated decisions in water resource governance (URT, 2002a).

Table 2.2: Institutional development in water resource management in Tanzania

Period	Allocation Institutions	Description
Pre-colonial	Traditional norms, values and beliefs	- Community based - Controlled through family, clan or Chiefs
Colonial (1923)	1923 Water Ordinance - Statutory Water Rights	- First water law in the country was enacted - Prepared and drafted during the German rule and adopted by the British - The law Created the first Water Boards in the country - Statutory water rights were introduced to restrict access and utilisation of water
Colonial (1948)	- Statutory Water Rights - Nominal Water Right Application Fees - Indian Limitation Act - Native Laws and Customs	- Colonial power declared absolute authority over water resources - Recognition of the earlier water rights including those under the 1923 Water Ordinance, lawful mining operations, some claims under the Indian Limitation Act and native law and customs. - Only ‘duly recognised representatives’ of the natives were recognised
Colonial (1959)	1959 Water Ordinance - Statutory water rights - Water users Registration Procedures	- Compulsory registration of the water users including the native water users - A centralised top-down system for water governance was reinforced
Post colonial (1971)	National Water Policy	- The first national water policy in post colonial government - Maintained the centralised and top down governance of the resource
Post colonial (1974)	Water Utilisation (Control and Regulation) Act No.42	- Water was declared a property of government - Regional Water Advisory Boards were created
Post independence (1994)	1994 the Subsidiary Legislation [Government Notice No. 347 of 1994 under section 38(2) of the Water Utilization (Control and Regulation) Act No. 42 of 1974]	- The changes aimed to revive the dormant water use fees - Strong emphasis on IWRM principles
Post independence (1997)	Water Utilization (General) Regulations of 1997	- The amendments to the Water Utilization (control and regulation) Act - Emphasized that the National Water officer must consult and inform the Basin Water Boards before issuing water rights.
Post independence (2002)	2002 National Water Policy (NAWAPO)	- Emphasizes devolution of authority for water rights allocation to the catchment, sub-catchment up to Water Users Association level - Renewed emphasis on IWRM
Post independence (2009)	Water Resource Management Act No. 11	- Provides for participation of stakeholders and the general public in the implementation of the Water Policy. - Gives more powers to Basin Water Boards - Legal reinforcement of IWRM idea - Redefines water right to water use permit

Source: Adapted from van Koppen et al., 2004; Komakech et al., 2011

When considering the water allocation institutions in Tanzania it is important to think of the forces both internal and external contributed to their evolution. As a country Tanzania has been affected by the global developments in water resource management. In particular, the country has been affected by the global movements towards economisation of the water resource through formal public and market mechanisms. Such global forces coupled with internal challenges from the social and natural environments have played great role in shaping the water allocation institutions in the country.

2.10 Literature Gap

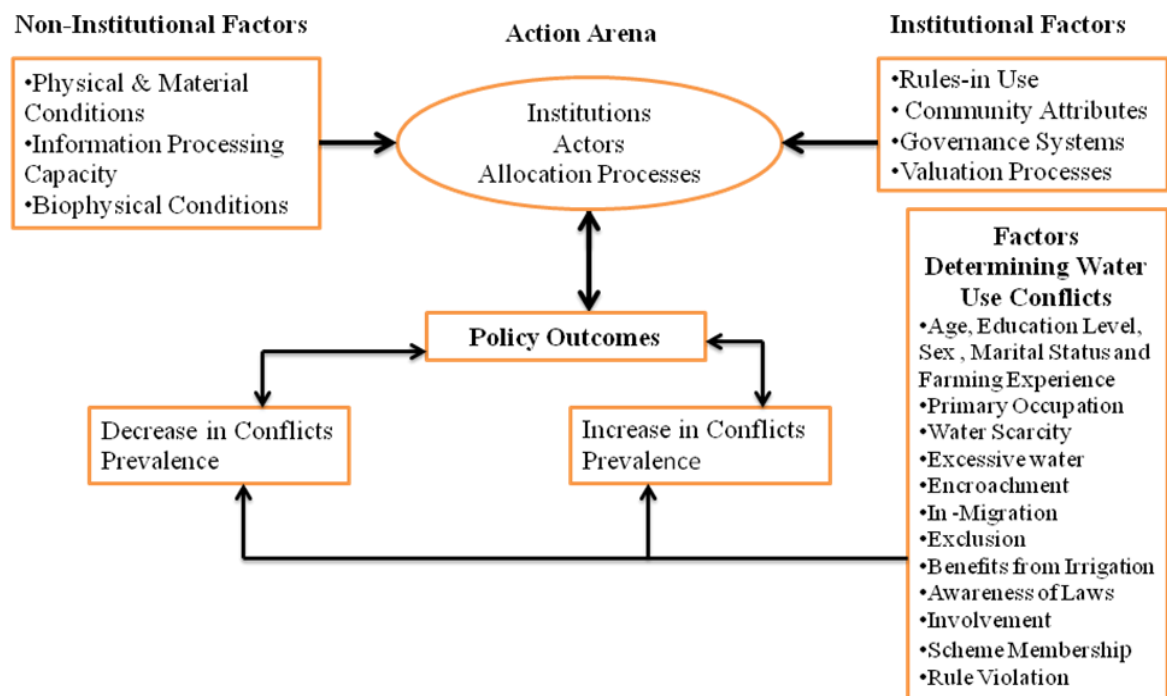
The empirical and theoretical literatures indicate how formal and informal institutions and their interactions shape resource policies including water policies implementation processes. Furthermore, the literatures provide rich information on how conflicts emerge and escalate among the water users. While positive and negative experiences with regard to formal- informal relations are widely discussed, there is little information showing how such relations evolve. In particular, the existing literature does not show how implementation of the natural resource policies and in particular the water resource policies are shaped by both, the institutional factors and prevailing physical, material and bio-physical conditions.

2.11 Conceptual Framework

The conceptual framework for this study has been developed from different institutional concepts. Specifically, insight from the Ostrom's principles for enduring institutions, Institutional Analysis and Development (IAD) framework, Social Ecological System (SES) frameworks and Institutional Bricolage concept were used in construction of the conceptual framework for the study (*See figure 2.2*). The framework indicates the action arena for water policy implementation comprising of the actors who utilise different institutions in water allocation processes. The framework shows that the actors do not just utilise the institutions but mediate them through bricolage processes. In the course

of mediating the water allocation institutions, the actors are influenced by the institutional factors emanating from the governance systems, community attributes and rules existing in the environment in which they are embedded. In addition, the actors are influenced by the non-institutional factors emanating from the physical and bio-physical systems in which the resource is embedded. Mediation of water allocation institutions as influenced by the existing institutional and non-institutional factors contribute to prevalence of water users conflicts in the selected schemes.

Figure 2.2: Conceptual Framework



Source: Developed from Ostrom et al., 2014, de Koning, 2011, Lecoutere et al., 2010 & Polsk and Ostrom, 1999

CHAPTER THREE

RESEARCH AREAS AND METHODS

3.1 Overview

This chapter provides explanation on the overall and specific methodological approaches that were employed in this study. The major aim of the chapter is to provide a clear understanding on the geographical location in which the study was conducted, philosophies that have informed the design, techniques that were employed in the study and the step by step approaches that were in collection and analysis of data.

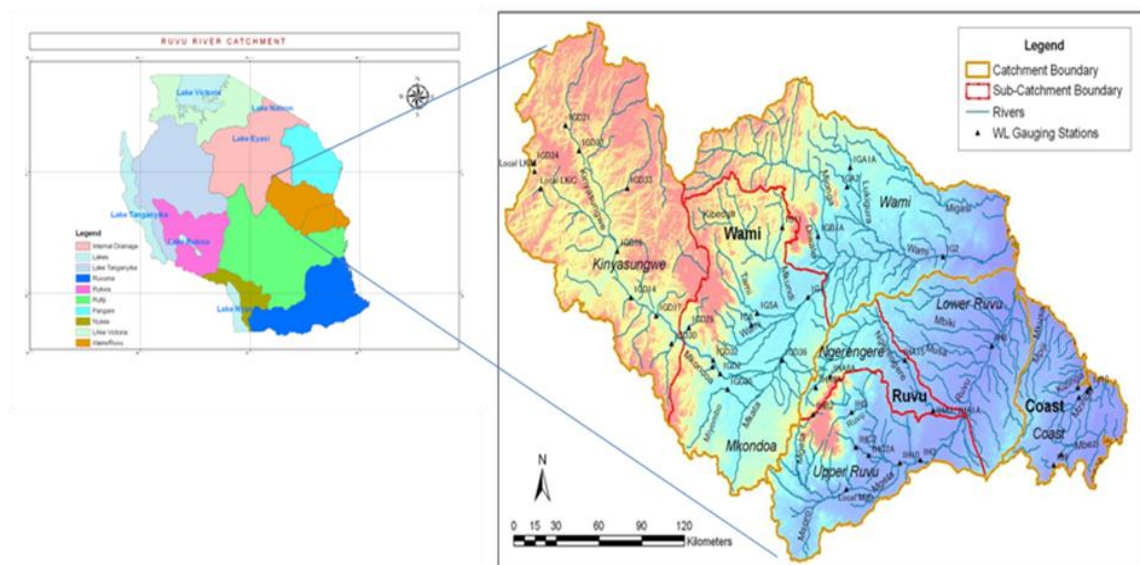
3.2 Area of the Study

This study was conducted in Mkindo and Kiroka irrigation schemes of Wami-Ruvu Basin (WRB) in Morogoro region in Tanzania. Being part of the WRB, the Mkindo and Kiroka irrigation schemes are directly affected by its socio-economic and ecological conditions. Therefore before explaining the profiles of the schemes it is important to understand the general characteristics of the basin.

The Wami-Ruvu Basin is one of the nine water basins in Tanzania that have been established under the Water Utilisation (Control and Regulation) Act No. 42 of 1974. According to 2012/2013 Wami-Ruvu Annual Basin Hydrological Report (WRABHR) the basin is found in the Eastern side of Tanzania, between Longitudes 35 30' 00" to 40 00' 00" E and Latitudes 05 00' 00" to 07 30' 00" South. It was established in 2002 and covers an area of about 66,820 km² covering six regions in Mainland Tanzania namely; Dar es Salaam, Morogoro, Dodoma, Tanga, Manyara and parts of Coast Region. The basin is drained by two major Rivers of Wami and Ruvu, occupying an area of 43,946 and 18,078 km² respectively. As it is indicated in the WRABHR, the basin is divided into three catchments namely Wami, Ruvu and Coast (*see figure 3.1*). The Wami catchment is divided in three sub-catchments of Mkondoa, Kinyasungwe and Wami. The Ruvu catchment is also divided in to three sub-catchments of Upper Ruvu, Lower Ruvu

and Ngerengere. The coast catchment has only one sub-catchment with the same name, Coast. In general, there are seven sub-catchments in the Wami-Ruvu Basin. According to WRABHR, most rivers in Wami catchment are seasonal and originate from Chenene, Nguru, Nguu and Rubeho Mountains and flow eastward towards the Indian Ocean. Comparatively, River Ruvu tributaries are perennial originating from Uluguru Mountains and flow eastward towards the Indian Ocean.

Figure 3.1: Location of Wami-Ruvu



Source: 2012/2013 Annual Wami-Ruvu Basin Hydrological Report, 2013

3.2.1 Rainfall patterns of Wami-Ruvu Basin

According to WRABHR (2012/2013), in the Wami/Ruvu Basin, rainfall patterns differ between the coastal and inland areas. This document shows that the annual rainfall at the coast is about 1100 mm and decreases towards inland where about 600 mm is received. The highest rainfall is received in the Uluguru and Nguru Mountains with more than 2500 mm of annual rainfall. The inland has only one rainfall season normally in December whereas the rest of the Basin has two rainfall seasons with the major one being found in April and the minor one in December. Little rain is received in the dry season of June to September.

3.2.2 Irrigation Potential and Economic Activities of Wami-Ruvu Basin (WRB)

The WRB has a population of people whose main economic activities are agriculture, industries, mining, fisheries and commerce. Agriculture is the leading economic activity and water consumer carrying about 60.01% of the total water use in the basin (JICA, 2013). According to the then Ministry of Agriculture, Food Security and Cooperative (MoAFSC) quoted in JICA (2013), the total irrigation area in Wami/Ruvu Basin is 24,946 ha, while the total number of irrigation schemes is 173. Compared to other regions covered by the Wami-Ruvu Basin, Morogoro Region has the largest land under irrigation (19,347 ha) and the highest number of irrigation schemes (71). The other regions and their irrigation areas and schemes in a descending order are Dodoma Region with 3,441 ha and 56 schemes, Coast Region with 1,946 ha and 28 schemes, Tanga Region with 126 ha and 2 schemes, and Dar es Salaam Region with 86 ha and 16 schemes. In Manyara Region, there is no irrigation scheme located in Wami/Ruvu Basin. The major crops irrigated in small scale irrigation schemes in Wami-Ruvu Basin are paddy, maize, vegetables and beans (Zonal Irrigation Office, 2011). The Mkindo and Kiroka, the irrigation schemes where this study was conducted are among the improved schemes found in Mvomero and Morogoro Rural Districts respectively in Morogoro Region.

3.2.3 The Water Use Pattern in WRB

The existing projections indicate that the surface water consumptions in the Wami-Ruvu basin will increase from 716 million cubic metres in 2011 to 1,828.4 million cubic meters in 2035 (JICA, 2013) due to expansion in economic activities. The highest demand for the resource is at present and future found in irrigated agriculture. Basing on surveys by JICA, the demand for water in irrigation schemes will increase from 538.3 million cubic metres in 2011 to 1,243.3 million cubic meters in 2035. Generally, the present and future water uses and demands are higher than the development potential of the surface water in this basin. This trend signifies an urgent need for effective demand

management and cost recovery mechanisms and institutions in the current water governance plans in the basin.

Generally, the WRB is among the basins in Tanzania with great agricultural and irrigation potentials. These have contributed to rapid increase in population which has in turn exerted pressure on natural resources such as water and exacerbated emergence of social unrests in different areas including the study areas.

3.2.4 Profiles of the Case Studies

3.2.4.1 Kiroka Irrigation Scheme (KIS)

Kiroka Irrigation Scheme (KIS) is one of the schemes in WRB that have been included in scheme improvement programmes under the government articulated in NIMP (URT, 2002b). Due to resource constraints, only part of the main canal in this scheme has been lined. The remaining part of the scheme is still earthen; therefore, the scheme can be classified as semi-improved. Kiroka irrigation scheme covers a land divided in blocks A, B and C owned and managed by a formal irrigators' group known as *Umoja wa Umwagiliaji Kiroka* (UWAUKI) or (Kiroka Association of Irrigators) which was formed in 2004. This group was registered on 14th May 2009 under the Societies Act [CAP, 337 R.E 2003]. The scheme is located in Kiroka and Kiziwa Villages; therefore, it is influenced by the social and economic trends happening in these villages.

The scheme is generally surrounded by communities of farmers. Some of them engage in subsistence rain fed farming, mainly growing rice, maize, coconuts, bananas, and root crops such as cassava and yams. Others engage in vegetable and rice irrigation using water from Kiroka, Mahembe, and Mwaya Rivers. The main ethnic group surrounding the scheme is Luguru, mixed with some minority tribal groups who immigrated to the area for various economic activities. Agriculture is the main economic activity for all tribal groups. Livestock keeping is sporadically conducted by few villagers or sometimes by Maasai immigrants who use Kiroka Village as a transit area when they

move from southern villages in Morogoro Rural District to other places in Morogoro Region. The farmers supplement agricultural production with petty business involving mainly buying and selling of fruits, vegetables, and root products such as cassava and yams. Participation in petty business has been stimulated by availability of markets for farm products in Morogoro Municipality, Dar es Salaam and other nearby regions and local markets which operate twice in a week on Tuesdays and Sundays. Accessibility to such markets has been facilitated by proximity to Morogoro municipality and availability of a road which is passable throughout the year. The scheme is about 20 km South of Morogoro Municipality.

3.2.4.2 Mkindo Irrigation Scheme (MIS)

The MIS is surrounded mainly by communities of farmers, and minority group of pastoralists, who immigrated to the area from North Eastern part of Tanzania. Nearly 250 people from farmers' communities engage in subsistent irrigated farming through the Mkindo Farmer Irrigation Scheme (MFIS) group which was formed in 1985. Through various government programmes, the scheme has managed to improve its infrastructure and is now classified as improved small scale irrigation scheme (URT, 2002b). The farmers in this scheme abstract water through the lined main canal distributing water to 120 ha of land divided in phases one and two. The main crop irrigated in this scheme is rice. Rice cultivation is the prime economic activity in Mkindo Village (where the scheme is located), followed by petty business. The most common business is buying and selling of rice, which has expanded, following improvement in market access due to presence of a road from Morogoro Municipality to the area that is passable throughout the year. Other crops are grown just as supplements to rice and these are maize, vegetables and beans. Livestock keeping is mainly conducted by Maasai immigrants residing in the nearby Kambala village. Generally, the scheme is surrounded by heterogeneous ethnic groups with different livelihood strategies which largely depend on water from surrounding rivers.

3.3 Overall Methodological Approaches

This study employed a mixed methods approach. As argued by Creswell and Plano-Clark (2011), mixed methods design focuses on collecting and analysing both qualitative and quantitative data either concurrently or sequentially. According to Creswell and Plano-Clark (2011), this approach is useful when neither of the two data sets, each on its own, can provide a better understanding of a phenomenon under study. This study adopted the mixed methods approach because understanding of water users' conflicts in the selected small scale irrigation schemes required both qualitative and quantitative sets of data. In particular the study adopted the exploratory sequential mixed method approach (Creswell *et al.*, 2003). According to these scholars, in this approach, a research starts with qualitative techniques to get data that can help to explore a phenomenon then uses qualitative data to develop variables and instruments for a second phase quantitative study for the aspects which can be understood through quantitative data.

Qualitative research techniques dominated this study and were used first to deeply explore the water allocation processes and resulting users' conflicts. Specifically, the qualitative techniques were first employed to explore actors' roles, influence and interactions at different levels, the evolution, enforcement and role of water allocation institutions, conformance to water allocation principles and institutional bricolage practices and their effects on water allocation processes and users' conflicts. The quantitative approaches were used just to supplement the qualitative techniques in analysis of incidences and prevalence of water users' conflicts (Creswell and Plano-Clark, 2011). These approaches were used because understanding of conflicts prevalence requires data from a wider sample which is difficult to operationalise through qualitative techniques.

3.4 Research Design

This study employed case and survey designs. The rationale for mixing these designs is the fact that neither of the two could independently provide adequate understanding of the issues focused on by the study as reflected in the study objectives. As indicated in the first chapter, the first three objectives were qualitative in nature thus were studied through the case study design. But the last objective was assigned to inquire both qualitative and quantitative aspects. This required the use of both case study and survey approaches. The details of why and how these designs were employed are provided below.

3.4.1 Case Study Design

To a large extent, this study employed a case study design. According to Yin (2003), a case study design is used when a research wants to investigate ‘a contemporary’ phenomenon within its real context, especially when the boundary between the phenomenon and the context is not evident. In this study, employment of the case study design was justified due to the fact that the boundary between the contextual factors and the phenomenon of interest (management of water allocations and related conflicts among the users) cannot be separated. Another characteristic of interest in this study was the ability to employ multiple methods of data collection (Yin, 2003; Creswell, 1994). Understanding of the social phenomena such as water allocation and users’ conflicts require collection of in-depth data, hence the need for greater flexibility in the manner that the study is designed and conducted (Stake, 1995; Yin, 2003). By allowing application of multiple data collection methods, the case study design enabled collection of in-depth data about the above phenomena and gave room for greater flexibility in conducting the study.

3.4.2 Survey Design

As it has been argued by Yin (2003), a case study is not the best method for assessing prevalence of phenomena. To examine the prevalence of water users' conflicts and the factors that contributed to their occurrence in the selected small scale irrigation schemes, the need for survey technique was apparent. The survey was conducted after existence of water users' conflicts had been established through in-depth face to face interviews with the study's key informants and FGDs with the farmers. The survey was conducted so as to gain broader understanding about the magnitude or prevalence of conflicts and the contributing factors for such conflicts across the wider population of the farmers.

3.5 Study Population

The study population comprised all potential small scale economic water users from the selected schemes, leaders of Water Users Groups (WUGs), leaders of Water Users Associations (WUAs), village governments and traditional leaders, officials from the District Councils in which the schemes are located and Wami-Ruvu Basin Water Office (WRBWO) staff.

3.6 Sampling Frame for survey

The sampling frame for the survey respondents is 4065 irrigators.

3.7 Units of Analysis

The units of analysis for the research were government officials, village, scheme and traditional leaders and Irrigators' household heads.

3.8 Sampling techniques

This study employed purposive and stratified random sampling techniques. The use of these two techniques was justified by the type of data that were targeted by the study. In the first place the study aimed to obtain qualitative data on water allocation processes and institutions and existence of some conflict incidences. The respondents from whom such kind of data could be obtained were to be deliberately identified and selected

because they were supposed to have experiences and pertinent information needed by the study. Furthermore, the areas of the study were to be identified deliberately to make sure that they had characteristics reflecting the problem under the study. On the other hand, the study focused on some quantitative data about prevalence of water users' conflicts. Such data could be obtained from a large sample. Stratification of the respondents and randomisation of their selection was crucial because of their big number and diversity. A detailed account of how these techniques were employed in selection of the research participants and respondents is provided below.

3.8.1 Purposive Sampling

The purposive sampling technique was used in selecting the schemes under the study and Key Informants (KIs).

3.8.1.1 Selection of the Schemes

Selection of the Mkindo and Kiroka irrigation schemes was guided by the government's irrigation schemes inventory (URT, 2002b). Basing on this inventory, there are different types of schemes in the country namely traditional, water harvesting, modern and improved irrigation schemes differentiated basing on the types of technologies used in water conveyance. The MIS and KIS were selected due to differences in their water conveyance technologies. In addition to technological differences, ethnic backgrounds and economic activities of the surrounding communities were considered in selection of these schemes. Another criterion used in selection of the schemes is the heterogeneity in terms of socio-economic and demographic characteristics of the people surrounding the schemes realized during informal conversation with people from these areas. As argued by Komakech *et al.* (2012b), heterogeneity is one of the factors that affect water allocation processes in small scale irrigation schemes. Being surrounded by communities which are heterogeneous ethnically and economically, the schemes were found appropriate cases for identifying patterns which are comparable and which can be differentiated in the water allocation processes and conflict trends.

Apart from technological, ethnical and economic conditions, presence or absence of Water Users Associations (WUAs) in the area where the scheme is located was considered. Formation of the WUAs by the small scale water users has been insisted as a strategy to enhance participation of the small scale water users in implementation of the WDM and cost recovery goals (URT, 2002a; 2009). Through preliminary informal conversations with the farmers in villages surrounding the schemes, information about availability of WUAs was obtained. Such information helped to determine suitability of MIS and KIS as cases which can be compared and contrasted basing on WUAs.

Basing on the above criteria, MIS was purposively selected due to presence of a completely lined main irrigation canal, presence of heterogeneous ethnic groups with different economic interests and resource endowments and presence of WUA (Mkindo WUA) in the area where it operates. On the other hand the KIS was purposively selected due to presence of semi-improved irrigation infrastructures and ethnically homogenous communities in the surrounding areas. Another criterion was presence of irrigators' groups whose economic interests were different and absence of the WUA in the area where the scheme is located. The aim of selecting these schemes purposively was to make a comparison to see if differences in the above characteristics created any differences in the irrigators' behaviour towards water policy implementation.

3.8.1.2 Selection of Key Informants

The Key Informants (KIs) constituted a group of research participants who had relevant and specific experiences and information about the study. Purposive sampling was also used in selecting key informants who comprised the officials in the Wami-Ruvu Basin Water Office (WRBWO), Mvomero District Council (MVDC), Morogoro District Council (MDC), and village Chairpersons from Mkindo, Kambala, Kiroka, and Kiziwa Villages.

Those who were selected from the WRBWO were the Basin Water Officer, an Environmental Engineer, Senior Technician, Community Development Officer (CDO) as well as a Assistant Human Resource Officer (*see Table 3.1-Category I*). From the district councils, the key informants that were selected were the District Agricultural and Livestock Development Officer (DALDO)/District Agricultural, Irrigation and Cooperative Officer (*see Table 3.1-Category II & III*). The above officials were selected because they had important knowledge, skills, and information about management of irrigation infrastructures, and control of the water resource and the resulting conflicts among the irrigators in small scale irrigation schemes.

At the ward and village levels, the selected key informants were the councillors for Kiroka and Mkindo wards and Village Chairpersons for the Kiroka, Kiziwa, Mkindo and Kambala Villages (*see Table 3.1 Category IV&V*). These were included in the study due to their roles as overseers of water management activities and conflicts resolution processes in the schemes and villages in general. The other key informants in this study were the chairpersons and secretaries from *Umoja wa Umwagiliaji Kiroka* (UWAUKI) (i.e. Kiroka Association of Irrigators), Mkindo Farmers Irrigation Scheme (MFIS) and *Umoja wa Umwagiliaji Mgongola* (UUMGO) (i.e. Mgongola Association of Irrigators) (*see Table 3.1-Category VI&VII*). These were selected purposively because the overall management of the schemes rests in their hands. Not only that but also, such leaders play a central role in ensuring that the water resource is efficiently used by the farmers and distributional conflicts are managed.

Table 3.1: The sample categories for officials, councillors, village and scheme leaders

Category I-WRWB Officials		
<i>Title</i>	<i>Available</i>	<i>Selected</i>
Basin Water Officer	1	1
An environmental engineer, Senior Technician	1	1
Community development Officers	1	1
Assistant Human Resource Officer	2	1
Total	1	1
Category II-MVDC Officials		
<i>Title</i>	<i>Available</i>	<i>Selected</i>
District Agricultural, Irrigation and Cooperative Officer (DAICO)	1	1
Head of Irrigation Section	1	1
Total	2	2
Category III-MDC Staff		
<i>Title</i>	<i>Available</i>	<i>Selected</i>
District Agricultural and Livestock Development Officers (DALDO)	1	1
Head of irrigation Section	1	1
Total	2	2
Category IV-Ward Councillors		
<i>Name of Ward</i>	<i>Available</i>	<i>Selected</i>
Mkindo	1	1
Kiroka	1	1
Total	2	2
Category V-Village Chairpersons (VCPs)		
<i>Village Name</i>	<i>Available</i>	<i>Selected</i>
Mkindo	1	1
Kiroka	1	1
Kiziwa	1	1
Kambala	1	1
Total	4	4
Category VI-Mkindo Irrigation Scheme and Mkindo WUA		
<i>Title</i>	<i>Available</i>	<i>Selected</i>
Mkindo WUA Chairperson	1	1
MFIS Chairperson	1	1
MFIS Secretary	1	1
Total	3	3
Category VII-Kiroka Irrigation Scheme		
<i>Title</i>	<i>Available</i>	<i>Selected</i>
UWAUKI Chairperson	1	1
UWAUKI Secretary	1	1
Total	2	2
GRAND TOTAL	20	20

Source: WRBO, MVDC&MDC, Staff Profiles (2013); Mkindo/Kambala/Kiroka/Kiziwa Village Official Records

3.8.2 Snowball Sampling

Snowball sampling is a type of purposive technique in which existing social networks are used to identify participants in a research. It is used to select participants who are not directly accessible (Mack *et al.*, 2005). In this study, this technique was used to select traditional elders and some Key Informants (KIs), particularly the chairman and secretary of the non-member irrigators' group (UUMGO) in MIS as shown in *Tables 3.2 and Table 3.3* respectively. To identify and select the traditional elders, initial consultations were made to the scheme leaders (from Mkindo and Kiroka Irrigation Schemes) and the village chairpersons from Mkindo, Kiroka and Kiziwa villages during the interviews. Thus, from each village, one elder was selected. Traditional elders were selected due to their role in traditional rituals and institutionalisation of the traditional values and beliefs amongst people in the villages where the selected irrigation schemes were located.

Table 3.2: Sample categories for traditional elders

Village	Selected
Traditional elders (Mkindo)	1
Traditional elders (Kiroka)	1
Traditional Elder (Kambala)	1
Total	3

Source: Interviews with Mkindo and Kiroka Scheme leaders and Village Chairpersons (2013)

The interviews with the scheme and village government leaders in MIS also helped to identify the leaders of the non-member irrigators group (UUMGO) as shown in *Table 3.3*.

Table 3.3: Sample categories for the UUMGO leaders

Study Participants	Available	Selected
UUMGO Chairman	1	1
UUMGO Secretary	1	1
Total	2	2

Source: Interviews with the schemes and village governments' leaders, 2013 in Mkindo

Moreover, snowball sampling techniques was also used in selection of the members and non-member irrigators in MIS and KIS who participated in FGDs as shown in *Table 3.4*. For MIS these were selected after initial consultations during interviews with MFIS,

village government and UUMGO leaders. In KIS the participants for FGDs were selected after interviews with village and UWAUKI leaders. The interviews in both schemes helped to identify irrigators both members of the schemes and non-members who had unique stories or experiences about water use conflicts.

Table 3.4: Sample categories for the FGDs participants in MIS and KIS

Participants	Selected
Member Irrigators with unique conflicts experiences in MIS	6
Member Irrigators with unique conflicts experiences in KIS	6
Non-member Irrigators with unique conflicts experiences in MIS	6
Non-member Irrigators with unique conflicts experiences in KIS	6
Total	24

Source: Interviews with schemes and village governments' leaders, 2013

3.8.3 Stratified Random Sampling

This is a sampling method which is used when the population from which a sample is to be drawn does not constitute a homogenous group (Kothari, 2004), as it was the case of the members and non-member irrigators in this study. In this study, the technique was used to draw the study sample for the household survey. The schemes members, before the sample was selected were divided into two strata of women and men by the aid of the irrigators' registers from the schemes. The strata of men and women were also identified for non-member irrigators in MIS. After stratification of the member irrigators in both schemes and non-member irrigators in MIS into two groups of men and women then the sample was randomly selected basing on the identified strata.

In Kiroka Irrigation Scheme (KIS), the non-member irrigators, despite sharing water with the members (UWAUKI group), were not organised in groups. Therefore, their sample had to be drawn from the entire population of adults in Kiroka and Kiziwa villages which comprised 1415 women and 1385 men, by the aid of the villages' registers. The village register helped to classify the population into two strata of men and women before choosing the sample randomly from each of them. The selection process was repeatedly done until the desired sample size was obtained. At the first instance, the

sample was drawn but when the people were approached some of them were found to have no business with irrigation or participated in irrigation. Those who were engaged into irrigation farming were retained, but those who did not irrigate were discarded from the sample. This procedure was repeated for three times until the sample was obtained.

Table 3.5 Sample size of survey respondents

Survey Respondents	Available			Selected		
	Female	Male	Total	Female	Male	Total
UUMGO Members	340	410	750	25	25	50
Kiroka Non Member Irrigators	-	-	-	25	25	50
MFIS members	140	110	250	25	25	50
UWAUKI members	158	107	265	25	25	50
Total	638	627	1265	100	100	200

Source: Registers for the UUMGO group, Mkindo and Kiroka Irrigation Schemes and Kiroka and Kiziwa villages

3.9 Sample Size

The sample size for qualitative research comprised 22 key informants, 3 traditional elders and 24 FGDs participants. These were selected due to their positions and the facts that they had important information to fulfil the objectives of the study (*see Tables 3.1, 3.2, 3.3 & 3.4*). Determination of the sample size for the survey respondents has based on the argument by Bailey (1994) that 30 units are enough to form a sample for studies in which statistical analyses are to be done regardless of the size of the targeted population. Thus, in this study, a total of 200 farmers were selected to participate in the survey (*see Table 3.5*). In general, the total of 249 small scale water users was involved in the study.

3.10 Methods of data collection

The choice of data collection method is determined by the nature, scope and object of the study (Kothari, 2004). This study is largely qualitative in nature. Therefore, intensive face to face interviews and FGDs were used to obtain data. To a small extent, the study contains some quantitative elements which were difficult to explore through qualitative instruments such as interviews. To understand such elements, quantitative techniques were used in data collection.

3.10.1 In-depth Interviews

An interview is a directed conversation which can be in-depth or informational. In this study in-depth interviews were used (Rubin and Rubin, 2005; Lofland and Lofland, 1984; 1995) in Charmaz (2006). As provided by Rubin and Rubin (2005), in-depth interviews are important if the research intends to show what happens, how and why. In particular, such interviews are crucial if the study focuses on experiences, describing social and political processes, describing historical trends and understanding personal issues (Rubin and Rubin, 2005). This study aimed to explain experiences with regard to water access and utilisation, the use of institutions, and involvement in water use conflicts. In addition, the study focused on describing social relations and decision making politics which affect the water users. Moreover, the study intended to explore historical issues on water allocation processes and institutions and personal stories of the water users with respect to access and utilisation of water. In that light the use of in-depth qualitative interviews was necessary.

In this study, the in-depth interviews were conducted to key informants who comprised officials from the WRB, Morogoro and Mvomero District Councils, councillors from the Kiroka and Mkindo Wards, Village Chairpersons in Mkindo, Kiroka, Kambala and Kiziwa villages as well as traditional elders from these villages. The in-depth face to face interviews were also conducted to the chairpersons and secretaries of MFIS, UUMGO, UWAUKI and Mkindo WUA. Also, in-depth face to face interviews were conducted to farmers who had experience with water use conflicts.

The interviews with the basin officials focused on getting data on the implementation of the National Water Policy, Water Resource Management Act and the basin's IWRM&D Plan. Moreover, the interviews with basin officials aimed at getting insights on the management of the water resource allocations and users' conflicts.

The interviews conducted with the Ward Councillors and village chairpersons focused on general water conservation issues and management of the water users' conflicts in the

schemes. Interviews with the MFIS, UUMGO, UWAUKI and Mkindo WUA chairpersons and secretaries intended to obtain information on the day to day management of the scheme, water allocation processes and resolution of users' conflicts. Interviews with the traditional elders had the intention of understanding the traditions, beliefs, taboos and customs influencing water allocation processes in the villages where the selected irrigation schemes are found. Interviews with traditional elders also aimed to get insights on the traditional means of resolving water users' conflicts.

3.10.2 Focus Group Discussions

According to Morgan (1988), Focus Group Discussions (FGDs) produce data and insights that would be less accessible without the interactions and communication found in a group. In this study, FGDs were conducted to achieve two major purposes, namely to unveil understanding and compliance of the members and non-member irrigators towards the water allocation institutions and explore their experiences with regard to water use conflicts. Due to existence of members' interactions and reciprocal communications, the FGDs were found appropriate for exploration of issues related to water allocation institutions and experiences of the water users in conflicts.

Grouping and establishment of the number of members in each FGD was guided by the argument by Morgan and Spanish (1984) that there is no particular correct way of formulating and managing FGDs. Thus, in this study four FGDs involving four groups each with six participants, three males and the other three females were held.

3.10.3 Documentary reviews

In addition to interviews, in this study data were also collected through documentary reviews. The documents that were reviewed are the National Water Policy (NAWAPO) (2002), National Irrigation Master Plan (NIMP) (2002) National Irrigation Policy (NIP) (2010), the Water Resource Management Act No. 11 of 2009, Water Sector Development Programme (WSDP) (2005-2025), National Water Sector Development Strategy (NWSDS) (2006-2015) and DADP guidelines (2010). Others are JICA report

on the Study on Water Resources Management and Development in Wami-Ruvu Basin (2013), irrigation schemes inception and progress reports for Kiroka irrigation scheme, the MFIS and Mkindo WUA constitutions and meeting resolutions for the UWAUKI group. The data that were obtained from the documents listed above helped to validate the data from the interviews, observations and questionnaires.

3.10.4 Direct Observations

Direct observations are useful for obtaining additional information in case studies (Yin, 2003). In this research data obtained through direct observation were additional information to interviews and documentary data. The aspects that were observed included attendance of the members of MFIS and UWAUKI in meetings and O&M activities which are called in local languages *Kiwili and Msalagambo* respectively and the condition of the intake facilities and irrigation canals used for diverting and transporting water from rivers to the farms. The last, but not least, element which was observed is conditions of the farms to learn about on farm water management.

3.10.5 Questionnaire

A questionnaire is useful when data need to be collected from a large sample (Kothari, 2004). As it has been pointed out earlier in this chapter, prevalence of water users' conflicts in this study needed to be verified with the use of a large sample. Therefore a questionnaire had to be used in collection of data related to the issue. A closed ended questionnaire was used to collect the survey data on incidences and prevalence of conflicts and factors contributing to their occurrence among water users in Mkindo and Kiroka Irrigation Schemes. The purpose of the questionnaire was to obtain data related to frequencies of farmers' involvement in water users' conflicts and their perception about the factors influencing occurrence of such conflicts in the selected irrigation schemes.

3.11 Data analysis

3.11.1 Qualitative Data Analysis Techniques

Two qualitative techniques, namely qualitative content analysis and explanation building were used to analyse qualitative data.

3.11.1.1 Qualitative Content Analysis

In this study, Qualitative Content Analysis was used in analysing the qualitative data. As contended by Hsieh and Shannon (2005), qualitative content analysis is a research method that entails “subjective interpretation of the content of text data through systematic classification process of coding and identifying themes or patterns”. It is an approach which seeks to interpret big volumes of qualitative data by classifying them into different categories and themes. This study employed directed (deductive) qualitative content analysis approach (Hsieh and Shannon (2005). A theoretical framework was first formulated, and then data were collected basing on the framework. Basing on the collected data, themes, coding categories and meaning units were developed to guide data interpretation and discussion (Granheim and Lundman, 2004).

3.11.1.2 Explanation Building Technique

According to Yin (2003), to explain a phenomenon is to show how it is influenced by some contextual factors. Similarly, this study focused on assessing the influence of multiple institutions on water policy implementation. To build explanations about the phenomena under the study, comparisons were first made between different categories of findings from the first case (Mkindo Irrigation Scheme) with theoretical assumptions. Then, some adjustments were made to the theoretical propositions. Findings from the first case were compared again with the revised theoretical propositions, along with the findings from the second case (Kiroka Irrigation Scheme). The aim here was to arrive at conclusions about the influence of multiple institutions on water policy implementation in the study areas basing on the explanation developed out of the findings-theory comparisons (Yin, 2003)

3.11.2 Quantitative Data Analysis Techniques

Quantitative data were analysed using descriptive statistical analysis and a binary logistic regression model.

3.11.2.1 Descriptive Statistical Analysis

Descriptive statistics were used to analyse the ordinal Likert scale data used to indicate the frequencies of farmers' involvement in water use conflicts in the selected schemes. The following scales were used: Never, Sometimes, Often, Very Often and Always (Elaine and Seaman, 2007). Percentages of respondents who picked each of the frequency measures above were computed to determine the magnitude or prevalence of conflicts in the schemes.

3.11.2.2 Binary Logistic Regression Model

The binary logistic model was used to analyse the factors determining the water users' conflicts in the selected schemes. The binary logistic model was used because the dependent variable, Involvement in Conflicts (IVCO) was dichotomous with the value of 1 if the farmer has been involved in such conflicts, otherwise 0. The explanatory variables were: (1) Household's level of education, (2) age, (3) irrigation farming experience, (4) Sex, (of the head of the household), (5) Household head's marital status, (6) Household Head's primary occupation, (7) Membership, (8) Water scarcity, (9) Encroachment, (10) Exclusion, (11) Irrigation Farming Benefits, (12) Laws awareness, (13) In-migration, (14) Involvement in laws' formulation (15) Rule violation and (16) Excessive water

The logistic model used was in the form;

$$\text{Logit}P(x) = \alpha + \sum_{i=1}^k \beta_i x_i + \varepsilon_i$$

Therefore the model was specified as follows:

$$\begin{aligned} COIV = & \alpha + \beta_1 HHlsc + \beta_2 HHAge + \beta_3 HHlmrsta + \beta_4 HHled + \beta_5 HHCuprim + \beta_6 membership + \\ & \beta_7 Waterscty + \beta_8 Excesve + \beta_9 Encroach + \beta_{10} Violation + \beta_{11} Exclusion + \beta_{12} Migration + \beta_{13} Benefit + \\ & \beta_{14} LawAware + \beta_{15} Invov + \beta_{16} FarEx + \varepsilon \end{aligned}$$

Table 3:6 Variables and their descriptions

Variable	Description	Type of measure	Expected sign
Dependent Variable			
COIV	Dummy	1 if the farmer has experienced conflicts, 0 if otherwise	
Explanatory variables			
Sex	Dummy	1 if the household head is a male and 0 if she is a female	+
Age	Continuous	Number of years	-
Marital Status	Dummy	1 if the household head is married otherwise, 0	-
Education level	Continuous	Number of years spent in school	+/-
Irrigation farming experiences	Continuous	Number of years spent in irrigation activities	-
Primary occupation	Dummy	If the primary occupation is irrigated rice farming, otherwise 0	+
Water scarcity	Dummy	1 if it is a factor, otherwise, 0	+
Excessive Water	Dummy	1 if it is a factor, otherwise, 0	+
Encroachment	Dummy	1 if it is a factor, otherwise, 0	+
Exclusion	Dummy	1 if it is a factor, otherwise, 0	+
Irrigation farming benefits	Dummy	1 if it is a factor, otherwise, 0	+/-
Rules awareness	Dummy	1 if it is a factor, otherwise, 0	+/-
In-Migration	Dummy	1 if it is a factor, otherwise, 0	+
Rule violation	Dummy	1 if it is a factor, otherwise, 0	+
Membership	Dummy	1 if the farmer is a scheme member otherwise, 0	+/-
Involvement in rule formulation	Dummy	1 someone was involved otherwise, 0	-

3.12 Variables' Assumptions and Operationalisation

3.12.1 Dependent Variable

Involvement in Water Use Conflicts

To understand about presence of water use conflicts in the selected schemes, the farmers were asked to state if they had experienced them or not in the previous five years from 2011 to 2014. Apart from conflicts experiences, the farmers were also asked to rate the frequencies at which they had experienced such conflicts in the previous five years from 2011 to 2014 by choosing from among the six Likert Scale measures, namely; Never, Sometimes, Often, Very Often and Always.

3.12.2 Explanatory Variables

Education level

The assumption is that, education can decrease or increase the chance for a person's predisposition to conflictive behaviours (Mbeyale, 2009, Kiende, 2013; Bennet and Cao, 2013). Education was measured in terms of years a household head has spent in school. In this study it is believed that the more the years spent in school the less the likelihood for a household head to participate in water use conflicts with the other users.

In-migration

The assumption is that as people in-migrate to an area for farming or livestock keeping activities, they cause diversity in composition of the community that may lead to competition and fragmentation of interests towards development activities (Green, 2002; Carius *et al.*, 2004). It was assumed that presence of in-migrations increases the chances for water use conflicts to happen. The effects of in-migration were determined through asking the respondents to state if they perceived them to be a factor contributing to emergence of conflicts or not.

Irrigation Farming Experience

Experience is important for a person's ability to manage conflict situations (Kiende, 2013). In this study irrigation farming experience is considered in terms of the period that a farmer has spent in irrigated farming with the other farmers in the group. It is assumed that the longer the period that the farmer has stayed together with others in the irrigation group, the less the likelihood that she/he will exhibit conflictive behaviour towards water acquisition.

Sex

On this element, the focus was to know if the household head was male or female. As argued by Lecoutere, *et al.* (2010) and Kiende (2013), an individual's sex determines his/her predisposition to conflictive behaviours. In this study, it was assumed that the possibilities of participating in water use conflicts are greater when the farmer is male than when she is a female.

Marital status

This was determined by asking the household heads to state if they were married or not. Marriage in African culture denotes higher social status in the community and greater commitment to one's family. Due to high social status and family commitment, married household heads were expected to have low predisposition to conflictive behaviours than the single ones (Lecoutere *et al.*, 2010).

Encroachments

Encroachments are tendencies by which illegal water users' trespass into one's farm for the purpose of exploiting water for irrigation or animal watering. Encroachments increase the chances for conflicts to happen among the water users (Mbeyale, 2009). This was measured by asking the farmers to state if they had experienced encroachments in their farms and say if they perceived them to be a factor contributing to conflicts or

not. The answer was ‘YES’ if a farmer thought that encroachments was a factor contributing to water users’ conflicts or ‘NO’ if she/he thought that it was not a factor.

Primary Occupation

This was determined by asking household heads to choose their primary livelihood strategies from among the provided alternatives. It was assumed that farmers whose primary occupation was irrigation farming would have greater chances of participating in water use conflicts than those with diversified sources of livelihoods.

Water Scarcity

This is inadequacy in availability of water for irrigation activities. Scarcity can be a source of competitions and hence conflicts or cooperation amongst users (Lecoutere *et al.*, 2010). This was measured by asking the farmers to state if they get adequate supplies of water for irrigation or not and if they perceive inadequate supplies to be a factor contributing to emergence of conflicts in their schemes or not. The answer was ‘YES’ if someone thought that water scarcity was a factor contributing to water users’ conflicts or ‘NO’ if she/he thought that it was not a factor.

Excessive Water

Excessive water in irrigation schemes can be a source of problems if effective systems for controlling it are lacking (Keraita *et al.*, 2012). Prevalence of conflicts is one of these problems. This variable was measured by asking the farmers facing this problem to state if they think it is a factor influencing emergence of water use conflicts or not. The answer was ‘YES’ if someone thought that excessive water was a factor influencing water users’ conflicts or ‘NO’ if she/he thought that it was not a factor.

Exclusion

This was measured by asking the farmers to explain if they participated in formulation of rules, making various decisions related to water resource management and if they equally enjoyed the benefits accrued from the water resources in their areas or not (Ostrom, 1990; Polski and Ostrom, 1999). To determine its contribution to water users' conflicts in the selected schemes, the farmers were asked to state if they perceived it to be a factor or not. The answer was 'YES' if someone thought that exclusion was a factor contributing to water users conflicts and 'NO' if she/he thought that it was not a factor.

Irrigation Farming Benefits

It was assumed that the more the irrigators benefits from irrigation farming the higher the probability that they will engage into conflicts with other users. The irrigators were asked to state if they thought that irrigation benefit was a factor contributing to conflicts or not. The answer was 'YES' if someone thought that irrigation farming benefits was a factor contributing to water users conflicts and 'NO' if she/he thought that it was not a factor.

Rules Awareness

Awareness about rules is crucial for resource users' support of the policy programmes for resource conservation (Sesabo, 2007). Awareness was measured by asking the farmers to mention any formal and informal rules that they know that are used in water distribution in their schemes. In addition, the farmers were asked to mention any statutory rule guiding water allocation in the scheme and the country in general. It was assumed that awareness of the existing national and scheme rules decreases the farmer's predisposition to conflict behaviours. The answer was 'YES' if someone thought that rule awareness was a factor contributing to water users conflicts and 'NO' if she/he thought that it was not a factor.

Rules Violation

Rules are perceived as instruments that guide the farmers' conducts; hence compliance with rules is crucial for maintenance of peace, order and prosperity in the scheme (Olson, 1965; Ostrom, 1990). In this study the farmers were asked to state if they perceived violation of water allocation and utilisation rules a source of conflicts or not. The answer was 'YES' if someone thought that rule violation was a factor contributing to water users conflicts and 'NO' if she/he thought that it is not a factor.

Membership

Group membership in terms of the number and composition influences water use conflicts. It was assumed that the larger the size of the group and the more diverse the composition of the members, the higher the competition hence conflicts in the group (Olson, 1965; Ostrom, 2000). Influence of membership was determined by asking the farmers to state if they perceived membership of their group a factor contributing to emergence of conflicts or not. The answer was 'YES' if someone thought that membership was a factor contributing to water users conflicts and 'NO' if she/he thought that it was not a factor.

Involvement in Formulation of Rules

Involvement in formulation of rules increases people's support for their implementation (Ostrom, 1990). The farmers were asked to state if they were involved in formulation of rules governing access and utilisation of the water resource in their scheme or not and say if involvement in making the rules was a factor contributing to conflicts or not. The answer was 'YES' if someone thought that involvement in formulation of rules was a factor determining occurrence of water users conflicts and 'NO' if she/he thought that it was not a factor.

3.13 Research Validity and reliability

Validity is about relevancy and accuracy of the measuring instruments (Bailey, 1994). In particular, it focuses on showing how the criteria used actually measure the interested concept and not something else. In this study, the focus was on measuring the concepts of multiple institutions, water allocation processes and water users' conflicts. To enhance validity, operational definitions have been provided in all these concepts so as to avoid ambiguous meanings. In addition, validity is about measurement techniques and processes. In this regard, Bailey (1994) contends that, to enhance validity, one has to make sure that the measurements of the concepts are conducted accurately (Bailey, 1994). To enhance accuracy in measurement of the concepts, different methods of data collection and sources of data were triangulated. The source and methodical triangulation helped to detect inaccurate or ambiguous information from the study and make corrections accordingly.

Another way of enhancing validity is to share the research findings with the respondents (Creswell, 2000). The aim here is to make sure that the accounts provided represent the participants' understanding of the issues in question. To enhance validity a summary of the major study findings were discussed with the experts in WRBWO, government officials in MVDC and MDC, the local government and scheme leaders as well as some few farmers who were available in briefing meetings conducted in their areas between February and May 2016. In such meetings the comments about the findings were sought and those found useful were used to make some corrections or strengthen the arguments in the report.

On the other hand reliability is indicated by consistency of the measure. This means that the measure produces similar results if repeatedly used on a concept which has not changed (Bailey, 1994). In this study reliability was also enhanced through triangulation of the data collection techniques. Through the triangulation approach, the study findings with regard to the key concepts which include institutional multiplicity, water allocation

processes and users conflicts were crosschecked across different data collection techniques to check for their consistency.

CHAPTER FOUR

ACTORS ROLES AND INTERACTIONS IN WATER POLICY IMPLEMENTATION

4.1 An Overview

Implied in the rational choice view is the assumption that actors passively interact under the influence of pre-determined rules and regulations. But, in view of the critical institutional theorists, it is not possible to have actors confined to particular institutional arrangements due to multiplicity of the values guiding their choices. Basing on critical institutional theory, in most cases the actors exercise agency which normally redirects policies in opposite directions from their original plans. In Tanzania a multitude of actors from different levels and sectors and with different institutional values interact in the water policy action arena. The aim of this chapter is to identify such actors from the national to the scheme levels and understand how their performance and interactions affect water policy implementation.

4.2 Key Actors, their Roles and Relationships in Water Policy Implementation

In Tanzania, like in many other countries, multiple actors influence water policy implementation. Engagement of multiple actors has been intensified as a result of a shift from monolithic structures of the post-colonial government to integrative structures embracing cooperation from different angles. One of the effects of multiple actors' operations is development of multiple institutions in water policy implementation.

4.2.1 The Central Level Actors

The central level actors in water policy implementation in Tanzania include the Ministry of Water and Irrigation (MoWI), the line ministries, independent departments and donor community (URT, 2002b). Drawing from NAWAPO, coordination of these actors is a prerequisite for effective implementation of the water policy. However, the general view from the interviews with the KIs indicated that the roles and interactions of the central

level actors seldom reflect coordinated operations insisted in the policy. For example, during interviews the Basin Water Officer (BWO) in Wami Ruvu Basin Water Office (WRBWO) argued that:

“It is common to find the same activities being conducted by different sectors without coordination. In my experience, I have seen the same water conservation activities undertaken by different ministries but in fragmented ways. For instance, I know that coordination, capacity building and monitoring of social and environment safeguard policies and guidelines which aim at water conservation, are duties entrusted to the Ministry of Water and Vice President’s Office Environmental Division. However, these organisations work in an isolated way.

In another interview with the then District Agricultural and Livestock Development Officers (DALDOs) in MVDC and MDC, fragmentation of water resource management efforts was also mentioned as one of the problems in water policy implementation. For example, to ascertain the existence of this problem, the DALDO in MVDC said:

There are various capacity building programmes in this office which aim at enhancing the capacity of local leaders in management of irrigation schemes. Although these training programmes had similar focus they were separately provided by the Ministry of Water and Vice President’s Office Environmental Division.

In a similar line of argument the DALDO in MDC had this to say about coordination of training activities conducted to the farmers and local leaders: *“The farmers receive various capacity building training programmes. However, the challenge is that sponsors design such programmes without coordination. As a result, similar training programmes are always repeated to the same participants”.*

As a way to ascertain existence of coordination problem in water policy implementation activities, the Senior Technician in WRBWO provided:

The way I see it, coordination has been difficult due to presence of conflicting goals between the line Ministries and the Ministry of water. What I know the Ministry of water emphasizes on water conservation,

while the Ministry of Agriculture and other line ministries focus on what they have in their strategic plans which, in most cases, do not conform to the water conservation idea.

Poor coordination according to the KIs is also denoted by presence of social problems such as encroachment of the water sources for human settlements and in-migrations of livestock keepers and farmers who seek water and pastures to areas endowed with water and pasture. These trends, according to the KIs contravene efforts towards water conservation, insisted by the MoWI and other stakeholders. In Wami-Ruvu Basin (WRB), as the chairman of Mkindo Water Users Association provided during the interview, in-migrations of the livestock have brought devastating effects: *“The big challenge in our area is flocking of cattle. Sometimes they walk near the rivers or farms or destroy our gardens or irrigation canals. Generally, it is common to find cattle roaming here and there in our area. This situation is no longer bearable to us”*.

Despite the fact that several factors are behind the poor control of livestock and farming activities along the water sources, fragmented interests among the responsible ministries seem to play a major role. It seems that, while the MoWI strives to establish mechanisms for sustainable utilisation of the water resource, the ministries responsible for agriculture and human settlements have not been taking corresponding measures to address the unplanned in-migrations to the areas close to water sources.

From interviews with different KIs, it can be argued that there is inadequate coordination of water policy activities at the central levels. This, to a large extent, provides a hindrance to effective implementation of the policy instruments on water resource management. Being the ones who set the overall direction of the policy, the failure of the central level actors to effectively coordinate their activities has the likelihood of dwarfing the water resource management activities at the local levels.

Apart from poor horizontal communication between the MoWI and sectoral ministries, interviews with the KIs indicated poor vertical integration of the MoWI and the regional, zonal, basin and community level actors. For example, during interviews, the

Community Development Officer (CDO) in the WRBWO explained that the Ministry of Agriculture, Livestock and Fisheries (MALF) is supposed to support small scale irrigation schemes in different aspects. In particular, basing on this officer, small scale irrigation schemes, the Mkindo and Kiroka Irrigation Schemes included are supposed to receive support, directives, guidelines, skills and knowledge regarding modern irrigation and farming practices in general from the MALF and other stakeholders from the donor community through the Zonal Irrigation Office (ZIO) and LGAs. Despite being link pins, the ZIO and LGAs have no effective mechanisms to coordinate the ministry and farmers in various water resource management activities as revealed during the interviews with the scheme chairperson in KIS:

I do not know anything about the ZIO, but at least I am aware of the role of MDC because it communicates with our scheme, although rarely in matters pertaining to scheme financing and other technical issues. Generally, we, the farmers in KIS, do not know exactly what these organs do and how we can benefit from their activities.

Generally, the findings from the KIs interviews show how vertical coordination of the water policy activities is a challenge. The findings reflect the ambiguities at the sub-governance level called by Mehta (1999), in Komakech *et al.* (2012c), the ‘messy middle’ which normally prevents effective linkages between the state and local level actors. In addition, the findings concur with the findings in Lloyd *et al.* (2005) which indicate that poor coordination of water resource and irrigation management activities has resulted on resource overexploitation in different areas in Tanzania and slowed down the conservation efforts undertaken in MoWI.

As it was realised during KIs interviews with officials in WRBWO, MVDC and MDC different measures have been undertaken by the government to enhance coordination of the water resource management activities. Among the measures that have been undertaken by the government as stipulated in the Water Sector Status Report (URT, 2013) are establishment of the Programme Coordination Unit (PCU) in the Ministry of

Water and Irrigation (MoWI), establishment of the Water Sector Climate Change Coordination Mechanism or alternatively known as a ‘Dialogue Forum’, and establishment of the national website (www.maji.go.tz) in Kiswahili language, to help the stakeholders, including ordinary citizens to access information about water resource development in the country. Other measures include information dissemination through the TV, Radio, public meetings and inauguration of the national water day in each year. Through those programmes, it was expected that the actors will get the chance of knowing what the government and different actors are doing in water resource action arena and make informed choices.

In the eyes of the government and donors, the ongoing measures towards coordination of the stakeholders provide a solution for effective integration of the actors at all levels; however during the interviews, the scheme leaders indicated doubts on the efficacy of such measures as indicated by the secretary of MIS:

The use of different information communication strategies is important. However, the majority of the farmers do not access modern communication devices such as magazines, mobile phones, computers, radios or television for learning purposes, but for other things and leisure. As a result, it is difficult for most of them to be informed of the various water resource and irrigation management issues.

Slightly different opinions were provided by the Councillor for Kiroka Ward who saw hope in government measures, despite the existing challenges: *“We live in the era of science and technology. The use of e-governance strategies in information communication is important. Although the challenges are eminent, there is a prospect for the ongoing efforts to bear the intended fruits in the future.”*

Drawing from the opinions of different KIs, there is general agreement that integration of the central level actors is still a big challenge in water policy implementation in Tanzania. Following introduction of the IWRM and adoption of the Sector Wide Approach (SWAP) in which inclusion of all water consuming sectors in water governance processes and decisions have been insisted on, the government and donors

were optimistic that collective action among different central level actors would be enhanced. However, the existing experiences show that collaboration of these actors in water policy implementation is still far from a reality. As a result of poor coordination, some key actors as argued in Lloyd *et al.* (2005) have been left out in planning and implementation of some water projects, and those who are included have failed to have common stands and strategies towards water conservation and other issues stipulated in NAWAPO.

4.2.2 Actors' Roles and Interactions at WRBWO

Below the national level, the responsibility to govern water resources management is vested in the Basin Water Offices (BWOs). As it was indicated by the Basin Water Officer in WRBWO during an interview, at the basin level, the overall decision making powers have been vested in the Basin Water Board (BWB), whose establishment, like all other basins in the country, has been clarified in the Section 22 and functions stipulated in Section 23 of the Water Resources Management Act No. 11 of 2009. The Board consists of members drawn from the private sector, catchment water committees, key water related sectors, local government authorities, water supply and sanitation authorities and ministry responsible for water. As provided in WRMA, this board is supposed to undertake all important decisions with regard to water governance and allocation across the basin area. Apart from decision making, the NAWAPO stipulates various specific responsibilities for the water Basin Offices, WRBWO included. These are: data collection, processing and analysis; pollution control; preparation of water utilisation plans; collection of the various fees and charges; monitoring and evaluation, and resolution of water users' conflicts (URT, 2002a). Despite the fact that the policy clearly stipulates the functions of the WBOs in the country, such functions are not effectively performed in WRBWO as the Basin Water Officer argued during the interview:

As an overseer of the water resource in the basin, we are supposed to execute various functions to promote sustainable utilisation of this

resource. But our performance has not been to the expected levels due to obstacles contributed mostly by shortage of funds.

Like the other WBOs, the WRBWO is required to execute its functions in collaboration with other stakeholders. As argued by the Community Development Officer (CDO) in this office:

“The main partners at the national level, the WRBWO is collaborating with are the Ministry of Water and Irrigation (MoWI), Local Government Authorities and other sectoral ministries and departments having a stake in water.

Moreover the CDO argued that, apart from the national level actors, there are actors from within the basin coming from the donor community, private and public sectors. These include Winrock International, Water Resource Initiative Development (WARIDI), UNDP, GIZ, Water Aid Tanzania, SUA and Water Witness. These non-state actors have been implementing different projects in water and general environment in collaboration with the WRBWO. According to the Community Development Officer (CDO), through collaboration with the non-state actors, the basin has managed to implement some projects which have helped in educating the water users including small scale water users on various water conservation issues:

We are very grateful to our partners from the private and NGO sectors. Through their support we have managed to address several issues that have been affecting management of the water resource in the basin. One of the issues is depletion of the water resources due to unsustainable agricultural and livestock keeping activities.

The views from the CDO in WRBWO align with the emphasis in the NAWAPO that collaboration of different stakeholders is crucial for achievement of the water resource management plans. Despite its usefulness, collaboration with the stakeholders has not been easy in WRBWO. During the interviews for example, the assistant human resource officer indicated existence of communication challenges with the ministries at the centre. According to the officer, sometimes communication is disrupted due to poor

network systems and sometimes there are delays in getting the feedback on various issues from the central level officers. Moreover, interviews with the officials from the WRBWO, MVDC and MDC indicated poor communication between the WRBWO and the Local Government Authorities (LGAs) despite the fact that both of them deal with water issues and have the duty to supervise water utilisation in irrigation schemes. Explaining about this situation, the CDO in WRBWO had this to say: *The basin and LGAs do not have regular communication and reporting relationships. “Communication takes place in an ad hoc manner and only when some consultations need to be made or issues need to be clarified”*.

The findings from the interviews concur with what the JICA report (2013) has indicated. According to the report, the WRBWO and LGAs have no strong linkages in various water resource management activities. As indicated in this document, communication between the two actors is mainly advisory, taking place mostly at personal levels. Apart from that, an interview with the human resource officer showed that the basin also faces communication challenges with the subsidiary offices found in six regions in Mainland Tanzania. According to him, this mostly happens because the basin and its subsidiary offices lack effective strategies in information communication:

The WRBWO faces a challenge in coordination of its subsidiary offices found in five regions in Mainland Tanzania. This is because we do not have effective mechanisms for ensuring information flow from the center to the regional offices and vice versa. To some extent, inadequate information communication system prevents timely decision making in various water resource management and allocation issues in the basin.

Moreover, as the CDO and BWO provided during interviews, communication between the WRBWO and external actors such as donors and NGOs, conducting water activities also takes place in an ad hoc manner. Although the basin’s strategic plan directs the WRBWO to identify the actors and sensitize them to participate in water resource management processes, no strategy has been established so far to reach the potential actors and initiate the relations. For example, as the CDO explained during an interview,

the WRBWO has not established any particular system for working with the external actors in various water resources management projects. Communication normally starts when an external actor has an issue at hand and wants to collaborate with the basin to pursue it. According to this officer, in most cases, the partners come with their own working systems, preferences and funding arrangements which the basin office normally complies with. Although some alterations can be made to such working arrangements, in most cases, the external actors have strong voices because they are the ones who initiate and fund the projects. With respect to the general members of the communities and small scale water users, official communication from the WRBWO is also inadequate as one of farmers in KIS explained during the FGDs: *“It is a long time now since we have formulated this scheme but no official from the basin office has visited us. Actually we are completely unaware about it”*.

The views from the farmers were supported by the interviews with the basin officials. In such interviews, the officials indicated that communication with the water users starts when they want to apply for the water use permit or when there are problems such as conflicts among them. Such officials further indicated that no communication exists with the general public who do not have any issues related to economic water uses. The only regular communication existing currently is between the basin office and some of the irrigators who have water use permits and whose intake facilities have been improved through various government or donor funding. According to the Community Development Officers (CDO), such customers constitute only a small portion of the individuals and groups using water for production purposes in Wami-Ruvu Basin. Generally, the study has found inadequate formal communication between the WRBWO and small scale irrigators in WRB. Due to poor formal communication the WRBWO as the SCDO explained further during the interviews has relied on the informal channels to get information about what the small scale water users do with regard to water resources: *“Thanks to our informers who usually report to us issues related to water, especially illegal abstractions and conflicts; without them we would not know many things happening in the communities”*.

While communication with the small scale irrigators and other water users seems to be weak, the basin office has managed to establish regular communication with the large water users as the human resource officer provided during the interviews:

As an organisation mandated to control utilisation of the water resource and facilitate different water provision activities, the WRBWO is supposed to have regular and effective communication with the water users around the basin area. In most cases we have managed to locate and regulate big water users because these are well organised and conduct their activities in areas which are reachable.

In the rational choice institutional view, there is strong emphasis on clear and formal lines of communication among different levels and actors. Communication systems effectively embedded within nested structures of governance are regarded crucial for devising enduring resource institutions (Ostrom, 1990). Although the WRBWO has clear communication with the large water users such communication is not arranged in neatly nested layers as literature in conventional or rational choice institutional theory try to indicate (Ostrom, 1990). As provided by both CDO during the interviews and JICA report (2013), the WRBWO's communication with the water users and the communities in general is mostly ad hoc normally taking place at personal levels.

Moreover, the rational choice institutional scholars emphasise formal organisation of business through clearly defined structures. The interviews with the KIs and farmers have indicated that the small scale water users in WRB are not always organised in the formal structures designed to enable them communicate with other organisations, for instance the WRBWO. To understand where these users are found and what their activities are, the WRBWO depends mostly on informal communication channels.

In this regard, the study findings have confirmed the interfaces between the formal and informal institutions in management of the water resource insisted in the literature (Cleaver and Franks, 2005; Cleaver, 2001; Ostrom, 1990). Generally, such findings are

contrary to the NAWAPO and WRMA view that the river basin offices enhance integration of different actors in water resource management.

4.2.3 Factors Affecting Water Policy Activities at the National and Basin Levels

Drawing from the IAD and SES frameworks, different factors might affect implementation of the policy instruments, but interviews with the officials in WRBWO indicated that the material conditions are the most salient. Such views are supported by the LGAs officials, particularly the irrigation officer in MVDC:

The Ministry of water as an overseer of all water resource management activities normally depends on the donors to supplement the budget allocated by the government in the execution of the various plans. In my view, high dependence on the donors for financial support affects the choices made by these ministries and departments with regard to water resource development projects, because the donors do not always abide by their promises.

The views from this irrigation expert in MVDC concur with the Water Sector Status Reports (2010, 2011 and 2013) which indicate donor's delays in disbursement of funds or decline of the commitments to disburse funds or provision of amounts which are less than what they promised (*see Table 4.1*).

Table 4.1: Approved versus the actual budget for WSDP in financial years 2010/2011 in USD

Source of Funds	Original Commitments	Revised Commitments	Actual Disbursements	% in Budget Performance
GoT	251,000,000	251,000,000	122,646,268	49
World Bank (IDA)	200,000,000	200,000	117,683,414	59
German/KfW	70,000,000	66,200,000	49,437,040	75
Dutch Government	60,000,000	39,600,000	20,594,536	52
French Development Agency	0	36,000,000	28,000,208,897	78
Total Basket	330,000,000	341,800,000	215,923,887	63
African Development Bank	80,000,000	135,208,897	85,208,897	63
MCC	207,000,000	52,550,000	2,780,000.00	5
JICA	83,000,000	36,470,164	29,923,127.70	82
German KfW		76800,057	68,875,514.90	90
BADEA		28,760,000	6,631,554.00	23
IDA (DAWASA)			813,811.20	100
AFD		15,600,000	11,341,472.30	73
AfDB (DWSSP)		41,402,857	44,367,254.00	107
EIB (DAWAS)		42,000,000.00	42,000,000.00	100
EU		116,581,299	95,945,590.40	82
GTZ Water Facility		6,757,551,	7,432,036.70	110
Norwegian Foreign Affairs		15,100,000	1,221,293.20	8
SECO		15,470,000	5,113,514.00	33
BTC/EU Dsm CWSSP		9,000,000	1,382,159.00	15
KOICA		16,300,000	-	0
CHINA GVT		3,418,000	3,418,000	100
Total Earmarked	370,000,000	611,418,825	406,454,224	66
Grand Total	951,000,000	1,204,218,825	745,024,379	62

Source: URT, 2011

As Table 4.1 indicates, the budget fluctuation is common in water policy funding. In this situation, it is difficult to have systematic execution of the activities from the national to the scheme levels. The gap between the promised and disbursed budget can also be found in the financial year 2012/2013. In this financial year, the government promised to disburse 93,343,978 million in USD, but disbursed only 65,282,227 million in USD. In the other hand the DPs disbursed only 132,837,537 out of 283,095,310 which they promised to give. This situation created the budget deficit of 178,319,524 million in USD. Budget deficits have negative impact on availability of capital; labour and technology to enable the actors pursue various projects in water resource development. Due to budget deficits, the MoWI and other ministries and departments related to water fail to monitor what is going on in their agencies and support them in their plans. Among

other things inadequate budget allocations affect performance of the river basin offices in the country.

Being a lead actor at the basin level, the Wami-Ruvu Basin Water Office (WRBWO) is required to establish effective strategies for coordination of water management activities, however due to financial constraints; the office lacks the capacity to do so. As interviews with the BWO have indicated, the WRBWO depends mostly on government and donors for financial support. Fluctuated budget allocations from them normally create budget deficits as indicated by the BWO: *“Our primary source of income is the fees from the water users; however our capacity to collect such fees is low. As a result, we always face budget deficits in various activities”*. Similarly, the JICA report (2013) shows that currently only 30% of the budget utilised in the WRBWO is obtained from the internal sources mainly water use fees, the rest depends on the central government and donors.

Budget deficits have contributed to various undesirable outcomes in performance of the WRBWO one of them being a failure to support the WUAs. For example, as interviews with the chairman of Mkindo WUA indicated, the WRBWO had not made any financial allocations to Mkindo WUA since its establishment in 2011 despite emphasis by the government that the BWOs must allocate back 20% of the collections from the WUAs. Due to lack of financial support from the basin the Mkindo WUA has failed to fulfil its obligations to effectively supervise water allocation activities in MIS and the surrounding areas as the chairman indicted during interview: *“Since this association was established various water resource management plans have been established but most of them have not been implemented due to lack of financial support from the WRBWO”*.

Apart from the financial constraints the capacity of the WRBWO to fulfill its obligations in water policy implementation is also affected by lack of adequate human resources (See Table 4.2).

Table 4.2: Human resources availability in the WRBWO

Field of Expertise	Required Number of Staff	Available staff	Deficit
Professionals	26	14	12
Technicians	31	24	7
Others	51	26	25
Total	108	64	44

Source: Human Resource Department WRBO (2014)

Due to inadequate human resources, the basin's capacity to monitor water abstractions and regulate water use behaviour in various locations has been affected. For example, an interview with the Human Resource Officer at WRBWO which happened to coincide with the JICA (2013) report showed that currently the basin authority has no capacity to open legal charges against offenders due to lack of legal officers. Thus in case of opening any legal charge against the defaulters, the basin has to seek assistance from the MoWI at the headquarters. This situation creates inconveniences as the basin's human resource officer indicated during the interviews:

Due to lack of a legal officer, the basin is forced to seek legal advice from legal officers at the headquarters. This process is financially costly and normally leads to delays in making decisions. To avoid expenses and delays, in most cases, we have chosen to finish the cases through informal approaches such as dialogue instead of sending them to courts.

Interviews with the basin officials indicate that, the WRBWO has not opened any legal case in the court since its establishment in 2002 mainly due to financial and legal resource constraints. Generally, lack of capacity to prosecute the offenders has forced the officials in WRBWO to invent their own ways of dealing with the cases. This situation contravenes the requirement in WRMA that offenses must be punished through graduated sanctions to send a lesson that rule breakers are not tolerated, as insisted in the institutional design principles by Ostrom (1990). Theoretically, the central level actors are technocrats who are supposed to be knowledgeable and ready to comply with the rules as stipulated in the national policy and legal frameworks. But practically, the actors do not always conform to formally stipulated systems as different factors may constrain

their abilities and willingness to act. The findings from the KIs and FGDs have indicated some limitations in the willingness and capacity of the central level actors to abide with the formalities stipulated in the NAWAPO and WRMA. Such limitations have paved the way for informal practices and rules to permeate the policy action arena. Generally, the behaviours of the central level actors in water policy implementation conform to both the rational and critical institutional perspectives.

4.2.4 Actors' Roles and Interactions in Selected Irrigation Schemes

As it has been pointed out in the overview of this chapter, what actors at the higher levels do implicate the capacity of the local level actors in water allocation processes. In the next sections the roles of the local level actors are examined to see how they are affected by what happens at the central and basin levels.

4.2.4.1 Mkindo Irrigation Scheme (MIS)

There are different actors in MIS who influence water policy implementation. These are internal actors who comprise farmers and scheme leaders and external actors from the governmental and non-governmental and community organisations, as well as pastoralists from the nearby Kambala village. Roles and influence of each actor are discussed in details below.

(i) Scheme Leadership

As it has been indicated in the scheme constitution, the overall management of the scheme is vested in the hands of scheme leadership. According to the scheme chairman, the move to prevent duplication of efforts and enhance enforcement of the rules, the scheme leadership in MFIS was formally divided into three major committees namely; the executive, farm and planning and finance Committees. These committees managed the scheme holistically. As the scheme chairman further provided, recently, the Ministry of Agriculture, Livestock and Fisheries (MALF) has instructed the leaders to divide the scheme leadership into blocks each with its own leadership. The leaders of the blocks will then represent the farmers in the executive committee which will be elected after establishment of the blocks. To enable changes from the current holistic leadership to

the block system, the various committees which previously managed the scheme have been dissolved to allow election of new committees under the new system.

Opinions from the farmers as were provided during the FGDs show that the majority prefer the block system because they think that it can ease communication between them and the leaders in the scheme: *“The blocks will make it easy for us to organise and contact our leaders whenever there are issues to resolve because the number of farmers is low”*.

According to the farmers, within the holistic approach, it was not easy for the farmers to communicate with the leaders in case issues related to water distribution or conflicts arose among farmers. In a way, farmers’ views reflect emphasis on conventional institutional theory about availability of low cost conflicts resolution arenas close to the users of the resource (Ostrom, 1990). According to the chairman of the scheme, the recent changes in organisation of the scheme and its leadership structures have aimed to improve representation of the farmers in various decision making processes. Most importantly, this move aims to bring the scheme leadership close to the farmers so as to fasten resolution of various conflicts related to distribution and management of the water resource in the plots.

While majority of the farmers in MFIS support the shift towards the block system in management of the scheme, there are few farmers who seem to have opposite view with regard to the changes. For them restructuring of the scheme leadership do not have any contribution in improvement of irrigation services in the scheme. Perhaps one may ask why some few farmers have come with opposing ideas while majority are optimistic with the changes. The FGDs revealed that the MFIS members who have provided the opposing ideas seemed to be aggrieved by different issues happening in the scheme as this man said:

In my view making changes in leadership system without changing our behaviours will not make any difference. The only important thing is for the leaders and government officials to stop turning their backs against

our problems. We all know how services are poor in our scheme and justice violated in dealing with the pastoralists. I do not think that leadership structures will solve these problems.

From the FGDs it was learned that those who seem to challenge the leadership structural changes are fewer than those who favour such changes. Despite being few, the views of those who challenge carry important message to the reformers. Perhaps, their views are warning shot that structural reforms are in themselves not sufficient strategies for improvement of the resource management systems; the argument which falls in the perspective of critical institutionalism (Cleaver, 2001).

(ii) Irrigators

According to scheme chairman, there are two categories of irrigators in MIS; those having membership to Mkindo Farmers Irrigation Scheme (MFIS) and non-member irrigators, organised into different registered and unregistered groups. Although the members and non-scheme members abstract water from similar source, the actions that they can take, the level of control in such actions and cost and benefits that they face are different. This is due to differences in resource endowments, ability to processes information and preferences towards the policy goals and strategies. Although various groups of non-member irrigators exist, the study has targeted only the *Umoja wa Umwagiliaji Mgongola* (UUMGO) because this group, as interviews with the scheme and village leaders revealed, is the largest group of all non-member irrigators using water from the scheme and also had been in conflicts with the member irrigators.

According to the scheme constitution, the farmers, both members and non-members are obliged to pay the fees, participate in O&M activities (*Kiwili*) and abide with all rules regarding irrigated farming in the scheme. The fees in this scheme are paid by all members and non-members regardless of the size of their farms and yields that they get. There are two farming seasons; wet (*Masika*) and dry (*Kiangazi*) irrigation seasons. In each of these seasons, the farmer is required to pay 30,000/=, as a water fee. Some of this money is paid to the MFIS group to cater for administrative cost, some goes to

Mkindo WUA, and the rest is used to pay the annual water use fees as stipulated by Wami-Ruvu Basin Water Board (WRBWB). Another role that the farmers in MFIS play is to distribute water from the source to the farms. Although the WRBWO has been mandated to allocate water to the farmers, its role ends with permit issuance but not distributing the water to the plots. The farmers undertake different actions related to water distribution basing on the rules and regulations written in the MFIS constitution.

Among the responsibilities related to water distribution are participation in O&M activities and payment of the water use fees on time. When commitments of the members and non-member irrigators towards such responsibilities are examined some variations can be found. Generally, readiness to pay the fees and participate in O&M activities (*Kiwili*) is higher among the members than the non-members.

The farmers in MFIS are generally enthusiastic about the scheme therefore we do not use big force to make them commit to the scheme responsibilities. The problem however, remains with the non-member irrigators. These normally comply after being coerced.

Various factors could explain why farmers have unequal commitments in this scheme but one of them is lack of equality in the rights that the members and non-members have towards the water resource. As interviews with the chairman of MIS indicated, the member irrigators in MFIS feel that they have more rights than their colleagues in UUMGO who are not members to the scheme. The MFIS members feel that they have rights to access, withdrawal, manage, exclude others and alienate the water resource rights. Among these, they think that the right to exclude, manage and alienate the resource is exclusively theirs as the chairman of the group insisted during the interviews:

The policy is clear about this issue. Small scale irrigation schemes must be owned and managed by the groups which constructed them and participate in their maintenance. We have constructed this scheme therefore it is legally ours. The fact that we have invited the UUMGO members to irrigate from this scheme does not mean that they have the right to own and manage it. As our fellow villagers, we can only allow

them to access and withdraw water but not to give them the rights to manage the scheme or sell water to others, as we do.

The interviews have indicated that rights that the MFIS members have, put them in a more advantageous position in decision making about the scheme than their colleagues in UUMGO who have the access and withdrawal rights only. Generally, such rights have promoted a sense of ownership towards the scheme among the members as the above words from the scheme chairman have indicated. On the contrary, the non-members think of themselves as just passers-by whose responsibility is only to pay the fees and use water: *“The MFIS leaders force us to be part of their group if we want to fully enjoy the rights existing in the scheme. But this is not appropriate because we have our own group registered by the government”*.

The idea of making the UUMGO members be part of the MFIS group might be viable as far as their rights to use water and enjoy other privileges in the scheme are concerned. However, such decision has been conceived without attention to the physical and bio-physical environments in which such members conduct irrigation. As KIs interviews with the scheme leaders and FGDs with the farmers revealed, comparatively, the MFIS members conduct irrigation in a better physical and bio-physical environment than the UUMGO members who use canals which are completely earthen and irrigate in the landscape which has not been levelled enough to allow smooth flow of water. In most cases these farmers get irregular distributions which lead to low productivity while their colleagues in MFIS enjoy regular and abundant supplies throughout the irrigation seasons. If they become members to the MFIS group, they will be forced to bear all responsibilities like the old members while the benefits that they get are not equal. Basing on the findings from the FGDs and KIs it is conceivable to argue that unequal benefits contribute to the existing apathy towards the collective action in management of Mkindo scheme among the members of UUMGO.

In its efforts to improve irrigation farming, the government through its scheme wise improvement program articulated in the National Irrigation Master Plan (NIMP) of

2002, has insisted local ownership of the schemes. Such emphasis is also in line with the central objectives of NAWAPO and NIP. Ownership is considered an important aspect for achieving self reliance in management of the schemes. In conceiving the idea of collective ownership however, the government has overlooked the fact that irrigators have diverse values and interests which make the whole idea of collective ownership challenging. In MIS the differences in terms of social, physical and bio-physical environments, between the member irrigators in MFIS and non-member irrigators in UUMGO have led to inequalities which have in turn contributed to emergence of heterogeneous interests and outlooks towards the policy instruments. Due to conducive environment in terms of the above factors, the member irrigators in MFIS have developed a sense of ownership to the scheme and voluntary compliance towards the water allocation rules and regulations. This is because these irrigators experience high productivity which motivates them to obey the rules. A sense of ownership and voluntary compliance towards the rules has been difficult to evolve in UUMGO due to production challenges emanating from the physical and bio-physical. Generally, the findings from the interviews with the farmers and leaders dispute the assumptions in critical institutionalism that actors are motivated by cultural incentives only. The quest for economic achievements seems to have influenced the decision by UUMGO members to resist the allocation rules under MFIS.

(iii) External Actors

As KIs with the leaders and government officials and FGDs with the farmers revealed, water policy implementation in the MIS is influenced by different actors from the external environment. These actors are from the government, non-governmental organisations and communities. The key actors from the government influencing policy implementation in this scheme are the Wami-Ruvu Basin Water Office (WRBWO), Zonal Irrigation Office and Mvomero District Council (MVDC).

The KIs interviews with the officials in WRBWO indicated that this organisation interacts with the farmers in MIS through the Wami-Ruvu Basin Water Board

(WRBWB), in particular through the Basin Water Officer, who is the Secretary to the Board. The farmers also communicate with the WRBWO through Community Development and Public Relations Unit (CDPRU). The role of WRBWO is to provide financial support to the farmers through the WUA and disseminate knowledge and skills about water policy issues. In addition, the WRBWO has the duty to supervise water abstractions and exchange information with the water users on water abstraction trends in the scheme and surrounding areas. Other important statutory actors are Mvomero District Council (MVDC) in particular the Department of Agriculture, Cooperative and Irrigation and Zonal Irrigation Office. Their role is to ensure that efficient irrigation is practised by the farmers.

Ideally, the external actors mentioned above need to have wide interactions with the irrigators and water users in general so as to enhance their participation in water management processes. The KIs and FGDs have shown that interactions between the farmers and such actors are highly limited. Instead of the farmers in general, in most cases, it is only the leaders who get the chance of meeting the government officials. During the FGDs the farmers indicated dissatisfaction with the existing communication arrangements with the government officials as one of them indicated:

We know that it is not possible for the officials to have direct communication with each one of us however; it is possible for such officials to arrange for some meetings with the farmers so that they can hear the challenges the scheme faces directly from us.

Such views were supported by another farmer who said:

We know that our leaders do good job in forwarding our concerns to the higher authorities. However, we are of the feeling that the message becomes more weighted when received from the original source than when it passes through different hands before reaching the end.

Generally, the views from the farmers question the representation system emphasised in rational choice systems in line with the critique from Cleaver (1999). According to

Cleaver (1999) the representation approach through the formally defined structures as insisted in the rational choice perspective provides limited chance for the people to participate in decision making processes and has the danger of confining the decision making opportunities to few elites.

The Catchment and sub-Catchment Water Committees (C&SCWCs) are also key actors influencing the water users in the schemes. Their role is to prepare and implement the catchment and sub-catchment plans and resolve the water allocation conflicts within the respective catchments and sub-catchments areas (URT, 2002a). Although the C&SCWCs are identified as key actors in water policy implementation, their existence depends on the users' capacities and willingness to organise in formal groups (WUGs) and associations (WUAs) (URT, 2002a). It is through the presence of adequate WUAs that the farmers can form such apex organisations at the middle level to represent them in higher governance processes. Unfortunately as KIs interviews with the officials in WRBWO, MVDC and MDC have indicated, the establishment of the WUGs and WUAs is still at low pace in WRB. For example, by the time this study was conducted, such officials said that, only 11 WUAs out of expected 38 were established in the whole basin. Slow pace in establishment of the WUAs has prevented formation of the C&SCWCs in WRB, hence their influence is lacking in most schemes including the MIS.

To some extent the influence of WUAs exists in MIS. Among the 11 WUAs formed across the basin, one, the Mkindo WUA, has been formed by the communities where the MIS is located. According to chairman of Mkindo WUA, to enhance water users' representation, this organisation is supposed to have effective strategy for information collection and dissemination to the water users. However, the chairman said that due to lack of capacity, the WUA has not been able to have regular and systematic communication with the users. As it is for the higher level actors, communication between the Mkindo WUA and water users is ad hoc and temporary dealing with issues as they emerge. Apart from the Mkindo WUA, the village government leaders in

particular the Village Chairman and Village Executive Officer (VEO) play important role in scheme development. These help in solving disputes arising among the farmers in the course of using the resource. Through the FGDs with the farmers, it was found that the farmers have more interactions with the scheme and village leaderships than the Mkindo WUA in various water resource management issues. This is because despite having a direct role in water resource management and direct communication with the WRBWO, the Mkindo WUA has not managed to establish effective system for working with the farmers as one of them provided during the FGDs:

Personally I do not know the roles of the Mkindo WUA in management of the water resource or farming activities. It is difficult for us to know this organisation properly because all of our issues are solved through the scheme leaders or sometimes village government.

Through interviews with the chairman, the factors contributing to limited operations of Mkindo WUA were explored. Such factors include but not limited to poor financial and technical supports from the WRBWO and negative farmers' attitudes. Due to poor financial support the Mkindo WUA has failed to conduct regular meetings with the farmers and also monitor water abstractions to identify rule violations. The claim for financial limitations by the chairman of this WUA was confirmed by the Basin Water Officer during the interview: *"The WUAs are doing good job, but they fail to perform well because we do not support them accordingly"*.

While its communication with the farmers seems to be limited, the Mkindo WUA collaborates closely with the scheme leadership, although mostly at personal levels. As the chairman of the scheme explained during the KIs interviews, this organisation has been offering advices to the leaders on various scheme and water resource management issues and helping them in conflicts management processes. In the eyes of the WRBWO and scheme leaders, the Mkindo WUA is an important partner in water resource management processes, but the FGDs revealed that to the villagers, it is mostly viewed as the agent used by government to drain money from the people. The organisation is

viewed like this, mostly because of the purpose for which it has been established. Interviews with the chairman revealed that, the Mkindo WUA was established mostly to facilitate collection of the water use fees from the villages crossed by River Mkindo. According to this leader, all villages crossed by this river are automatic members to this organisation therefore, each of their households is required to contribute 3000 Tshs annually as a water use fee to help its operations. According to the Mkindo WUA chairman, out of the nine villages crossed by River Mkindo, only eight namely Kinda, Kismangulu, Mndela, Mkindo, Dihombo, Hembeti, Kigugu and Lukenge accepted to be members of the Mkindo WUA. Due to this reason its residents have been paying the water use fees as per Mkindo WUA constitution although not all of them. In the other hand, Kambala, the village in which the Maasais reside refused to be part of this association therefore its residents do not pay such fees. Interview with the chairman of Kambala village indicated that opposition against the Mkindo WUA and water use fees has been contributed by entrenchment of the Maasai culture in village governance system.

According to the chairman of Kambala, the *Maasai* villages have two leadership systems; the formal system that bases on the government legal and policy arrangements and traditional system operating through the customary institutional arrangements of the Maasai tribe. In the second system, the final decisions about different issues including those related to implementation of the national policies and laws rest with the elders. As Kambala chairman further indicated: *“Normally, the village leaders do not adopt any decision without the approval of the Maasai elders even if such decision has been articulated in the national law and policy”*. Such dual decision making structures have made integration of *Maasai* pastoralists in water policy implementation difficult.

Findings about the influence of *Maasai* culture on management of the water resource resemble those reported by Lloyd *et al.* (2005) in respect to the Rufiji Water Basin. According to Lloyd and others, the managers and farmers in the Rufiji Water Basin have

been struggling to make the *Maasai* pay the water use fees because they have refused to do so willingly. These authors argue that the *Maasai* resist the allocation rules because they think that such rules are incompatible with their lifestyle, which do not base much on money economy. Instead of money, the *Maasai* have mostly depended on cattle for various exchanges. This has affected their attitudes towards the economic approaches in water allocation management as insisted by the government.

While considering the cultural factors is crucial, there is also a need to go beyond and consider the livelihoods needs of the pastoralists as insisted by the Kambala chairman during the interview:

Among other things, the policy wants us to register with Mkindo WUA. In doing so, we will be subjected to restrictions which will affect our capacity to access water and pasture. As pastoralists we do not accept this decision because it has negative implications on our livelihoods.

While the pastoralists indicated livelihood concerns in their decisions to reject joining the Mkindo WUA and paying the fees, the literature as exemplified by Lloyd *et al.* (2005) and policy makers, have normally associated such opposition with strong cultural affiliations. Misperception about the pastoralists' behaviours in WRB and probably across the country partly contributes to incompatible plans to involve them in water resource management processes.

The establishment of WUGs, WUA and then C&SCWCs reflects the emphasis on conventional institutional thinking that water users must establish low cost decision making and conflict resolution structures close to the resource users (Ostrom, 1990). Such emphasis however has overlooked the fact that such organisations are not technical structures per se, but also the social-cultural and political systems. In the eyes of a critical institutional observer, the water users groups and organisations are arenas in which the water users negotiate different decisions under the influence of the social-cultural and political milieus in which they are embedded. In that case, the water users

are not expected to accept them without mediations. In short, poor trends in formation of the representative organisations in the institutional thinking, is a result of contestations fuelled by the existence of different outlooks as a result of diverse social-cultural and political interests. While this is true, there is also evidence that the water users in Tanzania, especially those in the WRB, oppose such structures because of the poor services from the government as some of the farmers indicated during the FGDs: *“It is not that the farmers do not like to join the WUGs and WUAs and pay the fees. The problem is that such groups sometimes do not help in solving their problems”*.

The claims by the farmers concur with the argument in van Koppen *et al.*, (2004). According to these authors, small scale irrigators reject these groups to avoid the water use fees bearing in mind that most of them abstract water through own built traditional structures. Although interviews indicated that WUAs and WUGs are generally opposed, some few farmers showed support for them during the FGDs. The farmers who indicated support for the formal water users’ organisations mostly come from MFIS, the group which seems to be privileged in terms of irrigation infrastructures and farm productivity. These farmers feel that through membership to formal groups, the chance to benefit from irrigation has been increased as one of them pointed out:

Before I joined the MFIS group, I used to conduct agriculture traditionally. My knowledge and skills were low because I had no access to education or training opportunities. Through this group I have received wide knowledge on modern farming which has in turn helped to boost my farming methods and farm harvests.

Such views were shared by other farmers as indicated in remarks by one elderly man: *“Through MFIS group, we, farmers get various benefits; for example exposure to donors who help us in various technical issues”*. Although interviews indicated existence of some positive feelings about the WUGs, WUAs and other formal grassroots organisations dealing with irrigation and water management issues, such feelings are limited to only few farmers who experience benefits from irrigation. For those who have not benefited from irrigation, these organisations seem to be irrelevant. To a large extent

the failure to realise the benefits accrued from the WUGs, WUA and C&SCWCs explains why most water users have low motive to establish or join them. Due to absence of WUAs and C&SCWCs, most of the small scale water users are disconnected from the BWOs and national level decision forums such as the National Water Board. Bearing in mind that these form majority of the water users in the country, failure to involve them in macro level decision making and governance processes implies that water resource management is partially participatory. This experience is contrary to the subsidiarity principle which insists that water resource management should be decentralised to the lowest possible level (URT, 2002a).

Another important actor having close relationship with the scheme is Mkindo Farmers Training Centre located in Mkindo Village. Basing on the FGDs with the farmers and KIs interviews with the officials in MVDC, scheme and village government leaders, this institute has been a useful partner to the framers due to its role in imparting skills and knowledge on sustainable agriculture. Apart from the above state based actors, the farmers in MIS have been influenced by NGOs. As official record from MVDC and as shown in Table 4.3 have indicated currently about NGOs work with farmers in Mvomero District and Mkindo village in particular. These organisations play crucial role in imparting knowledge and skills on efficient farming and irrigation activities among the farmers.

Table 4.3: NGOs and their services to the farmers in MIS

S/N	Name of Organisation	Nature of Activities
1	OAF (One Acre Fund)	Works with farmers in East Africa including those in Mkindo. It offers education and training programs on efficient seeds, farming practices, and ensures that agricultural inputs reach the farmers on time. It also educates the farmers on how to attract markets for their products.
2	Community -Oriented Development Action (CODTZ)	Imparts skills and offers other services related to child welfare, nutrition, environmental conservation and sustainable agriculture
3	Water Resources Integration Development Initiative (WARIDI)	Its focuses are integration of private stakeholders for implementation of water projects including small and big irrigation projects. Addressing challenges emanating from environmental variability through forestry conservation, empowerment of water users groups to enhance water availability, maintenance of water infrastructures
4	CARE INTERNATIONAL IN TANZANIA	Educating villagers on conservation of Uluguru Mountains, Establishment of Serving and Loan Societies (VSLs).
5	Women Participating In Poverty Alleviation Tanzania (WOPATA)	Educating farmers on sustainable farming and provision of preserving bags for the farm produces, educating farmers on how to identify and attract markets
6	NAFAKA FEED THE FUTURE (USAID)	Capacity building for framers
7	TROPICAL SEEDS	Support framers on production of efficient maize and rice seeds.
8	Tanzania Official Seed Certification Institute (TOSCI)	Training and educating farmers and extension officers on efficient seeds, inspection of seeds and farms
9	SAT – KILIMO HAI NA ENDELEVU	Educating farmers on organic and sustainable agriculture
10	Building Rural Income Through Enterprises (BRITEN)	Mobilizing and sensitizing farmers to attract markets
11	Netherlands Development Organization (SNV)	Educating and sensitizing farmers on contract farming, educating farmers on sustainable farming

Source: MVDC, 2014

As farmers indicated during the FGDs and leaders during the interviews, since its establishment in 1985, the MIS has received several NGOs and other private organisations which have been coming to provide various services to the farmers. Despite the good job done by these actors, there is an outcry among the farmers and leaders that some of the NGOs lack continuity in their programmes. This is because sometimes as the farmers said, these organisations suspend the programs while their services are still needed by the people.

4.2.4.2 Kiroka Irrigation Scheme (KIS)

(i) Scheme Leadership and its Roles

As interviews with the scheme chairperson revealed, the overall responsibility in management of the scheme is vested in the hands of farmers group known as *Umoja wa Umwagiliaji Kiroka* (UWAUKI). As a way to enhance management of the resource and irrigation activities in the scheme, the chairperson said that the UWAUKI group has elected 23 members who form the UWAUKI Board. As it was noted from the interview with UWAUKI chairperson, this Board has the overall leadership and management responsibilities in the scheme. Of the twenty three (23) board members, four (4) are from the executive committee, ten (10) from three sub-committees and nine (9) representatives from Blocks A, B, and C. The four (4) members of the executive committee include a chairperson, secretary, treasurer and one member. The sub-committees include: (i) Infrastructure Committee consisting of three (3) members including a chairperson, secretary and one member, (ii) Construction Committee consisting of four (4) members who include a chairperson, secretary, treasurer and one member, and (iii) Planning and Finance committee consisting of three (3) members who include a chairperson, secretary and one member. In addition to the above committee members the UWAUKI Board consists of nine other (9) members, three from each block and who represent the interests of the irrigators from their blocks to the UWAUKI Board.

Although all committees above have crucial role in water policy implementation, the primary management responsibility rests with the Executive Committee as per the response a secretary of the UWAUKI group provided during the interviews:

As you know, our group does not have a written constitution. All matters pertaining to scheme management and water allocation are resolved basing on meeting resolutions. It is a responsibility of the Executive Committee (UWAUKI Board) to make sure that the meeting resolutions are well kept. Apart from keeping the meeting resolutions, the Executive Committee oversees the whole welfare of the scheme and solves different issues related to water sharing including conflicts and setting prices for

the external customers. Generally, this committee is a pillar up on which our scheme development is organised.

Despite having such a central role, the leaders in the Executive Committee face different challenges which affect their performance. These leaders, the interviews revealed, have low level of education and poor interpersonal relationships, worse enough they have fragmented views about scheme management as commented by the ward councillor in the interview:

The big problem in UWAUKI is leadership. The leaders lack knowledge and skills to manage the members and other scheme affairs. And this is not accidental; the highest level of education most of them have is STD VII. We real need to empower them through seminars and workshops. Unfortunately since this group was formed in 2004 no training has been conducted to impart the leadership skills to the leaders

Such appealing words from the Kiroka Ward Councillor provide a picture of how the leaders in KIS conduct their tasks under difficult environment. Saying that the leaders lack education does not mean that they are completely unknowledgeable. Knowledge, as critical institutional scholars such as Cleaver (2001) have insisted, emanates also from lived experiences of the people. It is true that the leaders in KIS have wisdom and possess experiential knowledge on different life courses. Such leaders however, need to adapt and enhance their capacity to process different types of knowledge for various purposes. With the existing multiplicity of institutions regulating water resource and the scheme in general, the challenge is how to establish leadership that will accommodate diverse interests and values. It is in this light that the Kiroka Ward Councillor emphasised the provision of continuous education for the leaders in KIS. While the appeal for continuous education is logical, the government in WRB and MDC do not have effective strategies for meeting such a need for the scheme leaders. The efforts by the government exerted in modernisation of the scheme and farmers' organisation overlooked the need for continuous knowledge acquisition for the leaders.

Generally, the leadership situation in KIS provides a proof for existence of a mismatch between the formal rules on water resource management and conditions in the local areas. While the national water policy emphasizes establishment of training, education and sensitisation systems to enhance implementation of the policy goals, no efforts are found in local areas to make them enforceable. It is due to this tendency that the claims for rationality emphasised in the policies and laws have been disputed in critical institutionalism (Cleaver, 2001).

(ii) Irrigators

As interviews with the scheme chairperson and secretary indicated, the irrigators in KIS form part of the participants having direct roles in water policy implementation. These leaders revealed that the irrigators in KIS have been organised in the formal Water Users Group (WUG) known as *Umoja wa Umwagiliaji Kiroka* (UWAUKI). This group has been mandated to manage all activities related to production and provision of the water resource in the scheme. Apart from the UWAUKI members, the interviews with the above leaders indicated that several other villagers have been engaging in irrigation in such areas. Most of the non-UWAUKI members however, engage into vegetable cultivation for business purposes.

Like all economic water users in the country, the farmers in the KIS and the surrounding areas are obliged to pay the fees after acquisition of the permit from the government. Since the scheme was established in 2004, the UWAUKI members have not paid any fees despite having the formal users' permit due to possession of an idle permit caused by delays in construction of the scheme. In addition various irrigators around the KIS also use water for irrigation without permit and paying the fees to WRBWO. As the chairperson indicated during the interviews, these irrigators still believe that water is a gift from God and therefore no one should sell it:

Currently our group face several challenges but one of them is how to end the mentality among the villagers that water should be accessed freely because it is a gift from God. It is due to such outdated views that

enforcement of the water policy has become a big challenge in our scheme.

Basing on the experiences from the members and non-member irrigators it is logical to say that farmers do not play their role effectively in the implementation of the policy instruments on water allocation as stipulated in NAWAPO (2002) and other related national policies. Another area in which the farmers' role is crucial is in management of the O&M activities. The study has found effective system for management of such activities in the scheme. According to scheme chairperson, the UWAUKI group accomplish the O&M activities through informal arrangement known as *Msalagambo*. Through this system, the farmers collectively provide labour for maintenance or cleaning of the main and secondary canals and the whole scheme environment. In addition, as the scheme chairperson continued to provide through *Msalagambo* arrangement the farmers also organise physical patrol inside the scheme environment so as to identify the pipes illegally connected for the purpose of stealing water from the scheme. Apart from providing labour, the farmers also contribute finances or goods such as crops to enhance management of the water resource and the scheme in general.

When the roles of farmers in water resource activities are examined, difference can be observed between the members and non-members. Through the FGDs with the farmers and interviews with the scheme leaders the study found that the members of the scheme are more willing to contribute to provision and production of the resource than the non-members. The interviews and FGDs revealed that variation in commitments towards the scheme and water resource management affairs has existed due to differences in the benefits that these two groups get from the scheme. The study has found that due to their position as owners of the scheme, the UWAUKI members assume that they have more rights to benefit from the scheme than the non-member irrigators. The UWAUKI members assume that they have rights to access, withdraw, manage, exclude others and sell the water rights to others the claim which is contested by the other villagers as remarks from the scheme secretary indicate:

Some people around the villages complain that UWAUKI has confiscated all rights in the scheme. But they do not know that the law has granted us all such rights. We have told them several times that they have to contribute to the existence of this scheme through joining our group if they want to enjoy the benefits.

Generally, distribution of the farmers' rights in the KIS reflects the argument by Schlager and Ostrom (1992) that the resource use rights are not homogenous across all users. Depending on the existing rules, some may have access rights only some access with exploitation yet others according to these scholars may have rights to access, withdraw, manage, exclude and alienate the resource. Apart from structures of the water use rights, the farmers' differences emanate from the physical and bio-physical environment in which they abstract the resource. The FGDs and interviews indicated that members seem to be privileged in terms of such aspects than the non-members.

Differences in farmers' commitments towards scheme management have also been found among the UWAUKI members. Due to unequal access to improved irrigation facilities the farmers in this group have been divided (*See chapter seven*). Those who access water through the lined main canal show high commitment than those using the earthen canal. Generally the experience in KIS confirms the argument that actors are influenced by expected benefits in their choices towards the policy strategies (Polski and Ostrom, 1999). In the literature, the rational choice and institutional theories provide debatable explanations on what motivate the actors to act. To the rational choice thinkers, motivation to act is a result of the expectations about certain tangible incentives while to institutional scholars the social-cultural and psychological needs are most appealing (Scott, 1995, March and Olson, 1995). In this case however, the economic gains from agriculture as mediated by the existing physical and bio-physical conditions seem to influence the farmers' decisions towards the policy and legal directives on management of the water resource and the scheme in general.

(iii) External Actors

Apart from UWAUKI leadership and irrigators, the KIs revealed that the external actors have influence on management of water allocation processes. These include the Morogoro District Council (MDC), Ward and village government leaders, Private Sectors, NGOs, and CBOs. Currently, there is close communication between the scheme and the MDC. This communication exists because MDC is the main supervisor of all activities related to farming and infrastructure development in the scheme. This office provides technical expertise in the construction and rehabilitation of the scheme and sometimes advises the group on various policy and legal issues and helps it in the resolution of the various users' conflicts.

Apart from the MDC, there is also close relationships between the scheme and the Ward leadership. The interviews with the scheme chairperson and secretary revealed that the Councillor for Kiroka Ward plays important role in advising the scheme leaders on various issues related to national policies, law and management of conflicts. Generally, according to the scheme leaders, the Councillor has played a great role as a caretaker of the scheme. Apart from the Councillor, the village government leaders (especially the Village Chairpersons) for Kiroka and Kiziwa villages are also important advisors and caretakers of the scheme. Findings have shown that, the village governments and councillors play active roles during resolution of conflicts.

As insisted by the government the private sectors, NGOs, CBOs and FBOs are also important actors in management of the water resource and development of small scale irrigation scheme (URT, 2002b; 2010). Through interviews with the scheme, village government and ward leaders, the study has found active involvement of five actors from the NGO and private sectors (*See Table 4.4*). These organisations have been helping the farmers in different development projects related to irrigation farming as indicated by the Councillor for Kiroka Ward during the interview:

The NGOs and other private and government organisations play crucial role in helping the farmers in Kiroka and Kiziwa villages to improve their agricultural activities. Through such actors the farmers have received skills and knowledge on various agricultural issues as well as the market and financial services.

Table 4.4 Organisations and their services to the Farmers in KIS

Organisation Name	Type of Support to the Farmers
Rural Urban Development Initiative (RUDI)	Increasing productivity through modern farming methods
FAO	Increasing productivity through modern farming methods
SUA+FAO	Modern farming methods (SRI), Environmental conservation
NMB Foundation	Marketing
SAT	Environmental conservation, improving productivity

Source: MDC 2014

While the role of these external actors is hailed by the Councillor, utilisation of the services they provide is still low among the farmers. The study has found that in most cases it is the local elites and scheme leaders who benefit from the market and financial services provided by the NGOs and private organisations. For example, due to poor infrastructures and low income most of the farmers have failed to produce to the levels and standards needed in the markets. The study has found that it is only few farmers, mostly the elites who have managed to utilise the market opportunities provided in the village as one of the UWAUKI member explained during the FGDs:

We have been sensitized to produce high quality rice so that we can easily get market. Such opportunities however, are for those whose productivity and qualities of products are high”. Most of us produce low quality and quantity of rice just to meet the food requirements at home.

In addition to that, ‘elite capture’ as referred to by Wong (2010) has redirected the benefits from the agricultural financial services away from the poor farmers towards the few individuals, mostly elites whose social and economic positions are higher. During

the FGDs, most of the members and non-member irrigators said that the financial services do not reach their hands as indicated by one of them: *“It is difficult for us, the poor farmers, to get the loans. We normally hear about the loans but most of us do not know who gets them and how”*.

Moreover, the study findings indicate existence of poor linkages among the private organisations and NGOS working with framers in KIS. As village and scheme leaders indicated during the interviews, the organisations work with farmers in isolation of each other, thus leading to duplication of efforts. In addition these organisations reach the farmers through the MDC therefore they have no strong links with the farmers or local government leaders. As contended in Lipsky (1980), the bureaucrats do not always strive to fulfil interests of the policy. Their quest to meet their individualistic interests sometimes affects their role as brokers who link the farmers with the service organisations in the area. Bearing such image of the bureaucrats, there are doubts on readiness and capacity of the bureaucrats in MDC to serve the farmers as policy expects.

Other important external actors in small scale irrigation schemes are the Basin Water Offices (BWOs). Although the government emphasizes on the presence of close communication between the BWOs and the water users in local communities, the study has found weak communication between the UWAUKI group and the Wami-Ruvu Basin Water Office (WRWBO) due to absence of a WUA in the area where the scheme is located. Apart from the above formal actors there are actors from the informal systems. The most influential actors from these systems are the Chief and his Elders’ Council known as *Wazee wa Milunga*. The chief and his council play important role in water conservation and general environmental management activities. These have been shaping the villagers’ behaviour through infusion of positive values towards water utilisation. Due to their supernatural powers (as defined by the villagers) the study finds the Chief and his elders’ council (*Wazee wa Milunga*) as key players in the mobilisation of the people towards the modern irrigation farming and water conservation rules

articulated by the government. However, interviews have revealed that neither the Chief nor his council are currently involved in management of the KIS.

In the thinking of the rational choice observer, the traditional leaders have no place because they do not add anything in the expertise needed to implement the project. But for the villagers in areas surrounding the KIS, such leaders are central to their physical and spiritual healing. Within the critical institutional theory the traditional leaders and institutions guiding them seem to have a central role in management of the scheme. The traditional leaders play role in resource management through injection of values which may impact implementation of decisions. The values from traditional leaders are easily injected because people feel morally obliged to obey such leaders or even imitate them in various life courses. Basing on the view by Scott (1995) that institutions evolve when people imitate others who are perceived to be conventional and role models in the communities, exclusion of the Chief and his Elders Council partly accounts for the existing opposition towards the modern irrigation initiatives in villages surrounding the KIS as pointed out earlier.

4.2.5 Power Relations in Actors' Interactions

One of the aspects common to actors' interactions is asymmetrical power relations. According to Lindbolm (1980) and Polski and Ostrom (1999), positions of actors in different power cliques is determined by their resource endowments. When actors at different levels are examined, differences in resource endowments are observable; these contribute to existence of asymmetrical power relations. At the national level, differences have been noted between donors and the ministry responsible for water and others having stake in this resource. It was found that a big share of the financial resources for water policy implementation comes from the donors' community (*see the provision in Table 4.1*). As a result, in most cases, the ministries have been compelled to endorse decisions reflecting donors' interests instead of beneficiaries of projects, although both the donors and government have normally claimed that the projects are

demand oriented. This goes against the principle of evidence based engagements in public policies advocated in the literature (Court *et al.*, 2006). But the government's fulfilment of the donors' interests focuses on maintaining good relations. Maintaining good relations with the donors is crucial because poor relations sometimes lead to withdrawal of funds by the Development Partners (DPs) as it has been indicated in the Water Sector Status Report (URT, 2011). Whenever this happens, the government has no choice but to abandon the projects or implement them below the prescribed standards.

Asymmetrical power relations have also been found in implementation of the water development projects at the basin level. Due to lack of adequate financial resources, the Wami-Ruvu Basin Water Office (WRBWO) has no capacity to initiate and implement different water projects. As a result, most of the projects are initiated and funded by the donors. According to basin water officer, the power of the basin authority and water users to influence the decisions in such projects is very limited.

Asymmetrical power relations have also been noted at the scheme level. Due to having the rights to own the scheme infrastructures and control financial resources, the members possess more power in decision making processes than the non-member irrigators. Such powers have enabled the scheme members to direct the water allocation processes according to their interests. Generally, the study findings have indicated existence of asymmetrical power relations in water allocation arenas similar to what has been argued in the literature (Kramm and Wirkus, 2010; Mbeyale, 2009).

In designing of the formal structures, the NAWAPO has based mostly on western rationality traditions without attention to the power structures existing in the local areas. In western traditions governance principles such as equity, participation and others of the like conform to social and cultural structures in which people are embedded. Such principles hardly work in developing countries where power asymmetries are common.

The critical intuitionism acknowledges the effects of asymmetrical power relations existing in developing countries; however, the theory is silent on how such structures evolve in water allocation arenas. In this study, power asymmetries are considered to be the products of the material, physical and bio-physical conditions in which the water resource is allocated (*detailed in chapter six*). Generally, the study has found that, asymmetrical power relations have partly affected the actors' roles and interactions in implementation of the water policy instruments at different levels.

4.3 Concluding Remarks

Findings from the study, with respect to this chapter indicate existence of multiple actors with different values, norms and beliefs on how water resource should be accessed and utilised. Instead of acting under government goals, strategies and principles, the study found that actors had fragmented interests. As a result of being fragmented, actors failed to develop common rules and mechanisms for managing access and utilisation of the water resource in the country. Apart from lacking common interests, actors in water policy implementation lacked capacity due to resource constraints and had unequal decision making powers stemming from differences in their resource endowments. Generally, the study found that due to their characteristics actors were not in a position to always act technically and in a unified manner as it is insisted in the rational choice theory.

CHAPTER FIVE

WATER ALLOCATION PROCESSES AND INSTITUTIONS IN THE SELECTED SCHEMES

5.1 An Overview

Improvement of water allocation processes is one of the policy goals in NAWAPO and WRMA. Among other things, the policy and legal reforms in Tanzania's water sector aimed to enhance water allocation processes through technological improvements and codification of rules. In view of NAWAPO and WRMA, small scale irrigation schemes are rational and technical organisations that must operate in accordance with minimum governance principles. In reality, however, water allocation is a process also influenced by the social, cultural and political factors existing in the communities. This chapter aims to assess the water allocation processes in the selected small scale irrigation schemes to understand how they conform to the rational rules and mechanisms as emphasised in the NAWAPO and WRMA.

5.2 Mkindo Irrigation Scheme (MIS)

Mkindo is one of the improved small scale irrigation schemes in Tanzania. Being a registered scheme, Mkindo like other schemes of similar nature in the country, is required to abide by the rules stipulated in the national legal and policy frameworks on water resource management. During KIs interviews and FGDs it was learned that since its establishment in 1985, the scheme has passed through various transformations which in one way or another have shaped its capacity in enforcement of the policy and legal instruments managing water allocation processes. Before understanding how the scheme has been enforcing the policy instruments on water allocation, it is crucial to understand the nature and evolution of institutions managing water resource in this scheme.

5.2.1 Brief Description of the Water Allocation Institutions in MIS

As it has been indicated in the literature, institutions acquire their characteristics partly from historical trends (Scott, 1995; Abrams, 1982). The same case applies to water allocation institutions in MIS. Interviews with the scheme and village government leaders as well as the traditional elder in Mkindo village indicated that before introduction of the colonial government the local people in areas surrounding MIS had their own governance system operating under the traditional leaders who were known as *Mfumwa*. It is important to note that during the *Mfumwa* system, no formal water right systems existed. Although no particular property right systems were used to control access and utilisation of the water resource, the behaviours of the people towards water were not left unregulated. The water resource had both livelihood and symbolic values. Therefore in using it the villagers were guided by traditional norms under the *Mfumwa* system. As the traditional elder indicated during interviews, among the community norms prohibited selling water or denying access to water to fellow human beings and fighting over water.

As it was provided by the scheme, village government leaders and the traditional elder during the interviews, the traditional norms under *Mfumwa* developed mostly out of the beliefs on the supernatural powers of the gods and ancestors. Due to these beliefs, compliance with such norms including those related to access and usage of water was high in the community. The voluntary compliance existed in traditional leadership systems managed to create harmony and efficient use of the resource in Tanzania as authors such as Mbeyale (2009), Katani (2010) and Cleaver (2002), among others, have indicated. This is due to the fact that such leadership focused mostly on relational interactions rather than material gains in management of the resources. As a result of relational norms, members of the community managed to develop collective ways of addressing disagreements and other issues related to utilisation and management of the natural resources.

The automatic compliance enjoyed by the traditional leaders halted when the government reinforced the formal structures through abolition of the chieftaincies in 1960s. In areas like Kilimanjaro traditional societies had property right systems developed out of ownership to irrigation infrastructures such as furrows (Komakech *et al.*, 2010). According to the scheme and village government leaders' absence of such structures in Mkindo village, decline in traditional leadership and weaknesses in the post-colonial administrative systems, prevented development of systematic property rights and most importantly paved the way for development of open access to water resources in the area.

As interviews with the scheme and village government leaders indicated, development of property right rules started in 1985 when the Mkindo Irrigation Scheme (MIS) was established by the government and farmers group, Mkindo Farmers Irrigation Scheme (MFIS) was formed. The early institutions in this scheme were mostly top-down and non-participatory in nature because they were initiated and controlled from the central government authorities. The top-down and non-participatory rules reflected the nature of the government programs such as National Village Irrigation Development Program (NVIDP) and National Irrigation Development Program (NIDP), which controlled irrigation farming and national water law, (the Water Utilisation (Control and Regulation) Act No 42 of 1974) which principally did not provide a room for intensive participatory systems to develop. The changes away from the top-down institutions took place after adoption of NAWAPO in 2002 and WRMA in 2009. These emphasized participation of various stakeholders, including water users, in management of the water resources in the country.

At the same time, the farmers' group (MFIS) experienced rapid expansion due to growing number of members happened as a result of growing awareness and interests towards irrigated farming. Outside the MFIS group irrigation activities through traditional irrigation schemes were also growing. While the MFIS members were regulated through NAWAPO and other government programs, the out of scheme

irrigators operated through traditional mechanisms somehow similar to those found in pre and post colonial *Mfumwa* systems.

In addition, the interviews with the leaders indicated that the areas surrounding the scheme experienced influx of the *Maasai* pastoralists who migrated to the area for the search of water and pasture. The *Maasais* came with institutional orientations different from those understood by the government, donors and the farmers. At the same time the Wami-Ruvu Basin Water Office (WRBWO) was established to oversee management of the water resource in its jurisdiction area which include also the community surrounding the MIS. Moreover, the scheme experienced increased role of NGOs such as MVIWATA and NAFKA and private sectors in management of agricultural activities. All stakeholders came with the new institutional orders that have affected management of the water resource in the scheme.

Table 5.1: Institutional developments in MIS

Period	Overall Governance systems	Resource Governance Approaches	Water allocation institutions
Pre-colonial Before 1920s	<i>Mfumwa</i>	Traditional	<i>Mfumwa</i> Rules, traditionally regulated access
Colonial 1920s-1961	Mixed-(colonial rule+ <i>Mfumwa</i>)	Centralisation decentralisation <i>Mfumwa</i>	<i>Mfumwa</i> Rules, traditionally regulated access
Post colonial 1961-1964	Post colonial government <i>Mfumwa</i> system	Centralisation	<i>Mfumwa</i> Rules, open access
Post Colonial 1980s-1990s	Post independence government	Centralisation	Multiple: <i>Mfumwa</i> Rules and Formal water property rights, Sectoral rules, licensed access
Post-independence 1990s to date	Post independence government	Centralisation Decentralisation	Multiple: Formal water property rights, Sectoral rules, NGOs and Private sectors rules, MFIS rules, Traditional beliefs, norms and values from <i>Mfumwa</i> , traditional norms from <i>Maasai</i> pastoralists, licensed access

Source: Constructed from Interviews with the MIS and village government leaders

Generally, the institutional developments as indicated in Table 5.1 are marked by formalisation efforts. Although the formal policy instruments such as permits and tariffs existed since Tanzania (the then Tanganyika) got its independence in 1961, it is in post independence period that active operations to implement them started to take shape. In addition, it is in this period when the influence from the NGOs and private organisations has been strong and interactions between the farmers and pastoralists in the surrounding communities started to grow. Generally, it is in this period that the challenges of institutional multiplicity became strongly evident in MIS and the surrounding villages. To cope up with the new institutional developments and the internal management challenges, the MFIS group adopted a written constitution in September, 2004 and a calendar system in control of water distribution to the farmers.

5.2.1.1 Scheme Constitution

As a move to enhance management of the water resources in their scheme, the farmers in MFIS have established a written constitution in which various functions of the leaders, rules governing water allocations and penalties for the shirkers have been clearly articulated. Such rules and penalties (*See Table 5.2*) guide the leaders in various committees in their decisions on various issues including the decisions on how water should be distributed among the members. This constitution and rules were approved during the general meeting which was held on 15th September, 2004.

The MFIS constitution and rules are crucial for supplementing the government guidelines on construction and rehabilitation of the scheme as well as management of the water resource. Ideally the MFIS constitution and associated rules and regulations must be rational reflecting standards prescribed in Ostrom's principles and the national legal and policy frameworks (URT, 2002a; Ostrom, 1990).

Table 5.2: Rules and penalties in MFIS

Type of Rule	Penalties for the Defectors
Adherence to the farming calendar is compulsory	Fine amounting to 30,000/=
	Facing court charges
	Will be summoned to uproot the crops
Cleaning of the irrigation canals on the proper time is compulsory	Fine amounting to 5,000/=
	Will be summoned to clean the canal
Water bills must be paid in time	Will pay the bills and fine amounting to 4,000/=
	May face the court charges
Participation in all scheme activities is compulsory	Fine not more than 10,000/=
	Fine amounting to 3,000/= for those who fail to attend in meetings
Sowing of unapproved seeds is prohibited	Fine not more than 20,000/=
	Will be summoned to uproot the crops
Adherence to irrigation time table is compulsory	Fine amounting to 3,000/= for those who violate the timetable
No one is allowed to break the main canal without instructions	Fine not more than 20,000/=
	Will be summoned to construct the canal
No one is allowed to water the livestock from the scheme	Fine not less than 30,000/=
	Will be summoned to construct or maintain the broken or damaged areas
It is prohibited to leave the plot uncultivated	Confiscation of the plot by the group
Rules related to other offenses not mentioned in the constitution	Fine not more than 10,000/=

Source: MFIS Constitution, 2004

However, due to the prevailing circumstances, in most cases the constitutional rules in MFIS have been blended with the informal systems. For example instead of paying the fines the people committing offenses have been assigned with some communal works such as cleaning of the scheme premises. The informal practices are also used by the non-member irrigators. Instead of the fresh flows, during the FGDs it was learned that these irrigators use the return flows from the scheme. In such abstractions, informally governed rotation systems are insisted by the farmers because the water supplies are not as abundant as in the regular allocations. Some non-member irrigators have signed an agreement with the MFIS group which allow them to buy fresh water from the scheme. In getting the rights to use water, these follow the procedures stipulated in MFIS rules. However, when it comes to distribution of water from the main canal to the farms, the non-member irrigators using water from the scheme just like others use informal

procedures. Generally, the KIs interviews and FGDs in MIS have indicated existence of some flexibility in the manner that rules are utilised in water allocation decisions.

5.2.1.2 The Scheme Calendar

As explained by the scheme chairman and secretary during the interviews, the scheme calendar is an instrument used by the farmers in MFIS to guide farming, water distribution and O&M activities. Apart from irrigation, farming and O&M activities, the calendar indicates a time table for the scheme meetings which sit to discuss the calendar, cleanliness of the canals and farming activities. Two types of calendars, the one for dry (*kiongazi*) and the other one for wet (*masika*) seasons have been used to guide water allocations and O&M activities in the group. Unlike the other small scale irrigation schemes in the country where water scarcity has been a major challenge (Van Koppen *et al.*, 2004; Komakech *et al.*, 2011); presence of too much water is an impediment to farmers productivity in MIS. This being the case the use of calendar is strongly emphasized to prevent destructions caused by water lodges in the farms.

Interviews with the scheme leaders indicated that, water distribution time table in the calendar differs depending on the farming season. During the dry season the calendar is fixed and strict. During the wet season, little irrigation is exercised therefore; the calendar deals mostly with the O&M activities. Due to flooding, participation in the O&M activities in the wet seasons becomes frequent and ad hoc as a result it is difficult to have a fixed calendar during the wet season. This being the case, the members are required to respond to the calls whenever such activities arise, failure of which can affect their right to access water during the dry season.

Although the use of the scheme calendar has been induced by the government experts, the scheme chairman and secretary said that the farmers have collectively accepted and followed it because it is of great help for their productivity. Despite being written and fixed, the calendar in MIS has been used flexibly whenever the need arises. As the

scheme chairman and secretary indicated during the in-depth interviews, flexibility in the use of a calendar is needed in order to allow those whose plots are easily lodged with water to cultivate and sow seeds ahead of others to avoid crop destructions.

Basing on the evidence from MIS, rules are not always strictly followed as assumed in rational choice institutionalism. In addition, rules are not only rational and fixed but sometimes flexible structures changing depending on the prevailing social, economical or political circumstances (Meinzen-Dick and Nkonya, 2007). Moreover, the experiences from MIS show that small scale irrigation schemes in Tanzania are open to regulations by multiple rules from both the formal and informal systems. Such findings contravene the belief in the rational choice perspective that water resource should be managed through the IWRM principles (URT, 2002a; 2009).

5.2.2 Water Allocation Processes in MIS

Basing on the IAD framework, the first step in analysing the policy is to isolate the policy issue or program whose outcomes need to be examined (Polski and Ostrom (1999). The analysis process is guided by questions that among other things, seek to explore events happening in the policy arena. In this study the central policy issue which the study aimed to explore is water allocation in small scale irrigation schemes.

In Tanzania water allocation processes in small scale irrigation schemes are mostly managed through the public mechanism but within the Decentralisation by Devolution (D by D) framework. Being a registered water user, MIS abstracts water through public mechanisms which, due to focus on D by D approaches, have been blended with the communal allocation arrangements. Under such mechanisms, allocations of the water resource in small scale irrigation schemes are managed by the users themselves. However, the users must first acquire a water use permit from the Basin Water Office (BWO) operating within the area (Section 43 (1) WRMA). The water use permit authorises a person to access and use water and stipulate the associated obligations and

privileges (Meinzen-Dick and Nkonya, 2007). To be able to get the water use permit, the farmers in small scale irrigation schemes in Tanzania are encouraged to organise in the registered Water Users Groups (WUGs) which are then delegated with the authority to manage and distribute water amongst the users.

Interviews with the scheme chairman and secretary revealed that there are two types of the formal WUGs in MIS. The first group is known as Mkindo Farmer Irrigation Scheme (MFIS) comprising of the farmers having membership to the scheme. The second group is called *Umoja wa Umwagiliaji Mgongola* (UUMGO) comprising of the farmers most of whom do not have membership to the scheme. The MFIS group has a formal water use permit from the government and has been authorised to own and manage the scheme in addition to the rights to access and withdraw water. In addition, this group pays the annual water use fees to the WRBWO as stipulate in WRMA. In the other hand the UUMGO group does not have the water use permit and is considered as an external customer who buys water from the scheme. The UUMGO group therefore fulfils its obligations to pay the annual water use fees through the MFIS group. While some members from UUMGO have agreed to pay the fees and get water from the scheme, others have rejected that idea and decided to use the water from return flows because such water is not charged. Generally, despite the emphasis in WRMA that all abstractions made for economic purposes must be charged, free abstractions are still found in MIS.

According to the scheme chairman, to enhance management of the water resource and the scheme in general, the scheme has formed three major committees namely the executive, farm and planning and finance Committees, comprising of the members from MFIS group, formed under the supervision of the government experts in MVDC. The UUMGO group is not represented in the scheme committees therefore has limited chance to influence decision making processes. The farm committee has the responsibility to make sure that water is distributed to only those who pay the fees,

participate in O&M activities locally known as *Kiwili* and adhere to modern farming methods. The farm committee control water distribution through opening and closing of the intake facility basing on the timetable articulated in the seasonal calendar and rules stipulated in the constitution. After an intake facility is opened water is distributed to all farms whose owners have fulfilled the laws for the period that has been indicated in the calendar. At the end of the prescribed irrigation periods, the farm committee closes the intake and once closed no one else will be allowed to open it until the next distribution period comes. Due to availability of abundant supplies of water all year long, the scheme leaders said that the rotational irrigation or *zamu* (Sokile *et al.*, 2005) is not insisted in MFIS although the group has adopted it as water distribution system. Once the intake has been opened all farmers in the group receive water according to their needs which are normally defined by the size of the farms. Despite existence of some informal practices water allocation processes in Mkindo Farmer Irrigation Scheme (MFIS) are largely systematic and formalised basing on the national policies and local rules stipulated in MFIS constitution and the scheme calendar.

While systematic and orderly distribution of water exists in MFIS, the same does not exist in UUMGO. Interviews with the chairman of this group indicated that, despite having a formal constitution, the members conduct the water allocation activities traditionally and chaotically. While in other areas traditional allocation systems are well organised (Komakech *et al.*, 2010; 2012), in this group no particular system has been established as farmers indicated during the FGDs: *“In our group there is no particular rule or system for water distribution, access to water depends on one’s efforts”*.

Due to absence of systematic distribution of water, each farmer irrigates at his or her own convenience which in most cases does not match with the scheme calendar. As a result of calendar violation, most of the farmers in UUMGO are affected either by excessive water or lack of flows. During the dry season, competition is very high among

the farmers in this group and survival for the fittest seems to be the dominant rule of engagement.

Apart from the farmers water resource in MIS is also used by the Maasai pastoralists. As it has been pointed out earlier in chapter four the pastoralists have rejected the call to join Mkindo WUA and pay annual water use fees. Apart from joining the Mkindo WUA and paying the fees, the new rule impliedly requires the pastoralists to change their livestock keeping cultures, by stopping nomadic system and reducing the number of cattle. Interviews with the Kambala village also indicated that the pastoralists also oppose this rule. Generally, the KIs have revealed opposition towards the water policy instruments among the pastoralists in communities surrounding the MIS due to factors that will be discussed later in this report.

5.2.3 Conformance to Rational Choice Values in MIS

As it has been pointed out in the introductory section in this chapter, small scale irrigation schemes are viewed by the government as rational technical systems. This being the case, they have been designed to reflect the rationality principles in various policy activities including water allocation. There are different aspects showing conformity to rational choice perspectives in water allocation processes in MIS. These include emphasis on formal water use groups and association, emphasis on formal rules and penalties codified in the scheme constitution and calendar, adoption of modern farming methods such as SRI and species such as *Salo* species and organisation of the scheme leadership through the formal committees. As interviews with the scheme and village government leaders and government officials in MVDC and WRBWO have indicated, codification of rules and formalisation of leadership aimed to enhance efficiency, equity and participation of the farmers in decision making (Polski and Ostrom, 1999; Ostrom, 1990). While the emphasis in rational choice perspective is on these universal principles, their implementation seems to face obstacles in MIS as the details provided in the next section indicate.

5.2.3.1 Adherence to Water Allocation Principles in MIS

(i) Efficiency

In Tanzania, emphasis on efficient use of water is provided in Section 96 (2) (b) of the WRMA. As far as the government is concerned, efficiency in water allocation can be enhanced through institutional measures, such as establishment of pricing schemes reflecting the costs, establishment of water use schemes which favour crops with high economic returns and establishment of effective sanctioning mechanisms for regulating water users behaviours. Apart from that, efficiency can be enhanced through improvement of technological facilities such as flow metres, hydrometric networks and compliance structures in irrigation scheme (URT, 2002a). In addition, efficiency is said to exist if the marginal social cost are equal to marginal social benefits and loss of water during transportation and at the point of use is controlled (UN, 2000; Polski and Ostrom, 1999; FAO, 1995).

In the first place, the focus on efficiency in Tanzania is observed in the decisions to adopt rice as one of the top priority crops in irrigation development. Such decision has led to reactions which are both beneficial and detrimental to MIS. Expansion in rice production has exposed the scheme and the surrounding areas to social unrests such as conflicts with the pastoralists and among the farmers themselves over access and utilisation of the water. The interviews with the chairmen for Kambala and Mkindo villages and FGDs with the farmers revealed that, the farmers and pastoralists have been clashing partly due to differences in cultural values associated with access and utilisation of the water resource. Although promotion of irrigated rice farming is important for enhancing economic efficiency of water, this decision was adopted without considering multiplicity of the community values towards water. While for the farmers, government and donors, promotion of irrigated rice farming is an important economic strategy, for the pastoralists livestock keeping comes ahead of all other livelihood strategies. Unfortunately, the strategies for enhancing the pastoralists' livelihoods were not

included in the measures to enhance efficiency in water allocation and productivity for the farmers. Generally, failure to reconcile competing cultural values and economic needs between the farmers and pastoralists has prevented realisation of social efficiency in water policy implementation in MIS.

Introduction of the pricing schemes for water allocation is also important for improvement of efficiency in water allocation (Ford *et al.*, 2001). While the use of pricing mechanisms is insisted in the NAWAPO and WRMA, some water uses in the MIS are not billed as the chairman of Mkindo WUA described during the interviews: *“Despite introduction of the water use fees, some people have continued to use water free of charge. These still believe that water is not a commodity but a gift from God”*.

Moreover, the use of graduated sanctions in MIS is not as insisted in the literature (Ostrom, 1990) and national water law (URT, 2009). There is ample evidence in MIS showing that sanctions are not used as stipulated in the law in this scheme. For example, as the scheme chairman and secretary contended during the interviews, there are several small scale irrigators in Mkindo watershed who do not pay annual water fees. Worse still, most of these irrigators are scattered in wide areas and not organised in formal groups designed by the policy for farmers’ representation. Bearing in mind the poor road infrastructures in most rural areas in Tanzania, it is difficult for the government officials; village and scheme leaders to monitor what the small scale irrigators do in different areas. As a result, most of these irrigators have not been punished despite knowledge by the government officials and leaders in the villages that they violate the law.

Another incidence showing violation of efficiency principle is allocation of water to non-permit holders. According to the scheme chairman and secretary, the decision to engage into water trade with the non-permit holders has been taken to help them get adequate allocations. Specifically this decision was undertaken in order to enhance good relations between the members of the scheme and the rest of the villagers who engage in irrigation farming. Despite its good intentions, this decision fuelled more divisions than cooperation between them. Through the interviews with chairman of UUMGO and

FGDs with the farmers the study has found that this decision failed because it focused mainly on making the farmers pay instead of negotiation on how water could be shared between the members and non-members in the scheme. Generally, the decision to sell water was guided by rational choice emphasis that this resource has economic value in its all competing uses (URT, 2002a) instead of the social and cultural relations insisted in critical institutionalism.

Furthermore, the interviews with the scheme and village leaders have revealed low impetus towards monitoring of the water abstractions despite availability of the required technical facilities. Low impetus towards control of water abstractions contravenes the policy goals on promotion of efficiency through imposition of restrictions and prohibitions on water allocation processes. Last but not least, violation of efficiency is also denoted by violation of the modern farming and irrigation rules which insist application of SRI and use of *Salo* species so as to conserve water. Despite the policy emphasis towards water serving farming and irrigation practices the study has revealed continuation of the old habits that impinge conservation of agricultural water resource in the scheme. As it has been claimed in the literature, the situation where the formal governance systems are weak, informal institutions such as habits normally dominate the policy processes (Bandaragoda, 2000). Continuation of the old behaviour in farming and water utilisation is an indication of poor capacity by the government agents to enforce the rules that emphasise efficient allocation of water.

(ii) Equity

Equity is another value emphasized in water policy and law in Tanzania. The emphasis towards equity has been provided in Section 96 (2) (b) of the WRMA. Like efficiency concept of equity is central to rational choice traditions. In such traditions, equity is denoted by various aspects; one of them is fiscal equivalence. By fiscal equivalency it means that the cost paid by the beneficiaries is equivalent to the benefits that they get from the goods or service (Polski and Ostrom, 1999; UN, 2000). Fiscal equivalence or

proportionality means that those who contribute to the service or good must receive the benefits which are proportionate to their contributions.

During the FGDs the farmers were asked to express their feelings on the cost and benefits of paying the water use fees and participating in O&M activities. All members in this scheme who participated in FGDs said that the benefits that they get are not equivalent to the cost that they incur in irrigation farming. The FGDs and in-depth interviews with the scheme chairman and secretary revealed that the members of the scheme are dissatisfied with the quality of the farm roads and secondary canals transporting water from the main canal to the farms:

We are very grateful for the improvements that have been done to the scheme however; the quality of the distribution canals and farm roads is still a big problem. Our leaders tell us that the problem is inadequate financial resource, but I think if the available resources are properly utilized part of the problem could be solved.

The above feelings seem to be shared by all farmers in MIS. The farmers are of the view that the fees that they pay in each farming season could also be used for improvement of the farm infrastructures. This claim however is disputed by the irrigation experts in Mvomero District Council who say that such amount are not enough to meet all those costs. Existence of perception gap between the farmers and the government officials is a sign that transparency is lacking in management of the scheme's financial resources. Without transparency equity will continue to be theoretical than a practical strategy.

Dissatisfaction towards the existing services is also high among the non-member irrigators in UUMGO. These irrigators do not believe that the services that they receive reflect the cost that they incur through seasonal payments of the fees. All irrigators from UUMGO who participated in FGDs were of the feelings that the fees are higher than the amount of water that they receive from the scheme. These farmers also complained about the poor irrigation infrastructures and the farm roads for transporting the harvests

as one of them indicated: *“If possible I would like to ask the leaders in MFIS to reduce the fees that we pay in each season because we do not receive the services according to the payments that we make due to poor infrastructures”*.

In addition to fiscal equivalency, equity principle emphasizes that, the users who commit more resources in terms of time, finances and other social and economic resources must receive higher payoffs than those who contribute less (van Koppen *et al.*, 2007). This principle is perceived appropriate for enhancing collective action in resource management. To some extent this principle is observed in MIS because the member irrigators receive relatively higher payoffs than the non-member irrigators from UUMGO in terms of decision making privileges and share of water from the scheme. Due to their role in construction and management of the scheme, the members of the scheme have been given first priority in water allocation decisions. This principle may sounds appealing to some people but for the UUMGO members it implies unfair discrimination.

Interviews with the chairman revealed that members of UUMGO group are not happy with the favors that their colleagues in MFIS get. For them, water is nobody's property thus no one has the right to have exclusive control over it. But the MFIS members have based their decision from the subsidiarity principle insisted in the national and international laws and policies that water users must own and manage water development projects.

The decision by MFIS is not legitimate within the frameworks of the bureaucratic mechanisms only but also communal. Historically, the local communities in different parts of Africa, Tanzania included, have claimed their legitimacy to water partly through ownership or investment on irrigation infrastructures (Komakech *et al.*, 2012a). The contestations by the UUMGO members provide a lesson that institutions are not immune even if they are widely held by the actors. The fact that institutions have been accepted

by majority of actors in the formal or informal or both systems does not give them a warrant to proceed without critiques. Generally, even if majority support institutions, as insisted in critical institutionalism, adaptation is crucial to make them endure (Meinzen-dick and Nkonya, 2007).

Apart from the farmers, the pastoralists are also of the view that fiscal equivalence is not observed in policy instruments on water allocation. According to their leader (chairman of Kambala village), the pastoralists have failed to understand how paying the water use fees will lead to the improvement of their livelihoods, as noted in his words: *“We do not see how these fees are beneficial to us. The leaders know our needs, instead of helping us they just force us to pay”*.

Reflecting on what the fiscal equivalency principle advocates, it is obvious that the pastoralists will not see logic to pay for water. Although the Maasais resistances towards the policy are normally attributed to cultural values and norms, as it has been pointed out earlier in the previous chapter, some instrumental motives are also behind this.

Another principle for evaluating equity in policy process is distributional equity which emphasizes contribution basing on one's ability to pay. As interviews with the scheme chairman and secretary indicated, some flexibility has been allowed to enable farmers provide contributions other than cash in case they do not have money. In this case the farmers have been allowed to contribute according to their capacity. The decision to allow non-cash contributions indicate adherence to informal cultures in water resource management. Despite formalisation of the scheme management the farmers have not abandoned traditional practices they have used over many years. The study has found that through the existing informal systems the distributional equity principle emphasized in the policy (Polski and Ostrom, 1999) has been observed in MIS. This experience confirms the argument in critical institutional theory that institutions endure when they reflect analogues and styles of thoughts that are already part of the existing systems

(Cleaver, 2001). Although distributional equity is among the rational choice principles imposed from above its enforcement has not been difficult because it conforms to cultural rules of the people.

(iii) Participation

Apart from enforcement of the water use fees and permits, the National Water Policy (NAWAPO) has also focused on promoting participation of the communities and in particular the water users in decision making processes. According to the DADP guidelines, participation of the farmers must start from the point where the decisions to establish or improve the irrigation scheme are adopted (URT, 2010). Therefore, the O&OD model in which the decisions to improve or establish an irrigation scheme follows the bottom up procedures has been insisted (URT, 2010). Establishment of the MIS took place in 1980s the period when irrigation development in villages was managed through the National Village Irrigation Development Project (NVIDP). Unlike the DADP program, the NVIDP was highly centralised program, in which all decisions were undertaken through the central government organs. Generally, this program provided no room for the farmers in villages to participate in decision making processes.

Due to centralised governance system, establishment of modern irrigation scheme and the WUG (MFIS) failed to follow the bottom up procedures insisted currently in the DADP guidelines. Interviews with the scheme chairman revealed that, the top down policy decisions contributed to rejection of the scheme by the villagers in the early years of its establishment. According to this leader, some farmers abandoned their plots simply because they were found within the Mkindo irrigation project area, for the fear that they will participate in irrigation farming and become MFIS members. Following the recent institutional reforms adopted through NAWAPO, NIP and DADP the use of O&OD Model has been insisted in all decision making processes. The study has found that the village government in Mkindo Village and scheme leaders are conversant with the O&OD guidelines and apply them in all major decisions regarding management of

the scheme. According to the scheme chairman, the scheme has been assisted by the experts in Mvomero District Council (MVDC) to apply this model in various scheme management decisions.

While great improvements are found internally, beyond the scheme level participation of the farmers is still poor despite existence of Mkindo WUA. There are different factors contributing to poor participation of the farmers in higher level decisions, one of them being poor representation. According to the Water Officer for WRBWO, the basin has approved only the chairman of the Mkindo WUA to represent the water users in Mkindo in Wami-Ruvu Basin Water Board (WRBWB) meetings. If it happens that this representative is unable to attend the meetings, nobody else is allowed to take his place: *“I am the only one who attends the meetings in WRBWB. Whenever I get a problem, the meetings are conducted without representative of the water users from our area”*.

Moreover, considering his level of education, skills and knowledge it is difficult for this representative to negotiate effectively with the other members of the Board especially those holding high positions. In short the study finds the chairman of Mkindo WUA more of a symbol than a water users' representative in decision making in WRBWB.

Implied in the government intention to formalise the small scale irrigation schemes is the notion that farmers will follow the rules and principles as stipulated in the law due to the fear of penalties and promise of support. In other words the logic of consequences (Scott, 1999) influenced the elites in the decision to establish formal rules in control of the schemes. In such view the elites were of the assumption that the water users always succumb to formal rules and principles, thus making attainment of the policy goals easy. While the national policy and law have such instrumental outlook, the study findings in MIS provide a different picture. Generally, the findings show that the formal allocation rules and principles are not strictly followed in this scheme. In addition, the findings show that water allocation processes in MIS are not guided by the formal and rational

rules and principles only but also the spontaneously evolved informal rules. As pointed out by de Koning (2011), instead of the formal procedures, the resource management and in particular allocation institutions evolve as the actors mediate their institutional worlds through bricolage processes of articulation, alteration and aggregation. The study has found that such processes are at the centre of the water allocation processes in MIS.

5.2.3.2 Articulation Processes in MIS

The key indicator showing articulation process is the accentuation of old cultural values and rejection of the formal institutions by the farmers and pastoralists. As it has been indicated previously in this chapter, the pastoralists have rejected the water use fees, the idea to join Mkindo WUA, stop nomadic livestock keeping style and reduce the number of herds. This decision by the pastoralists was not made out of nothing, but it was contributed by articulation of their culture and the new culture brought by the policy.

After interpretations of their cultural values, the pastoralists seemed to realise that the formal rules on water are contrary to what they understand as a right way of doing things (Cleaver, 2001; de Koning, 2011). This line of argument is indicated in the words of their leader (Chairman of Kambala Village) during interviews: *“Most Maasais think that having a big number of herds is prestigious. This makes it difficult for them to change. But through education this perception can be changed”*.

The statement above shows how the pastoralists in MIS distinguish themselves through their livestock keeping culture. While cultural differences between the pastoralists and farmers are evident, the economic instruments on water resource management were formulated as if they would be used by a homogenous water users group. This assumption can be reflected in the proposal that all water users in Mkindo Water shed must be regulated through the Mkindo WUA, must pay annual fees and abide by the environmental conservation principles. As far as the pastoralists' culture by the Maasai is concerned, these policy decisions are not appropriate because they contravene their quest for livestock wealth. In addition, the decision to ask the pastoralists to pay water

use fees is contradictory, given their nomadic culture. The nomadic culture enables the pastoralists to abstract water from different points which may not be under similar governance authorities. If the law is to be followed, the pastoralists must pay fees in each village they water their animals. As it was indicated by the traditional leader for the Maasai tribe during an interview, pastoralists see such multiple payments unrealistic.

As argued by Cleaver (2001), through articulation processes, the cultural values undergo some interpretations which sometimes cause them to lose their original forms. Loss of original forms takes place as a result of leakage of meanings and cultural borrowings happening as actors articulate institutions both new and existing. Such practices, however, do not exist among the Maasai pastoralists in MIS. The possible explanation normally provided is that the Maasai have rigid cultural stands which prevent interactions with external cultures (Lloyd *et al.*, 2005). This explanation is in line with the argument that collective action is difficult to develop between groups with extreme cultural backgrounds (van Koppen *et al.*, 2007). While strong claim to their culture is a valid factor, there is also a need to consider the quest for economic development among the Maasai. Although in the eyes of policy elites the rule that requires reduction of livestock sizes is appropriate it is difficult for the Maasai to adopt because they do not have alternative options which are economically viable as reflected in the following statement by the Kambala Village Chairperson: *“But it is also important to remember that we keep our livestock in an uncertain environment. To some people the more they have them the more the chance to earn income”*.

Such words from the Kambala Village Chairman show that the pastoralists’ behaviour is also motivated by economic goals. While this is the case, the policy elites, as it has been pointed out earlier, have normally attributed the challenges of enforcing the rules among the pastoralists to cultural affiliations, forgetting their appeal for economic development.

To some extent cultural borrowing has been happening in the farmers’ communities around the MIS. Such practices are indicated by the readiness to copy some pastoral

cultures among the villagers from the farmers' communities around Mkindo. This is evidenced by the tendency by some youths from the farmers' communities to accept working with the Maasais in livestock keeping. Partly this tendency shows that these youths have articulated their culture and that of the Maasais and decided to borrow some elements from the other side. But some economic motives are also evident in their behaviour as indicated by the chairman of Mkindo village during the interviews:

When it comes to co-existence with the pastoralist, we the farmers do not have any objection; that is why we have allowed our children to work with them. After all, they get money when they work there; the problem is the pastoralists' behaviour to destroy our farms.

In most cases the critical institutionalism has emphasised the influence of cultural values in the behaviours of the resource users (Cleaver, 2002; Cleaver and Franks, 2005; Scott, 1995). However, evidence from this study shows that, in contemporary societies there are great possibilities that cultural stands are embedded within economic interests of the actors. Being a central livelihood asset, water is a resource which neither the farmers nor the pastoralists are ready to forgo. The study has found that the pastoralists and farmers in MIS have failed to develop common norms of trust and reciprocity (Ostrom, 2000), not only due to cultural heterogeneities, but also competing economic interests over water. Generally, the water users' behaviours in MIS conform to both the motive to enhance economic gains and maintain social-cultural values. In short the findings show how demarcation of economic and social-cultural values is difficult in explaining the behaviours of the water users in MIS, contrary to what the rational choice and critical institutional views indicate.

5.2.3.3 Alteration Processes

Alteration processes involves rule bending which normally leads to emergence of rules-in-use in place of the rules designed in the policies and laws (de Koning, 2011; Polski and Ostrom, 1999). Assignment of the communal works in MIS instead of the graduated sanctions stipulated in the WRMA is an indication of how the designed rules are bent to

suit the local circumstances. As the chairman of Mkindo village argued during the in-depth interviews, flexibility in imposing penalties has been allowed to enable those who have no capacity to pay fines in cash to pay for their mistakes through other means.

In the perspectives of the rational choice observer, rule breakers need not be entertained, therefore punishments must always be administered to discourage other from doing the same mistakes (Ostrom, 1990). In most cases the punishments which seem to fit with the committed offenses are those which cause economic pain to the person who pays. In African customary water laws however, mistakes are considered as part of humanity therefore deserve some degree of tolerance (Kiflemariam, 2001). In addition, the African water laws prefer flexible than graduated sanctions basing on financial penalties in punishing the mistakes. Generally, the principle of ‘approximated penalties’ (Meinzen-Dick and Nkonya, 2007) is preferred in punishing the offenders in African cultures instead of the formally designed penalties. To a large extent rule bending practices in MIS reflect the African customary systems in water resource management.

Rule bending is also indicated by the act to sell access and withdrawal rights to the non-permit holders without following the procedures stipulated in the WRMA. The study has found that such decision has been driven by the need to maintain good relations as insisted in African customary systems (Cleaver and Franks, 2005). According to the farmers and leaders in MFIS the non-member irrigators from UUMGO are like their brothers and sisters with whom they have a shared life over many years, therefore denying them water is like committing a moral offense although that is appropriate within the formal law. Basing on the claims by the MFIS leaders, the notion that actors are rational decision makers who always seek economic gains in what they choose is invalid. Instead of economic gains decisions can also be motivated through moral consciousness of the actors. This argument align well with the view in Cleaver (2001), van Koppen *et al.* (2007) and Meinzen-Dick and Nkonya (2007) that the communal resource, management systems direct most of their attention on sharing the resources than excluding others through the formal rights. With regard to this experience, Cleaver

(2001) denounced the tendency by the policy makers to label the villagers with single identities such as peasants, pastoralists or water users in designing of the water governance policies and reject identities derived from their social and cultural affiliations.

While the leaders claim to have humanitarian motive in their decision to sell water to non-member irrigators in MIS, some farmers and leaders in UUMGO have disputed such argument saying that the MFIS group has the motive to benefit financially:

In selling water to us the motive is just to get money. If they want to help us why don't they listen to our views that the fees are high compared to the quality of service that we get?" I think if the MFIS leaders focus on maintaining good relations with the UUMGO group, reduction of the fees would not be a problem.

Such observations contravene the argument favoured in critical institutionalism that community based allocations focus mainly on sharing the resource than economic gains from water. It is difficult to tell which side between the two above reflect the real nature of resource users in MIS. However, basing on what the farmers explained during the FGDs, the possibilities for rational behaviour among the users are also evident. As contended by Todaro (1994) cited in Kiflemeriam (2001), peasants make calculation of risks before making decisions; therefore, there is a big possibility that the farmers in MIS decided to sell water out of the need to avoid risk of endangering their productivity in rice as a result of being in conflicts with the fellow villagers. Therefore without invalidating the claims for social relations in MFIS decision to sell water to UUMGO, there is a need to consider also the possibilities for instrumental motives.

It is not only the farmers who alter the formal rules before utilisation, but also the officials in WRBWO and MVDC. The study has found that, the WRBWO has been lenient in punishing the users who abstract water without paying. Basing on critical institutionalism conventions are normally tolerated because actors have accepted them as part of their life. In African resource governance systems conventions such as free

abstractions are tolerated by the actors because they are deeply embedded within the social and cultural systems of the people.

While cultural influences are appealing, the administrative failures could also provide a valid account of the officials' tolerance towards the rule breakers in the basin. As findings from interviews have indicated, the officials in WRBWO and MVDC, Mkindo WUA, village government and scheme leaders face various challenges which affect their capacity to control access and utilisation of water. Bearing in mind the low capacity to apprehend the illegal water users, the government officials and scheme and local government leaders have no choice but to invest first on diplomatic than coercive measures in their efforts to address illegal abstractions:

We know that there are illegal users of water out there. Currently our focus is mainly on education to make the public understand the law, than imposing punishments to them. Eventually, as more people become educated I believe that such informal behaviours will fade out.

The above words from the Wami-Ruvu Basin Water Officer indicate an intention in the government to utilise educative approaches in implementation of the water policy as articulated in the National Water Policy (NAWAPO) and National Irrigation Policy (NIP) of 2002 and 2010 respectively. In using the education and sensitisation materials there is hope that transaction cost of monitoring the resource will be minimised because majority of users will understand their rights and obligations in resource management. The focus on such participatory approaches indicate government understanding that mechanical approaches advocated in rational choice traditions are not always enforceable.

5.2.3.4 Aggregation Processes

Finally, the study in MIS has revealed some practices that conform to aggregation processes. Aggregation, as defined by de Koning (2011), is a process by which the formal and informal institutions are combined and recombined to produce multipurpose institutions. Interviews with the scheme and village government chairmen revealed

combination of the formal and informal institutions in O&M activities and management of water distribution. Instead of waiting for the government, the farmers in MIS have undertaken the O&M activities through traditional collective working system known as *Kiwili*. The government has played its role mostly in activities which need complicated technical interventions. In one way or another *Kiwili* activities reflect the emphasis in the NIP and NAWAPO that the farmers among other water users must participate in various water provision and management.

The use of *Kiwili* in implementation of the O&M activities reflects the view in critical institutionalism that policies should start with what exist in the social and cultural environment in which the actors are embedded (Cleaver, 2001). The government has provided a room for the farmers to devise their own system for conducting the O&M activities although principally the scheme operates under government policies and laws. A lesson that is learnt here is that, formal and informal institutions have interdependencies. Despite the existing technical expertise, the government could not undertake the O&M activities on its own for the fear of increasing the transaction cost in management of the resource in the scheme. In addition, full control of the O&M activities by the government had the danger of alienating the farmers from the policy processes.

Distribution of the water to non-member irrigators also indicates how the formal and informal rules can be aggregated to form a system which can enhance the policy processes. In this decision, the farmers have combined the formal rules stipulated in the national law and MFIS constitution with the traditional norms emphasising social relations to come up with the water trading mechanism so as to enable the non-member irrigators to get water although they do not have permit from the government. The water trading rules between the MFIS members and non-members and *Kiwili* are good examples of the multipurpose institutions that can influence the water allocation processes. Such systems are governed by the rules-in-use devised by the people,

different from the rules in-design established by the government (Schlager and Ostrom, 1992; Polski and Ostrom, 1999).

The bricolage processes discussed above indicate how actors exercise agency in policy implementation. As indicated in the findings of this study, the policy directives undergo some interpretations and adjustments by the actors to reflect their needs, expectations, and capabilities. Such findings are in line with what the literature on critical institutionalism provides (Cleaver, 2002; Cleaver and Franks, 2005; de Koning, 2011). While acknowledging the influence of culture, the study findings have also indicated some economic motives in the agency exercised by the actors.

5.3 A Brief Description of Water Allocation Institutions in KIS

As the traditional elder in Kiroka village indicated during the interviews, the villages surrounding the KIS had their own customary systems of managing various affairs including pursuit of development before introduction of the formal rules through the colonial and post colonial governments. The Chief of the area, known by the name of *Kingalu Mwana Banzi* together with the elders' council (*Wazee wa Milunga*), managed all social, cultural, political, and economic affairs in the area of jurisdiction which stretches from Morogoro urban southward to Matombo. Before engaging into any development activity the people used to conduct rituals through the chief and his elders' council *Wazee wa Milunga*, to understand if such activity is viable or not. The result of this ritual, determined the actions that the people needed to take in order to pursue various development activities. In most cases these rituals came out with some normative rules that the people had to follow in order to avoid catastrophes and achieve success in their goals. Among other things such norms helped the communities to regulate behaviour towards different development affairs including accessing and using of the water resources.

According to the traditional elder, communities surrounding the KIS did not have any systematic irrigation farming neither did they have property rights arrangements for

water allocation during the time of traditional leadership. Generally, the demand for water was low compared to the abundant supplies which existed. People needed water mostly for domestic uses and traditional rituals. If any irrigation activity existed, it was practiced only sporadically by few villagers who used it for production of vegetables in small gardens for home uses. The fact that intensive irrigation uses were absent in the communities does not mean that the available water resource was used without any regulations. All water issues that affected the communities were addressed through the chief and its elders' council. According to the elders, the people believed that the chief and his elders' council had supernatural powers and therefore, in most cases, they avoided to do things that defied their orders for the fear of being cursed by the Gods. *"In those days it is the chief who had the final say on all matters related to life. We used to experience various miracles through him that is why we believed him and did whatever he told us"*.

As it has been contended in Scott (1995), institutions acquire life through peoples' practices; therefore, the belief that people had about the spiritual powers of the Chief promoted compliance and in turn helped to make early institutions endure. Arrival of the colonial rules brought some disruptions to the belief systems that guided peoples' conducts in communities surrounding the KIS. The colonial government relied on their indigenous puppet by the name of *Mndewa* for supervision of compliance toward the rules including those which governed the use of water from different sources. Being a government representative *Mndewa* always wanted to make sure that his colonial masters are satisfied with his work so he used his power to force people to comply. Due to his affiliation with the colonial masters the *Mndewa* was not respected but the people obeyed his rules only out of fear. As a result of people's disrespect, voluntary compliance towards the rules enjoyed by the chief and *Wazee wa Milunga* started to decline. This situation marked the beginning of open access regime in natural resources such as water in this area.

As it was pointed out in chapter two of this report, in post colonial era, the national policy and legal frameworks insisted control of access and utilisation of the agricultural water resource in Tanzania through the formal users' rights and tariffs. Although the post colonial national law and policy insisted regulation of access and utilisation of agricultural water resource through permits and tariffs, their utilisation did not start immediately in the areas surrounding the KIS. Absence of strong national regulatory mechanisms in early years of after independence has partly prevented evolution of effective allocation institutions in KIS.

In addition to national institutional trends, development of water resource allocation institutions in KIS and the surrounding areas have been affected by demographic forces especially population growth through natural courses and in migrations. The demographic trends and environmental challenges stimulated interests towards irrigation farming in villages surrounding the KIS. At the beginning the farmers started irrigation activities in a land of about 50 to 70 hectares (scheme construction report, 2014), irrigated through the traditional intake facility built by the villagers for the purpose of collecting the water for domestic use and conducting small scale irrigation in vegetable gardens. Then farmers who abstracted water through this traditional facility created property rights which based mostly on ownership to the furrows used to divert water and participation in construction and maintenance of the traditional intake facility.

Later on, irrigation practiced in a traditional way was found to be highly challenging by the farmers; for example, most of the time the farmers had to engage into maintenance or construction of the intake facility because such facility could not survive during the floods. Apart from that, most of the farmers experienced low yields during the harvesting time due to failures to access enough water for irrigation, following the use of poor water conveyance systems. The hardships faced during irrigation and the strong desire to improve their irrigation system made the irrigators enthusiastic about re-organisation and formalisation of their group and access rules. Efforts toward re-

organisation of the group led to formation of irrigators association by the name of *Umoja wa Umwagiliaji Kiroka* (UWAUKI) through the government support in 2004.

Soon after its formation the UWAUKI group managed to acquire the water use permit. Apart from acquisition of permit the group was also required to pay annual fees. Despite the emphasis that economic water users must pay for their abstractions, the UWAUKI group still use free of charge due to delays in construction of its irrigation infrastructures. Formation of UWAUKI also brought some new rules which stipulate equal cropping patterns and application of SRI (*Kilimo Shadidi*) farming method and use of water efficient *Salo* species to minimise water exploitation.

Despite being a registered group, UWAUKI do not have a written constitution. Due to absence of a written constitution the scheme and water allocation issues are managed through the meeting resolutions. From these resolutions different rules for control of access and utilisation of the water resource are developed. Generally, the evolution path of the water allocation institutions in the KIS (*see Table 5.3*) indicates persistence of informal institutions in management of the water resource in the KIS and surrounding areas.

Table 5.3 Institutional developments in KIS

Period	Political Regime	Governance Approach	Water allocation institutions and Mechanisms
Pre-colonial Before 1920s	<i>Mwanabanzi</i> Chieftaincy	Traditional	Traditional beliefs, norms and value under <i>Mwanabanzi</i> . Allocation mechanisms: traditionally regulated
Colonial 1920s-1961	Mixed-Colonial and post colonial governments and <i>Mwanabanzi</i> Chieftaincy	Centralisation Decentralisation	Formal colonial and post-colonial government rules and regulations, Traditional <i>Mwanabanzi</i> norms, beliefs and values. Allocation mechanisms: traditionally regulated
Post colonial 1961-1980s	Post-colonial Government	Centralisation	Formal government rules, <i>Mwanabanzi</i> values, beliefs and norms. Allocation mechanisms: open access.
Post Independence 1980s-1990s	Post-independence government	Centralisation	Formal government rules, Traditional <i>Mwanabanzi</i> values, beliefs and norms, Allocation mechanisms: open access
Post-independence 1990s to 2000s	Post-Independence government	Centralisation Decentralisation	Multiple: IWRM values and rules from government and donors, rules from NGOs and Private sectors, traditional <i>Mwanabanzi</i> values, beliefs and norms, Allocation mechanisms: public, private, open access

Source: Constructed from interviews with village chairman and scheme chairperson

Although the traditional leadership under *Kingalu Mwana Banzi* and *Wazee wa Milunga* was completely abolished, traditional values and norms are still influential. For example, as the interviews with the traditional elder indicated, traditional rituals to evade disasters such as drought and floods are still conducted despite provision of education to the people that such disasters are a result of climatic changes. Moreover, interviews with the village chairmen for Kiroka and Kiziwa villages showed that the villagers still abstract water freely and informally as during the time of traditional leadership, although the law stipulate payment of annual fees. Generally, the situation in the KIS substantiates the assertion in critical institutionalism that water resource management takes place under the influence of multiple rules from the formal and informal systems (Cleaver, 2002; Cleaver and Franks, 2005).

5.3.1 Water Allocation Processes in KIS

Despite being a registered scheme and having a water use permit, KIS mostly employs communal mechanisms in allocation of water. In this scheme the Infrastructure and Environmental Committee (IEC) has the responsibility to open and close the intake facility and distribute water to the farms. Being a registered scheme, KIS has adhered to some formal management processes such as registration of the farmers group (UWAUKI) and establishment of the leadership system basing on committee system insisted by the government. Besides such few formalities, most of the activities related to scheme and water management are conducted informally. For example instead of the constitution, as it has been pointed out above, the scheme has been using the resolutions from the past meetings to make the decisions on various resource provision and management issues. In addition informal systems are used in management of the farming and irrigation activities. Such activities are managed through the calendar which is not written anywhere but collectively understood and shared by the farmers. Moreover, no written timetable is used in water distribution although access is controlled through rotation system (*zamu za umwagiliaji*). Other practices showing informal operations in this scheme are determination of quotas by the size of the plot to be irrigated and negotiations on who should irrigate, when and for how long are done at the farm level by the farmers without any written guidelines.

During the period of scarcity, allocation of water is highly competitive and '*survival for the fittest*' becomes the dominant rule that regulate access to water. This approach has benefited mostly the farmers at the upper course of the river or those who are powerful. Sometimes the farmers at the upper course divert all water to their farms regardless of whether the other farmers at the lower courses get the water or not. Although all farmers are affected by scarcity of the resource, the situation is acute in areas where the main canal is not yet lined in Block B and C and some parts of Block A. In such areas it is normal to find completely dried irrigation furrows during droughts (*see figure 5.1*).

Figure 5.1: The dried out irrigation furrow at KIS



Source: Field Visits, 2014

In areas where the canal has been lined in Block A, dry season competitions are also found but they are not as stiff as in areas where the irrigation infrastructure is traditional.

To enhance compliance towards the access and utilisation rules, strategies such as imposition of fines or assignment of community works have been used. Apart from coercive measures, motivational aspects such access to warehouse services have been used to persuade the farmers to follow the rules. A warehouse is needed by the farmers for storing their rice until the time the prices are good. Those who do not use *Salo* seed and practice SRI method do not get access to this facility. Some member irrigators have cultivated *Salo* and adapted to SRI approach so as to benefit with the storage services. However as the DALDO in MDC indicated during the interviews the number of famers who have adopted the modern farming methods is still small. Enforcement of the policy instruments is also facilitated by *Msalagambo* system. *Msalagambo* is a term used to describe the informal working arrangement in which the farmers or villagers in general, collectively provide labour in the O&M activities. This system helps the farmers to pursue different O&M activities without coercive measures from the government. Moreover, this system helps to monitor the scheme environment to identify the illegal

users of the resource. Through this system the farmers collectively search around the scheme to identify illegal connections and apprehend the responsible people.

As it has been explained by the Kiroka Ward Councillor, awareness towards irrigated farming has been growing in the villages surrounding the KIS, therefore apart from the UWAUKI several other villagers have been engaging in irrigation in such areas. The non-member irrigators access water through paying the fees as external customers. The study has found that no fixed price schedule has been prepared therefore; the ability to negotiate the prices is one of the determinants of access for the external customers. According to the group chairperson the prices of water increase with the size of the plot to be irrigated. Currently the customers pay Tshs 10,000 per month for $\frac{1}{4}$ ha, Tshs 20,000 per month for $\frac{1}{2}$ and Tshs 40,000 per month for 1ha of land.

The non-member irrigators using water from the KIS are not organised in formal groups and engage mostly into vegetable cultivation for business purposes instead of rice. Some of these irrigators use advanced irrigation technologies such as pipe and pumps but majority irrigate traditionally using buckets. Apart from the scheme, these farmers sometimes use traditional sources (*See figure 5.2*) to get water for irrigating the vegetable gardens.

Figure 5.2: Traditional water source in KIS



Source: Field Visits, 2014

Those who irrigate rice use traditional canals to convey water from the sources to the farms (See Figure 5.3). Although the scheme has specific rules and mechanisms for accessing water, most of the non-member irrigators do not follow them. As a result of this, most of the non-member irrigators divert water at their own conveniences normally through open mechanisms. Like their fellow irrigators in UWAUKI who abstract water through traditional canals, these irrigators do not have assured access due to poor technologies and scarcity of water especially in dry seasons.

Figure 5.3: Traditional rice irrigation in KIS



Source: Filed Visits, 2014

Apart from facing supply uncertainty, the non-member irrigators do not have water use permits. Due to lack of permits what the non-member irrigators normally do is to connect their pipes during the night and steal water from KIS. As a way to reduce free abstractions by such irrigators, the UWAUKI group has decided to sell them the rights to use water. The main assumption is that if the UWAUKI group sells the water rights to the non-member irrigators, the problem of water theft will be reduced because such irrigators will be given a chance to access and utilise water from the scheme legally. Despite having the chance to buy water most of the non-member irrigators still attempt to steal water. Therefore, as pointed out earlier, to address the water theft problem, physical patrols around the scheme have been conducted through *Msalagambo*.

5.3.2 Conformance to Rational Choice Values in KIS

From the existing water allocation processes practices denoting conformance to rational choice traditions can be observed. These include acquisition of water use permits, organisation of leadership in formal committees and adoption of water serving farming practice (SRI) and rice species (*Salo species*). Adoption of water conserving farming practices and rice seeds is considered a crucial step for enhancing productivity and

enhancing efficiency in water utilisation. As a rational technical organisation, UWAUKI was also expected to abide with some governance principle stipulated in the national and international legal and policy frameworks. Among other things the group was expected to abide with the principles of efficiency, equity and participation.

5.3.2.1 Efficiency

As it has been pointed out previously efficiency in water allocation processes is emphasised in the national water law. In practice efficiency can be assessed basing on various criteria among them being how pricing schemes in water are designed and implemented. The water pricing schemes are implemented through imposition of the water use fees to those who abstract water for different purposes. Although the use of pricing mechanisms is insisted for efficient allocation of the water resource, in KIS as it was pointed out earlier, water is allocated free of charge due to existence of idle water use permit. According to the Water Officer in Wami-Ruvu Basin Water Office (WRBWO), the water use permits become operational only if the infrastructure used in abstraction of water is functional and in good order. Short of that such permits become idle until the infrastructures are completed or rehabilitated in case they have been broken. The study has found that the water use permit that the UWAUKI group holds has become idle due to delays in construction of the scheme. As a result of having an idle permit, the group has been exempted from the fees. It is not only the UWAUKI members who abstract water without payments, but also the non-member irrigators. Unlike the UWAUKI members, the non-member irrigators do not have water use permit thus within the national and international legal and policy frameworks their abstractions are considered illegal. Generally, the KIs and FGDs have revealed that the use of water pricing as a strategy for promoting efficiency has not been successful in KIS.

Another criterion for assessing efficiency is the extent to which loss of water is prevented during transportation and at the points of use (UN, 2000). Efficiency in KIS is also low because most of water is lost during transportation. Not only poor transportation, the scheme also loses water due to poor on farm water management. For

example, while the policy insists effective management of the return flows the structures for managing such flows are lacking in the scheme. In addition, the WRMA (Section 44 (1)) prohibits extraction of the water resources beyond the limits defined in the permits however; no mechanisms are in place to ensure that the farmers in KIS comply with the prescribed quantities. Generally, no measurements are conducted so as to monitor the volumes of water abstracted by the farmers in KIS.

Moreover, application of poor farming methods and the use of poor rice seeds have been hindering the efforts towards efficient allocation and utilisation of the water resource in the KIS. As interviews with the DALDO in MDC revealed, most of the farmers in the scheme and the surrounding areas have failed to adapt to modern farming methods such as SRI and use of effective rice seeds such as *Salo*. To enhance adaptability to the modern farming methods and use of effective rice species, the experts in MDC have advised the farmers in UWAUKI to make application of such methods and species mandatory to all members. The use of coercive approaches emphasized by the MDC experts sounds appealing within the rational choice traditions. However, such approaches may not be helpful if the root cause of the problem is not addressed. As findings from this study indicated (See Chapter Seven) various contextual issues affect farmers' adaptations towards modern farming and irrigation practices. While the challenges facing the farmers are evident, no effective strategies have been prepared by the irrigation experts in MDC to address them. Apart from financial problems, the experts are constrained by the perception that the farmers are difficult to change. This perception is evident in the comment by the head of irrigation section during the interviews:

Whenever the farmers are asked about application of SRI method and use of modern species such as Salo, they provide nice explanations. But when you go to the fields you do not see that they practice what they know. I think more education is needed to make them change.

As one can deduce from the above words, the experts believe that the farmers have no concrete reason for their failure to adapt. It is just that their attitude is negative, a reason why they need to be educated. To some extent, this perception reflects the critical institutional thinking. In the explanation of the critical institutional theory the failures by the farmers to adapt to modern farming practices can be attributed to their cultural beliefs. Generally, the assumption is that, the farmers fail to adapt because they are affected by deeply embedded habits which are difficult to change through formal rules alone thus they need thorough education and sensitisation (Cleaver and Franks, 2005). However, it is important to remember that farmers are risk evaders (Todaro, 1994 in Kiflemariam, 2001). This being the case, they normally avoid doing things which they do not understand how they will impact their livelihoods. Through FGDs with the farmers the study found that their tendency to reject modern farming methods and seeds does not happen out of habits as the experts and critical institutional scholars might assume, but rather a result of the decisions to avoid risks of practicing something whose outcome is uncertain as one of them indicated:

I am one of the farmers who have been trained on SRI farming method and the use of Salo seeds. But the costs for such a system and seeds are very high. I cannot use all my money in farming while I have no assurance if I will succeed or not.

Such remarks show how risk avoidance affect farmers' adaptation towards the modern farming practices. Although modern farming practices are crucial for increasing productivity, the farmers have rejected them due to high costs and unpredictable returns. In general, the farmers in KIS have exercised agency through weighing of the costs and benefits of adaptations to modern farming practices or continuing with the traditional agriculture. Thus, rather than cultural values alone, economic factors also contribute to farmers' failures to adapt to the modern farming rules.

Last but not least criterion for assessing efficiency is by comparing the marginal social cost with the marginal social benefits that have been accrued from the policy outcome

(Polski and Ostrom, 1999). As it has been pointed out earlier, in this chapter, efficiency is said to exist if the marginal social benefits exceed the marginal social costs. In KIS findings show that efficiency in terms of marginal social cost is low in post policy era. Low efficiency in this case is indicated by persistence of the social unrest between the UWAUKI group and non-member irrigators and villagers in general. By having a water use permit, the UWAUKI group considers itself as the only legitimate organisation to own and control the scheme. The non-member irrigators and the other villagers disapprove legitimacy of this group and see it as an agent of exploitation for the villagers. During the FGDs some of the non-member irrigators showed great dissatisfaction with UWAUKI: *“The farmers in this village would like to participate in irrigation project. The problem is to work under UWAUKI. If a different modality would be established most of us would have been ready to adapt to modern irrigation practices”*.

The farmers’ opinions about UWAUKI show how formal systems can be contested despite the claims for rationality and technicality. In addition, the tension here challenges the conception of legitimacy in rational choice traditions. In this perspective, legitimacy is a matter of obtaining legal authorisation such as a permit document and fulfilling the associated obligations. In a real sense, however, legitimacy is a normative and socially constructed concept, with multiple sources. While some claim their legitimacy through formal routes others may justify it informally. Generally, as contended in Komakech *et al.* (2012a), legitimacy in its real sense exists only if the users think that the programmes serve their interests. In critical institutionalism legitimacy is considered in relation to the way the programmes or decisions reflect the social and cultural environment of the users. In addition, in this view, legitimacy depends on the way the users interpret the issues with respect to the existing cultural symbols. UWAUKI faces social unrest because its legitimacy is not grounded within the social-cultural systems of the people. Generally the experiences in KIS indicate divergences from the principles of efficiency in water allocation contrary to government belief that

formalised WUGs have more chance of realising efficient allocations than the informal groups.

5.3.2.2 Equity

Another criterion for assessing adherence to the policy is by looking at equity. As it has been indicated earlier, two dimensions of equity exists namely; fiscal equivalency and distributional equity (Polski and Ostrom, 1999). By fiscal equivalency it means that the benefits that the people get from the resource are equivalent to the cost that they have incurred in its production and provision (Polski and Ostrom, 1999; UN, 2000). Short of that people will not be willing to contribute to resource development. Currently, the farmers in UWAUKI and the whole community surrounding the scheme do not pay any charges for agricultural water uses to the Wami-Ruvu Basin Water Board (WRBWB). In addition, as the irrigation experts in MDC have claimed, the farmers in KIS and community in general have not contributed any funds for construction of the scheme. This being the case, it is difficult to judge equivalency between the cost that they incurred in terms of financial contributions and the benefits that they get from the scheme.

Although the annual payments of the agricultural water fees and financial costs for scheme construction are lacking, such farmers have been contributing finances for minor O&M activities. When these kinds of contributions are considered, low level of fiscal equivalence is observed in the KIS, especially among the irrigators in Block, B and C. In these Blocks, the farmers have been paying the contributions and participating in O&M activities through *Msalagambo*, but have never been getting adequate allocations of water due to poor infrastructures. In addition to finances and labour, the villagers have also contributed pieces of land to allow construction of the scheme. Despite such contributions some villagers like those from Mahembe Hamlet in Kiroka village have been excluded from the scheme simply because their plots are not found in the project area and the crops they cultivate are not covered in the project plan. Surprising enough

such villagers are required by the village government to participate in O&M activities because the leaders say that all villagers must participate in cleanliness of the environments around the rivers. Due to this grievance, the villagers from this area have been unwilling to contribute to various communal works related to environmental conservation.

When the situation above is closely examined, the problem can also stem from interpretation of the term equity. Within the rational choice traditions equity is considered mostly in monetary terms. Such instrumental view on equity misses social and normative aspects mostly used by the users in justification of their claims. The non-member irrigators feel that they deserve to get the benefits from the KIS because of the pieces of land which they have contributed and their status as members of the villages in which the scheme is located:

When we use water from the scheme, UWAUKI and village leaders consider us as thieves. If we take other people's properties that could be called theft, but what is wrong with using water from the scheme? Besides, we are legitimate residents of this village. I think the leaders' decision to deny us access to such water is unfair.

So in the perspectives of the farmers, equity is defined in terms of equality of resource distribution among the members occupying a society (Meinzen-Dick and Nkonya, 2007). The question of who contribute what is not given a priority in such view. Generally, in this case perception gap between the government leaders, officials and UWAUKI in one hand and the non-member irrigators and villagers in general in another is evident. As Polski and Ostrom (1999) have contended, policies among other things depend on what the actors believe about the underlying principles, strategies and outcomes. In this case there is difference between what the villagers and leaders and officials believe about how the scheme and water resource must be managed and utilised. This partly prevents implementation of the policy instruments in the KIS.

5.3.2.3 Participation

This is another criterion that can be used in evaluation of the policy outcomes. According to DADP guidelines, participation of the farmers in irrigation management must start from the point where the decisions to establish or improve the irrigation scheme are adopted. Due to this reason, the O&OD model in which the decisions follow the bottom up procedures has been insisted in establishment and maintenance of the KIS. Before the scheme was earmarked for improvement, the surrounding villagers were given the chance to decide whether they needed an irrigation scheme or another development project. According to the leaders, the idea was discussed in the village assembly meetings and finally majority of the villagers who attended the meetings supported establishment of the irrigation scheme. While the UWAUKI and village government leaders perceive establishment of KIS to be democratic and participatory, findings from the study showed that majority of the villagers did not participate in the processes that led to establishment of the KIS. According to the local government leaders, the major factor that prevented participation of the villagers in decision making processes that led to establishment of this scheme is failure to attend the village assembly meetings.

Although this factor is valid, the study has also found that the top down approach in which some of the decisions have been made has contributed to inadequate participation of the villagers in establishment of the scheme. For example, adoption of rice as the only crop in the project was made only by the UWAUKI group and some government officials in order to fulfil the requirement of the national policies. According to the farmers, this decision was not discussed in the Village Assembly meetings and therefore was not passed by majority in the villages surrounding the scheme. Although the farmers in UWAUKI group are satisfied with it, the decision to make rice the only crop has excluded majority of the villagers from the benefit streams accrued from the KIS, as one of the villagers from Mahembe hamlet complained during the interviews:

We were convinced that this scheme will have benefits to us, so we agreed to contribute a portion of land for its construction. But now we are not allowed to use the water simply because we do not cultivate rice. I don't think that this decision is fair and if we knew all these will happen no one would support this scheme right from the beginning.

Apart from the ordinary farmers, poor participation in decisions making has also been found in UWAUKI leadership. The findings have shown that, not all leaders have equal chance of making the decisions that affect the scheme. The decision making power is usually open to the leaders with high influence due to their resource endowments or social position in the community.

When the question of participation was conceived and its implementation designed, the focus of the elites was mainly on availability of formal structures such as the WUG and codified rules to ensure compliances. In the eye of the rational observer, the scheme seems to have met minimum conditions for the farmers to participate in the irrigation project. Within critical institutional logic, however, availability of formal structures is not in itself a sufficient factor for effective participation. There are various social and cultural issues which need to be addressed to make participation meaningful (Cleaver, 1999).

The general trends in water allocation processes in KIS indicate divergence from the allocation principles advocated in the national water policy and law. Instead of the efficiency, equity and participation principles the water users have subjected the allocation institutions under negotiations through bricolage processes of articulation, alteration and aggregation. Through these processes as the next section will indicate, the focus of the policy has been shaped away from formal governance principles to reflect mostly the needs of the farmers.

5.3.3 Institutional Bricolage in Water Allocation Processes in KIS

As it has been pointed out in previous chapter, water resource is governed within the environment in which multiple actors and institutions interact. Within the rational choice logic implied in the national policy and legal frameworks, actors are objects whose role in the policy arena is just to process the policy goals within the dictates of institutions. In critical institutionalism focused in institutional bricolage concept actors are considered to have capacity to mediate institutions through articulation, alteration and aggregation to make them reflect their circumstances.

5.3.3.1 Articulation Process

With respect to articulation, the common indicator found in KIS is accentuation of the traditional norms and beliefs and rejection of the formal rules in water allocation and utilisation. Accentuation processes have led to rejection of the new institutions by the actors. As it has been explained earlier in this chapter, the farmers had their own ways of allocating water resource before the new formal systems were introduced. Such traditional ways of water allocation, which mostly discouraged payments over water and encouraged informal organisation of the users are still preferred by the irrigators, especially the non-member irrigators. Preference on free access to water among the villagers has led to rejection of the water use fees and opposition against UWAUKI, the group mandated to control and manage water in the scheme.

Another practice indicating accentuation of the traditional values and which contravene the water resource management policy is fire burning method of cultivation along the river banks also reported elsewhere in Mnkabenga (2012). During the study fire burning practices were observed especially in irrigated vegetable gardens cultivated along the river banks. One can assume that fire cleaning of the plots is done due to the need to ease the cultivation work. However, basing on what the farmers explained during FGDs there is a possibility that such practices exist due to accentuation of cultural beliefs: *“The people here believe that fire signifies life. The more the fire burns and spread the longer*

the life for the one who starts it. Probably through such belief the fire burning practices spread to agricultural activities”.

Like what Polski and Ostrom (1999) have said, the actors are mostly influenced by rules which emerge from within than those designed and imposed by the experts. Although nobody is forcing the villagers to burn the bush in farm clearance, the widely spread belief people have on it as indicated in the above quotation, coupled with the weaknesses in enforcement of the law make such practices to override the government guidelines in sustainable farming.

5.3.3.2 Alteration Process

According to de Koning (2011), institutions undergo modifications through different alteration processes. As far as KIS is concerned, two processes are significant namely; rule bending and institutional adaptations.

(i) Rule Bending

Rule bending is one of the common informal practices the study has found in KIS. One of the good examples of rule bending practices in this scheme is the decision to sell water to the non-members who want to use the water from the scheme for irrigation. According to WRM Act the water user can sell the right to use water to another user only after consultation with the Basin Water Office (BWO) in the respective area. Basing on this provision of the law, the UWAUKI had to seek the consent of the WRBWB before engaging into water trade with the non-UWAUKI members in the villages surrounding the scheme. The study has found that it was difficult for the leaders of UWAUKI to apply this rule strictly because those who need water are the people with whom they have good relations for long period of time. Denying them access to water would mean spoiling the good relations between them and the rest of the villagers. Apart from that, for the UWAUKI members adoption of the formal procedures for selling water to non-member irrigators meant giving the chances for free riding behaviour to proceed. Most of them would not be happy to see the other villagers use water without

payment while they have made their contributions. Therefore, rule bending in this case has been used as a mechanism for addressing free riding problem in water access as the scheme chairperson indicated during the interviews:

UWAUKI had no choice but to sell water to the non-members. The group made several attempts to make them stop illegal abstraction of water without success. We have now accepted them as our co-users; however they must pay the fees to compensate our efforts.

This decision has provided an opportunity for the non-member irrigators and villagers in general to access and withdraw water from KIS. However, its sustainability is questionable as it lacks legal back up to make both the UWAUKI and non-member irrigators abide with the rules. Another factor threatening this decision is poor management of the water prices. As it has been explained earlier in this chapter, customers are charged basing on their capacity to bargain although fixed prices have been established. In such situations some customers have been charged beyond the fixed prices while others get lower prices. This situation has fuelled resentments from the customers. Despite complaints from the customers, no efforts have been done to adjust the situation due to absence of common agreement among the leaders in UWAUKI. Generally, failure of the group to establish systematic fee structures is a setback to effective water trade between the members and non-members of the scheme.

Moreover, the rule bending practices in this scheme have sometimes resulted to violation of the policy and legal instruments designed to control the resource. The good example of rule bending practice which has led to negative impacts in this scheme is the decision to minimise the standards in construction of the scheme infrastructures. Generally, this decision was undertaken basing on the local peoples' definitions of what is appropriate given their needs, expectations and resource endowments (de Koning, 2011). However, this decision was not appropriate as far as irrigation expertise is concerned. Perhaps, it is surprising to see experts approving violation of construction standards in important project like irrigation scheme, but within the developing countries where deviations from the policies is a common culture (Thomas and Grindle, 1990), that decision was

not difficult to make. Various factors contribute to deviations from the policies in developing countries but one of them is elite capture (Wong, 2010) which in KIS was confirmed during the FGDs with the farmers. During the interviews, the irrigation experts in MDC explained that the decision to dilute the construction standards was collectively adopted by the villagers due to financial situation that prevailed. However, during the FGDs most of the non-member irrigators seemed to be unaware of how the decision was made as one of them indicated: *“We do not know how the design of the scheme was adopted. That decision was made by the officials in MDC and perhaps our leaders. But we as farmers we did not participate in passing it”*. Generally, the farmers in KIS were of the view that rather than the villagers, few elites influenced most of the decisions in scheme construction project. Such view seem to confirm the argument that elite capture affect implementation of the policy decisions in developing countries provided by Wong (2010).

Apart from construction standards, negative rule bending practices have also been noted in punishing the offenders. According to the scheme members, whenever influential people are caught with offenses, some excuses such as lack of evidence, are normally given so as to set them free as one of the UWAUKI member indicated during the FGDs: *“I am of the opinion that rules are poorly enforced in our scheme. This situation perpetuates undesirable behaviours among the members and non-member irrigators in the scheme. The big problem is that leaders are not strong enough to make the rules work”*.

As the chairperson of UWAUKI group revealed during the interviews, rule bending in punishing the offenders has been affecting maintenance and construction activities. This is because the building materials such as cement have been stolen by unfaithful contractors but no measures have been taken to punish them although the law is clear about such acts: *“More than twice I have caught people with cement bags. I stood firm*

to demand legal actions against them, but due to conspiracy by some village and scheme leaders the thieves were freed”.

The above words from the chairperson show how rules can be altered to serve interest of some or all actors in the policy process. Generally, findings from the interviews indicate how bricolage practices can result to negative outcomes if not facilitated. Although flexibility found in such processes, as commonly insisted in critical institutionalism, is desirable in resource management, if not diligently practised, it may lead to distortion of the policy goals. To enhance innovative bricolage practices Merrey and Cook have placed emphasis on facilitated bricolage (Merrey and Cook, 2012). Similarly, Bruns has called for regulated autonomy in exercise of flexibility in resource management (Bruns, 2007). Such aspects have not been considered in the existing legal and policy frameworks on water resource allocation.

(ii) Institutional Adaptations

Basing on the previous discussions, rejection of the bureaucratic institutions and claims to cultural norms and practices is common practices among the farmers in areas surrounding the KIS. Despite such general divergence trends towards policy instruments there are some indications that some adaptations are taking place. For example, the study has found that although majority of the unregistered irrigators are not ready to join the UWAUKI, some of them have indicated readiness to pay the water fees to the group as external customers if the current rate of 15,000 TSH per ha per month will be reduced to at least 10,000 TSH. Increasingly the villagers are learning the importance of financial contributions and try to move away from the belief that water is a gift from God thus it should be free. In addition, existence of the SRI farming practices and uses of the *Salo* rice seeds by few farmers indicate that some changes are taking place in the traditional farming systems although such changes are still slow.

Generally, the study has found that, the level of adaptation towards the modern water allocations and irrigation practices is higher among the farmers inside UWAUKI than those who are outside the group. In the other hand, claims on traditions have been found to be higher among the non-members than the members of UWAUKI. The possible explanation for this situation has been provided by the UWAUKI and village government leaders. According to these leaders before the KIS was constructed, some farmers had already started to irrigate in small scale using a small traditional intake built by the villagers for the purpose of abstracting water for domestic uses. When the idea of transforming this intake into a large facility to be used for improved irrigation scheme (KIS) was formed, it was easy for the farmers who had already started to irrigate traditionally to organise into the formal group and adapt to the new rules. Although some other farmers in the villages surrounding the scheme were sensitised to join the group, majority were not convinced to practice modern irrigation because this was something that they never knew before as the village chairman in Kiroka indicated during the interviews:

Irrigation farming is a new activity to most villagers. When the irrigation project was introduced in the village, most of the villagers did not accept to participate. Slowly such attitudes are changing and more farmers are now trying to practice modern irrigation framing after understanding what it is.

While the experts may have a desire to see people radically adapt to new methods, practical experiences from this study indicate that changes normally take place incrementally and gradually. In short such experiences indicate that innovative changes begin with what is at hand (McKague *et al.*, 2009; Cleaver, 2002). It is out of this reality that the critical institutionalism (Cleaver, 2002; Cleaver and Franks, 2005) has insisted a focus on existing cultural materials of the people in formulation of the policies instead of the western blueprints entertained in the rational choice systems.

5.3.3.3 Aggregation Process

As argued by de Koning (2012) and Cleaver (2001) aggregation is the process whereby different formal and informal institutions are combined and re-combined to form multipurpose institutions that can serve the intended purposes in resource management. In KIS such processes are mostly found in punishing the rule breakers. Instead of fining the rule breakers, sometimes the UWAUKI leaders have asked them to undertake some community works such as cleaning of the irrigation canals or clearing the bushes around the scheme's foot paths. According to UWAUKI chairperson, such informal penalties are given out when a person is not capable of paying the fines:

The group has different ways of punishing the offenders. Someone can just be warned, fined or forgiven depending on the offence committed. Sometimes we excuse the offenders from paying the fines and ask them to undertake community works if they are financially not capable.

The interviews revealed that institutional aggregations are common also in the O&M activities. As the secretary of UWAUKI indicated during the interviews, instead of contributing money or labour in the O&M activities, sometimes the farmers have been allowed to contribute their harvests, animals such as chicken, or ducks or any other thing that one thinks that can have some financial values.

Innovations done by the farmers are crucial considering the variations in income. While some farmers can afford to contribute finances there are others who have no ability to do so. Through institutional alterations all members of UWAUKI have been given a chance to contribute to provision and production of the scheme. If the rule would insist that only money should be contributed, most of the farmers could not afford to maintain their membership in UWAUKI due to poverty. The study has found that apart from financial constraints, contribution of the goods instead of the funds is preferred because it is a long standing culture of the communities surrounding the KIS as one of the UWAUKI members provided during the FGDs:

It is good that our leaders have allowed us to contribute goods also instead of cash only. Apart from being in line with our financial capacity,

contribution of goods such as chicken, flour etc is a long practice in our community. Our parents used to do so during initiation ceremonies and funerals. It gives a chance for all people to play part in community affairs regardless of their financial capacity.

Msalagambo system also denotes presence of aggregation processes in KIS. In this study *Msalagambo* reflects what are known as multipurpose institutions emerging from combination of some formal and informal institutional elements. This system is multipurpose because it combines the participation idea from NAWAPO with the traditional collective working system. In conducting the patrol for identification of the illegal uses, *Msalagambo* activities have sometimes involved the formal security group from the village known as *Mgambo*. Generally, *Msalagambo* serves as the traditional working arrangement as well as the system for accomplishment of the formal policy goals. It is a practice that disapproves the notion in rational choice perspective that collective action in water resource management arenas can only be achieved through top down control by the government organs.

5.4 Concluding Remarks

The study findings with respect to water allocation process in the selected scheme generally indicate deviations from the rational technical institutional arrangements articulated in NAWAPO and WRMA. Such deviations have emerged due to failures by the farmers to abide with the policy instruments either willingly as a result of cultural values and norms and dissatisfactions towards the formal water allocation processes or unwillingly due to lack of capacity to practice the rules. Poor governance by the government officials indicated by the failure to improve irrigation infrastructures, apprehend and punish illegal users, and promote collective action through reconciliation of the competing interests among the water users have exacerbated defections from the rules. Generally the study findings from the selected schemes conform to the argument in critical institutionalism that policies are influenced not by the rational systems alone but also the social-cultural and political circumstances in which the resource is managed.

CHAPTER SIX

FACTORS AFFECTING WATER ALLOCATION PROCESSES IN THE SELECTED SCHEMES

6.1 An Overview

Actors, as it has been indicated previously, play a central role in implementation of the policy goals in water allocation processes. Considering the role of actors is crucial, however, it is also appealing to explore both institutional and non-institutional factors influencing their choices in water allocation processes. Such factors are crucial to explore because they set the contexts in which water allocation processes and resulting conflicts are shaped. It is in this light that this chapter was set to identify and assess the institutional and non-institutional factors shaping the water allocation processes in the selected schemes.

6.2 Institutional Factors Affecting Water Allocation Processes

Institutions, as it has been said before, play a central role in shaping the people's behaviour towards water use. There are different institutional factors affecting actors in water allocation arenas. These factors are discussed in details.

6.2.1 Attributes of the community

For many decades now, the GOT has been striving to enhance management of water allocations in irrigation farming. Among the factors affecting such efforts is the cultural orientations of the communities in which the water and irrigation policies are implemented (Komakech *et al.*, 2012c; Cleaver, 2001). As it has been pointed out previously, the Wami-Ruvu Basin is surrounded by the communities which are heterogeneous in many aspects. This situation affects the ability of the basin officials to establish common norms on management of the water resources in the basin.

As indicated in the interviews with the scheme and village leaders and FGDs with the farmers, in MIS the challenge is on how to reconcile the interests of the farmers and

pastoralists. Due to cultural differences the pastoralists have rejected to collaborate with the farmers in establishment of the WUAs in their area and pay the water use fees. Although culture seems to be an issue its effects in water policy implementation in this scheme and the surrounding areas are exacerbated by poor services in agricultural and pastoral activities. As it has been pointed out in the previous chapter, the pastoralists question legitimacy of the water use fees in the situation where the water services are still poor.

Apart from cultural heterogeneity, differences in beliefs about the policy strategies are also a problem. The study has noted some differences in beliefs on how the scheme and water resource should be managed. While the members believe that the scheme is their private property, the non-member irrigators perceive it to be a common pool resource which needs to be owned by all villagers. Such belief has made the non-member irrigators to oppose payment of water use fees to MFIS as one of them indicated during the FGDs: *“Why should we bother to pay them? This water belongs to nobody but God”*.

Due to existence of parallel beliefs, the leaders in Mkindo WUA, Mkindo Village and MIS have failed to establish an integrative approach in management of water allocation in MIS. Although the national and international laws and policies have strongly emphasised application of the IWRM strategy in all levels of resource governance, the realities in the areas surrounding the MIS show that such strategy is difficult to be realised due to differences in cultural orientations and beliefs about water resource management among the users; findings which have also been reported in the study by Komakech *et al.* (2012c) conducted in Hingilili sub-catchment of the Pangani River Basin.

In KIS the farmers are also divided in the way they perceive the policy strategies for management of water allocation processes. Interviews with the scheme and village government leaders discovered that while the scheme members support the formal rules

for control of access and utilisation of the water resource, majority of the farmers in the surrounding communities have rejected them. Differences in the manner that the community members view the water policy instruments can be illustrated by the existing opposition to join the UWAUKI group. Despite efforts by the scheme, village leaders and the Ward Councillor to educate the people, majority of the villagers have rejected to join this group. As interviews with one of the traditional elders (*Mzee wa Milunga*) in Kiroka Village, and the FGDs with the non member irrigators have revealed, most of the farmers in the surrounding villages perceive UWAUKI as an extended arm of the government rather than an organisation created for their development as a comment from one of the non-member irrigators indicate: *“The leaders are trying to convince us that UWAUKI is our organisation. How can this be true while we see only the government and few villagers benefiting from its establishment?”*

The findings in the selected schemes concur with the assertion that beliefs about the policy strategies and outcomes affect the actors’ role in policy implementation (Polski and Ostrom, 1999). Due to differences in beliefs on the utility of the policy measures and how the water resource and the schemes should be managed, the members of the schemes and the non-member irrigators have failed to establish collective action rules. This, as indicated in the interviews with the scheme and village government leaders has in turn fuelled opposition against the policy instruments among the irrigators having no membership to the schemes. The opposition shown by the people in communities surrounding the KIS and MIS are common to many areas in Tanzania. For example different studies have indicated the same community attributes in Pangani Basin (Komakech *et al.*, 2012a; Komakech and van der Zaag, 2011). This study and others conducted in different areas show how the policy instruments are open to contestations by the local communities although in the eyes of the government they seem to be technically rational.

6.2.2 Rules-in-use

As pointed out by Polski and Ostrom (1999) actors are sometimes influenced by the rules practiced in the communities called rules-in-use instead of what they call rules-in-form or design stipulated in the statutory documents. The study findings from the FGDs and KIs indicated that instead of the codified rules, the water users in the selected schemes have been guided by alternative and spontaneously evolved rules in their actions towards the water resource. For example, despite emphasis by the national water policy and law that water users must consult the BWOs in their areas before selling or transferring the water rights to other users, the farmers in MIS have made a decision to sell the water right to non-member irrigators from UUMGO without informing the WRBWO. According to the scheme and village government chairmen due to urgency of their needs the irrigators in UUMGO could not have patience to wait until the approval of the WRBWB is sought, so they would keep on asking for water. To the MFIS members and leaders denying water, the people that they have lived with over many years and whom they have close relations was unbearable. Therefore even if the decision to allocate water without the approval of WRBWB was illegal, the MFIS leaders decided to adopt it so as to maintain good relations with their fellow villagers:

Even if the non-member irrigators are not eligible to use water from the scheme, the truth remains the same-they are our brothers and sisters. Bearing that in mind the farmers in MFIS have collectively accepted the decision to sell water to them although the law does not allow

As one can see, the rules in use emphasises maintenance of good relations in water allocation processes. Such rules have overridden the formal allocation rules emphasising possession of a water use permit for all economic water users. Generally, the farmers were guided by the logic of appropriateness in making the decision to sell water use rights to UUMGO members instead of that of consequences insisted in the rational choice theory (March and Olsen, 1995). Although they were aware of the consequences that would follow their action if the government knew that they illegally sold water to

non-permit holders, within the cultural rules of the community such action was morally appropriate.

Apart from that, the rules-in-use in communities surrounding the MIS, as interview with the traditional elder and village government leaders indicated, forbid trading in water. While the national and international laws have been designed to enhance economisation of the water resource, the local beliefs perceive the water trade as immoral. According to the chairman of Mkindo village this belief has partly contributed to the opposition by the Maasai pastoralists and some irrigators in the area to formalise their abstractions. Although this belief still exists, according to the scheme leaders, it is mainly held by the unregistered water users due to lack of awareness on the modern water resource management rules. Other practices showing how the rules-in-use override the codified rules in MIS as interviews and FGDs have revealed are use of traditional farming and irrigation methods, use of competition in accessing water instead of orderly access stipulated in timetable and calendar, especially among the non-member irrigators from UUMGO group and use of non-monetary penalties in punishing the offenders.

In the KIS rules-in-use influenced the decision to sell the water access and utilisation rights to vegetable growers from the Kiroka and Kiziwa villages that did not have water use permits. As it has been pointed out earlier, the rule in design forbids the permit holders to sell their water rights to other users without the consent of the responsible BWO. According to the chairperson, the local circumstances could not allow the UWAUKI group to notify the WRBWO office before selling of water use rights to ineligible users. Basing on this leader, the scheme was facing high level of free riding by the non-member irrigators from the surrounding villages, thus waiting for the government approval would increase the chance for unsustainable use of the resource. Explaining how the situation was and why the decision was necessary the chairperson of UWAUKI group had this to say:

We understand that the law wants us to notify the WRBWO before selling of water right to the non-members, however, due to the agency of the

matter the only solution was to quickly adopt the decision to sell them access and withdrawal rights otherwise they would continue with free abstractions.

Additionally, the divergence from the designed rules in KIS is denoted by utilisation of the meeting resolutions in place of the constitutional rules emphasised by the government policy and law. The use of meeting resolutions has shaped management activities in KIS, sometimes contrary to the expectation of the policy and law. Although lack of skills could be the factor, as noted in the interviews with the scheme chairperson and secretary there is a possibility that UWAUKI's failures to formulate a constitution, is a result of long period of informal practices in management of the water resource in the surrounding villages.

6.2.3 Governance Systems

Governance systems constitute among other things the systems for management of the water rights (Ostrom *et al.*, 2004). Interviews indicated that the scheme and village government leaders in MIS are of the opinion that configuration of the water right systems to some extent impinge effective implementation of the policy instruments. According to them, the main issue of a concern is the top down mechanisms through which such rights have been established.

Generally, the scheme and village leaders are of the view that the existing top down approaches in designing and enforcing the water use rights has contributed to the failure to take care of the cultural differences between the pastoralists and farmers. This has in turn jeopardised enforcement and protection of the water use rights. Due to weaknesses in the governance systems the rights to access and withdraw the resource and exclude the ineligible users have been interfered by the illegal users. Moreover, due to weak governance systems, effective support for the water users' organisations (MFIS and Mkindo WUA) has been difficult. This has reduced their capacity to implement the water policy instruments.

Another weakness of the water resource governance system as explained by the scheme and village government leaders is poor nesting of the different water resource management levels. As a result of this anomaly, the higher level organs in particular the WRBWO and MVDC have failed to supervise effectively what is being done by the Mkindo WUA and farmers' group i.e. MFIS. The good example here can be illustrated by the tendency by the MFIS group to sell water to ineligible users without knowledge of the WRBWO. Apart from weak inter-linkages, the government organisations lack legitimacy in the eyes of the local water users. Existing opposition against the Mkindo WUA by the villagers mainly the pastoralists show how legitimacy of the formal organisations (MFIS, Mkindo WUA) is questionable in areas surrounding the MIS.

In KIS, the top down decision to relate the water use rights with cultivation of rice has fuelled opposition against the UWAUKI group. This decision has led to the division of the villagers who before the new rules shared the water resource peacefully from similar sources. The FGDs revealed that the villagers who were formally homogenous have been divided between those who agree to use water for rice production and who receive first priority by the government and others who want to use water for producing other crops and who are not given any priority by the government. The UWAUKI group as FGDs with the non-member irrigators indicated is also rejected due to non-participatory mechanisms employed in its establishment and management. Although the initial decisions towards establishment of the group were deliberated through the O&OD approach, only few villagers were involved in the final decisions which led to formulation of the group and the scheme's governing rules. Generally, the procedures for establishment of the UWAUKI group and the governing rules overlooked the existing social and cultural structures that guided the people for many years.

Apart from non-participatory rules KIS is also disconnected from the higher water governance organs because it lacks affiliation with the WUA. Due to localisation of the scheme management activities, the scheme fail to utilise the opportunities existing in the surrounding environment as interviews with the scheme chairperson revealed:

We do not have regular communication with the government officials in the district council or WRBWO. To some extent this affects our capacity to know what is going on in the governmental and non-governmental organisations dealing with water, and denies us the chance to benefit from various opportunities.

Basing on the existing governance arrangements, the Ministry of Water and Irrigation (MoWI) is the overseer of the water resource in the country, followed by the Basin Water Offices (BWOs), District Councils and finally Water Users Associations (WUAs) at the basin and community levels respectively. These organs have the duty to protect the water users' rights and make sure that such users fulfil their obligations towards the water resources in their areas. In addition through such organs the water users at the grassroots levels are linked to the ministry level. Currently KIS is not affiliated to any WUA due to absence of such umbrella organisation in its area. As a result of being disconnected, the KIS has not been effectively supervised or supported by the higher levels in particular the WRBWO as explanation from the basin's environmental engineer indicate:

As an organisation with a responsibility to control the water resource in the basin, our task is to identify and visit all users abstracting water for economic purposes. Due to resource constraints we have failed to do so. Kiroka is one of the small scale irrigation schemes which we have never visited since it was established.

This situation partly explains why the KIS has been lenient in the manner that it undertakes the water management responsibilities. Moreover, as owners of the scheme the UWAUKI group has the right to exclude others from the resource and the government has the duty to protect such rights for the group. Due to lack of capacity and close communication with the scheme, the WRBWO has failed to protect such rights for the group leading to frequent encroachments by the unregistered irrigators found in the surrounding areas. The study found that innovative practices such as *Msalagambo* have evolved out of the existing gaps in governance of the water resource in areas surrounding the KIS.

In the perspective of critical institutional theory rather than the hierarchically established structures, it is institutions that foster cooperation that can enhance collective action in water resource management, therefore, the existing top down mechanisms are inappropriate for effective management of the resource and the schemes in general (Cleaver, 2001). Theoretically, this assertion sounds appealing however, in communities such as those surrounding MIS and KIS where extreme ethnic and economic diversities exist, institutions fostering cooperation are difficult to evolve. Although central controls entertained in rational choice traditions are not appropriate given the emphasis towards the polycentric governance systems (Acheson, 2011), in the cases such as MIS where extreme cultural differences exists (van Koppen *et al.* 2007) or KIS where divisive scheme operations are common, government interventions are important. However, rather than hierarchical and unilateral the appropriate interventions according to critical institutional scholars are in terms of regulated autonomy (Bruns, 2007) or facilitated bricolage (Merrey and Cook, 2012) approaches. These interventions are perceived important especially where competition over resources threaten livelihood strategies of the poor people.

While its role is central to evolution of cooperative norms, findings in MIS and KIS show that the government is in most cases indicating a laissez faire style in management of the water resource in small scale irrigation schemes. Due to absence of strong watchdog mechanisms from the government the farmers and pastoralists in the selected scheme have found a leeway to inject individualistic cultural and economic interests over collective action norms advocated in the national policy and law. The extreme community divisions have affected evolution of innovative collective action institutions in MIS and KIS.

6.2.4 Valuation and Selection Processes

According to Polski and Ostrom (1999), in their choices the actors are affected not only by availability of resources but also their preference towards various policy strategies and outcomes. Likewise, the water users in the MIS and KIS are affected by their

preference towards the water policy instruments. There are different incidences showing how water users' preferences affect their choices towards water allocation goals. For example, in MIS low preference towards the policy instruments has made the Maasai pastoralists to reject the proposal to join the Mkindo WUA and pay the annual water use fees through this organisation. As it has been pointed out earlier, the pastoralists resist the policy instruments because they do not see their benefits to them.

Apart from the pastoralists, low preference towards the policy instruments has also been shown by the non-member irrigators from UUMGO. These irrigators have been unwilling to pay the water use fees to MFIS group due to perception that such fees are exploitative. Apart from that, interviews with the Mkindo Village Chairman revealed that, most of the irrigators in villages surrounding the MIS still use water informally by diverting the return flows from Mkindo scheme because they are not willing to pay the fees.

In the perspective of institutional thinking, the behaviour displayed by the water users in MIS could be a result of cultural disagreements between modern governance insisting economic values of water and traditional systems believing in non-monetary control of the resource. The cultural differences might be the factor but instrumental motives are also important. This is because the interviews and FGDs show that members of the scheme in MFIS group show willingness to pay the fees although they have been groomed within similar water use culture with the non-member irrigators and pastoralists. If culture is the issue here MFIS members could also resist the water use fees. But they have agreed to pay the fees due to assurance on benefits that they will get from the resource. This experience show that preferences among the resource users do not stem from cultural values alone but also the economic aspirations as insisted in the fiscal equivalence principle (Polski and Ostrom, 1999).

Apart from that, the study has found low value towards construction of the drain canals for transporting water from the farms back to the river system as the chairman of the scheme indicated during the interview: *“Most farmers in our scheme do not have the*

drain canals. This affects efforts towards water conservation as insisted in the policy and law”. As it was pointed out by the farmers, scheme and village government leaders during the FGDs and KIs interviews respectively, construction of the drain canals in MIS has been constrained by low capacity technically and financially among the farmers. However such explanation is disputed by the irrigation experts in MVDC. According to these experts most of the farmers have rejected such canals due to the perception that they reduce the size of their farms. Although it is important to consider influence of culture in farmers’ preferences towards the drain canals, attention must also be directed on the issue of capacity as raised by the farmers and leaders. Generally, the study found that farmers’ valuation of the drain canals as water control devices in MIS is influenced by both economic and cultural factors. The farmers’ preferences have also affected their adaptability towards the modern farming systems particularly the SRI and use of the modern rice seeds particularly the *Salo* species. Through FGDs with the farmers, the study found low adaptability towards the SRI (*kilimo shadidi*) and *Salo* rice species especially among the non-member irrigators despite intensive education through the system known as *farmer to farmer*. To enhance the use of *Salo* and SRI method, the MFIS group articulated the rule that makes such method and seeds mandatory to the members of the scheme and defined the penalties for those who violate it. This decision has promoted adaptations towards such modern practices in rice farming among the members. Adaptation level however is still low for the non-member irrigators in UUMGO because the rule that makes application of SRI and use of *Salo* mandatory is lacking in their group, giving the leeway for the farmers to continue with their traditional farming practices.

According to the chairman of UUMGO group the farmers failed to adopt the SRI method and *Salo* seeds due to negative attitudes. Such claim was confirmed during the FGDs where some farmers were noted saying that *Salo* rice does not have good test. Due to this attitude, the study found that the farmers, both inside and out of the scheme cultivate *Salo* mostly for commercial purposes. When it comes to food as the village chairman in Mkindo indicated they choose traditional seeds: “*Many people do not like*

rice from Salo. They say such rice is tasteless. But we encourage them to adopt it so as to improve their livelihoods". FGDs with the farmers revealed that most of them supplement the irrigated rice farming with rain fed rice farming. The farmers indicated that they engage into rain fed rice farming so as to get food and use the irrigated rice just for business. According to the scheme and village government leaders, such dual responsibilities partly affect the ability of the irrigators in the scheme especially the non-members, to meet the cost of *Salo* and SRI thus forcing most of them to remain with the traditional farming system.

In KIS effects of valuation processes are also noted in the manner that the farmers adapt to modern farming practices. As explained by the scheme leaders during the interviews, the KIS just like most of the improved schemes in the country adopted rice as the only crop to be cultivated in the scheme and not any other crop as per directives from the central government. To be eligible to cultivate in the scheme the members are allowed to plant either *Salo* species or *Supa*. Furthermore, the farmers have been instructed to apply the SRI method in farming so as to conserve water and increase farm yields. As interviews with irrigation officers in Morogoro District Council (MDC) revealed, preferences towards the SRI farming method and adoption of *Salo* species have been low among the farmers in KIS and the surrounding areas. The same findings have been recorded from the FGDs with the farmers in KIS both the members and non-members. Failure to adapt to SRI and *Salo* species exists mainly due lack of water control structures during the rainy seasons, inadequate flows during the dry season, low access to farm inputs and poor farmers' attitudes. To sensitise and empower the farmers towards modern farming practices, the government in Morogoro District Council has welcomed the NGOs, private companies and government organisations to support the farmers through education, improvement of irrigation infrastructures, farm productivity and markets for the rice. The study has found active roles of five stakeholders as shown in *Table 4.4* in chapter four.

According to the Councillor for Kiroka Ward, support from the above organisations has resulted to establishment of the farmers' union called Agricultural Marketing Cooperative Society (AMCOS). Apart from that, through the above NGOs and private companies, farmers have been provided with the storage house and milling machine for value addition in their crops.

As it was explained by the scheme chairperson during the interviews, availability of milling machine has helped the farmers to add some values to their crops and make them more marketable than the raw paddy which they used to sell before. Generally, the private sectors have played a crucial role in widening the market horizons for the irrigators in the KIS. In their part the farmers have showed great appreciation during FGDs for the efforts done by such stakeholders to help them in agriculture. According to the scheme chairperson, support from the above private organisations has increased enthusiasm about application of *SRI* and use of *Salo* and hopefully more farmers will adopt them so as to enjoy the existing benefits.

The experiences existing in KIS show how actors depend also on external systems to adapt to new institutions (van Koppen *et al.*, 2007; Meinzen-Dick and Nkonya, 2007; and Bruns, 2007). As a result of external support from the private sectors the farmers' capacity and preferences towards modern farming and irrigation practices have been shaped in favour of the policy. Basing on the findings from the interviews and FGDs, there is a likelihood that willingness of the farmers around Kiroka and Kiziwa villages to join the UWAUKI group and practice modern irrigation will increase if the support from the private and NGO sectors will sustain. Generally, the study findings indicate importance of material incentives in actors' adaptations towards modern irrigation farming as indicated in the literature (Todaro (1994) in Kiflemariam (2001). Such findings dispute biasness towards the cultural elements in explaining the actors' behaviour towards the water policy instruments. Again, the findings ascertain presence of both economic and cultural influences in the actors' choices towards the policy goals.

6.3 Non-institutional Factors Affecting Water Allocation in Selected Schemes

6.3.1 Material Conditions

Like the actors at the ministry and basin levels, the farmers in the selected scheme are affected by the existing material conditions in particular, availability of the financial resources in their choices towards the water policy instruments. Particularly as interviews with the scheme and village leaders and FGDs with the farmers revealed, enforcement of the water resource management rules in the selected schemes is constrained by lack of adequate financial resources. For example, in MIS the farmers have failed to adapt to modern farming practices such as SRI and adopt modern rice species such as *Salo* because they lack financial resources to meet the involved costs.

According to irrigation experts in Mvomero District Council (MVDC), SRI and *Salo* require consistent application of inputs and effective control of water, therefore they depend highly on the financial capabilities to acquire the inputs and improve the irrigation infrastructures (Keraita *et al.*, 2012). Such requirement is difficult for the irrigators in MIS, and especially the non-member irrigators to fulfil due to low financial capabilities. Through interviews with the group chairmen and secretaries in MFIS and UUMGO, the level of income for non-member irrigators was found to be lower ranging between USD 1.5 and 2 per day than the income for the member irrigators which was found to range between 2 and 4 USD per day. Although such income is above the poverty line (Keraita *et al.*, 2012) it is not sufficient enough to meet the costs for the farm inputs:

Principally, all members and non-members of the scheme are required to practice SRI farming method and use the Salo species. The farmers have received this decision positively however the challenge is how to meet the required standards due to lack of financial capacity.

This is a general observation by the above group leaders when they were explaining the challenges farmers face in irrigation farming in the MIS. Due to low financial capacity most of the non-member irrigators from UUMGO have continued with the old farming

habits parallel to the new systems adopted through different government programs. Generally the study findings confirm importance of financial support in farmers' adaptations towards sustainable farming practices (Tazeze *et al.*, 2012).

In KIS, inadequacy of financial resources has affected the capacity to make sound decisions about improvement of irrigation infrastructure. According to District Agricultural and Livestock Officer (DALDO) the original plan in this scheme was to construct a lined irrigation canal to benefit the farmers at Kiroka and Kiziwa villages. Due to lack of adequate financial resources, the villagers were provided with three options; to contribute the remained amount of funds, to minimise the construction standards or abandon construction of the scheme altogether. As the DALDO in MDC explained during the interviews, villagers' decision was to minimise the construction standards so as to continue with the project. Consequently this decision led to construction of poor irrigation canal as shown in figure 6.1.

Figure 6.1: Main irrigation canal in KIS



Source: Field Visit, 2014

Although the farmers disputed the claim by the irrigation experts that poor construction standards is a result of inadequate financial resources (See Section 5.3.3.2, Chapter

Five), with the existing evidence there is a possibility that the experts' views are valid. Basing on the experts explanation, to achieve construction of the KIS, three main financiers were identified namely, the District Agricultural Development Plan (DADP), the Morogoro District Council (MDC) and the farmers from Kiroka and Kiziwa villages. Among these three financiers only one the DADP, disbursed the funds at the time the construction work was starting. This situation led to existence of financial gaps which consequently affected the construction works. In the rational choice traditions implied in IAD framework, actors are said to be rational decision makers having abilities to choose alternatives which are economically viable. Basing on the experiences from KIS it is logical to say that such assumption overlooks the limitations including the financial limitations facing the actors in arriving at the final decisions about various issues.

6.3.2 Information processing Capabilities

Information processing in the schemes among other things depends on availability of technical facilities for data collection and observation. Among other things such processes depend on availability of technical devices for control of the volumes abstracted by the users. In MIS the intake facility has technical facilities for control of the volumes (*see figure 6.2*); however no information about abstraction rates is collected due to low impetus by the farmers, government officials and scheme and village leaders to restrict water abstractions.

Figure 6.2: Intake facility with control devices in MIS



Source: Field Visits in 2014

Although resources constraints could be the contributing factor, as it has been pointed out earlier, generation of water abstraction data is also affected by laxity among the scheme and village government leaders caused by availability of abundant supplies as it was indicated by the scheme secretary during the interviews: *“We do not have a need to measure the abstracted volumes in our scheme. We have plenty of water. No one can finish it no matter what are his/her uses”*. Generally, the situation existing in the MIS resembles the findings from a WIDER study (1998) quoted in Tamas (2003) which show that the ‘honey pot’ of resource normally lead to less investments by the governments and their agents towards the resource, causing undesirable informal practices and behaviours. In Mkindo Irrigation Scheme such practices and behaviours include negligence in control of resource abstractions.

Kiroka Irrigation Scheme (KIS) also has control devices for the water volumes (See Figure 6.3). Despite having the required control facility the abstracted volumes are also not monitored in this scheme to see if they are within the prescribed quotas or not. As a result of this, accurate information about water abstraction and utilisation trends has been missing to the farmers and officials in WRBWO. The supplies in KIS are not abundant enough to warrant negligence in water control; poor control and support from the government as revealed through the interviews with the scheme and village

governments leaders, mostly accounts for the existing negligence in measurement of volumes.

Figure 6.3 Intake facility with control devices in KIS



Source: Field Visits in 2014

Apart from regular measurements of the flows and abstracted volumes, information about the abstraction trends in the resource can be obtained through physical inspections of its environment to identify the potential users. According to Wami-Ruvu Integrated Water Resource Management and Development (WRIWRM&D) Plan, the basin intends to initiate physical inspections of all water abstraction points including the small scale irrigation schemes, to identify all water users including those abstracting water illegally. This plan however has not been operational in KIS due to lack of funds. To offset the monitoring gap left by the government, the UWAUKI group as it has been pointed out earlier has opted to use the traditional system known as *Msalagambo* (see chapter four) to get information about illegal abstractions in the scheme and around the surrounding areas as the secretary of the group indicated: *“Knowing who divert water, from the scheme when, where and how is very difficult. But during Msalagambo it is easy for us to inspect the scheme environment and see what is going on because we work collectively”*.

It is not only hydrometric information that is difficult to obtain, but also general information for enhancing management of the schemes. The difficulty in obtaining information is partly a result of poor communication with the external actors exacerbated by lack of communication facilities. As a move to enhance efficient allocation and utilisation of the water resource in the country, NAWAPO has insisted investments in technological resources including information acquisition and communication technologies. The emphasis in NAWAPO is in line with the rational choice traditions where technological developments are considered central to information processing and utilisation for policy achievements (Montouri and Purser, 1996). Despite their importance the technological resources have limits in enhancing implementation of the policy decisions. The findings from MIS and KIS have shown that the decision to obtain and process information depends not only on the actors' capacity technologically but also institutional elements such as habits or perceptions insisted in critical institutionalism. Whether technological or institutional, the information processing challenges in the selected schemes reflect the notion of bounded rationality insisting that actors are limited in their capacity to acquire information for decision making (Williamson (1975) in Kiflemariam, 2001)).

6.3.3 Physical Conditions

Capabilities of the actors in the action arenas are affected by availability of the necessary physical resources needed for production and provision of the good or service. With respect to small scale irrigation schemes the technology used for storage and transportation of water among other things are crucial resources for effective policy implementation. The MIS has a well lined main canal (*see figure 6.4*) and modern intake facility (*see figure 6.2*) for collection of water before transporting it to the farms. By having an effectively lined main canal the scheme has to a large extent managed to exclude the illegal users who normally abstract water by connecting the water pipes to the scheme during the night. What have remained are just minor thefts of water by those who use it for domestic purposes. Furthermore, the lined canal in MIS has prevented the

pastoralists to send their cattle deep in the scheme: *“To a large extent, encroachments by the pastoralists have been prevented in the project area. Such acts are happening only rarely along the borders; thanks to the efforts to modernise our scheme.”*

Although for being a CPR, the canal water in MIS just like the other resources in this category is expected to face high level of free riding (Polski and Ostrom 1999; Acheson, 2011), presence of effective physical structures has made it difficult for the intruders to encroach the scheme. But effective infrastructures and absence of free riding are experienced only by the members of the scheme. The non-member irrigators, particularly the UUMGO members face high level of encroachments from the pastoralists due to presence of earthen main and secondary canals. Although sanctions such as confiscation of cattle and imposition of fines have been administered, the pastoralists have not stopped to encroach the farms in Mgongola. According to the farmers poor irrigation structures in Mgongola provide a leeway for the pastoralists to easily penetrate inside the scheme and water their cattle.

Apart from excluding the illegal abstractions, the lined main canal in MIS has helped to minimise loss of water during transportation from the source to the farms. Generally, the experiences in MIS show how control of allocation and utilisation of the water resource depends on technological improvements similar to what has been indicated in Keraita *et al.* (2012).

Figure 6.4: Lined canal in MIS



Source: Field Visit in 2014

Poor quality of irrigation structures also affects management of water allocation processes in KIS. As a result of having poor irrigation infrastructures, the scheme has been encroached very easily by illegal users who normally connect their pipes during mid-night. Consequently, frequent encroachments of the scheme by the illegal users have led to the need to conduct regular physical inspections so as to identify such users and punish them accordingly. According to the scheme chairperson, this situation has been costly to UWAUKI group in terms of time, energy and sometimes when external monitors are hired financial resources. Generally, findings from KIs and FGDs indicate that due to poor irrigation infrastructures, free riding behaviours are common in KIS despite existence of the boundary rules defining who should use water and how (Ostrom, 1990). These findings conform to the views by Polski and Ostrom (1999) and Ostrom (2003) that the more the possibilities for free riding are present the less the likelihood that the community members will contribute to production and provision of the resource.

Moreover, due to weak irrigation structures, the scheme has frequently been destroyed by floods (*See Figure 6.1*). As a result of the damage sustained by the scheme, large quantity of water has been lost during transportation from the source to the farms. This

situation has prevented efficient allocation of the resource in the scheme. Generally, poor condition of the scheme infrastructures has raised the transaction costs for management of the scheme (Polski and Ostrom, 1999) and has watered down the usefulness of water use permit as an instrument of water conservation in KIS.

Technological developments are crucial not only for preventing illegal abstractions and enhancing efficiency, but also for reconciling multiple institutions in water policy arenas. Although presence of multiple institutions may impinge evolution of collective action among users, the benefits accrued from effective technological resources can act as motivational factor for the resource users to concentrate on more constructive issues than when the technologies are poor. In the selected schemes findings show that those abstracting water through effective technology (member irrigators) comply with the rules more easily than those using poor technologies (the non-members of the scheme).

To a large extent the findings from selected schemes justify the call for technological developments in policy processes as emphasised in the rational choice traditions. Such experiences tell us that institutions need supportive physical environment to be practical. Without such supportive physical environment the possibilities for the institutions to be idle or violated are great. The study findings from the selected schemes indicate that physical environments influence the manner that the water users apply their power, knowledge and agency as they negotiate different water allocation institutions (Cleaver, 2001). In areas where technological environment is conducive, innovative practices towards water resource management have been possible to develop out of such negotiations than in situations where such environment is poor.

6.3.4 Bio-physical Characteristics

Apart from institutional and technological factors, the bio-physical characteristics of the resource have influence on the water allocation action arena and the related policy outcomes (Ostrom *et al.*, 2014). Among the bio-physical factors influencing the water users in small scale irrigation scheme is the topography of the land in which irrigation is

conducted. In addition to poor irrigation infrastructures the topographical conditions in the areas where the non-member irrigators in UUMGO conduct irrigation have prevented effective control of water. According to these irrigators the areas in which they conduct irrigation activities are not topographically levelled. The study found that the farmers face difficulties because they use poor equipment in tilling the land. Due to poor topography and farming equipment, the farmers in this group face challenges in levelling the land hence control of the flows in their plots, making adaptations towards the modern farming methods in particular the SRI and use of effective seeds such as *Salo* species difficult. According to the agricultural experts in Mvomero District Council (MVDC), SRI and *Salo* need strict control of water short of which can lead to low productivity. The challenges existing in topographical conditions partly explain why most of the non-member irrigators in the MIS have opted to irrigate traditionally.

Another bio-physical factor to consider in water resource allocation is geographical location of the water users (Ostrom *et al.*, 2014). The non-member irrigators in UUMGO abstract water at the lower course locations. Due to their geographical location the farmers in UUMGO have not been capable of controlling the flows as they wish. As a result it is common to find the farmers in this group struggling with scarcity, especially when the MFIS group restrict the flows or get excessive water which destroy their crops especially when the MFIS group increases the flows. To avoid such inconveniences, the UUMGO members have made a decision to apply for their permit so as to be legitimate users of the resource and strengthen their position in water allocation decisions:

We are now fighting to get our own water use permit. Once we get it and become owners of the scheme, we will have strong voice in water distribution and the MFIS members will stop treating us harshly.

This decision is plausible; however, it all depends on the good will of the MFIS farmers who use the advantage of their head end location to control the flows down to UUMGO. In addition, the prevailing bio-physical conditions determine the users' behaviours towards the O&M rules in MIS. As explained by the scheme chairman during the

interviews, the possibilities for defection from the rules among the farmers in this scheme are higher during the wet than dry season. According to him, during the wet season water is plenty and farmers normally do not feel the need to obey the rules which require them to participate in cleanliness and maintenance activities. Among other things, the leaders in MFIS use dry season sanctioning of access as a strategy for enhancing compliance during the wet season:

We know how to control defections from the rules during the wet seasons. We just make sure that those who defect during wet season do not get water when the need is high in dry season.

Generally, the experiences from MFIS group show that rules evolve not only from the institutional and physical forces, but also the bio-physical factors such as conditions in the resource units and stocks. Such experiences are in line with Ostrom *et al.* (2014) who posit that the bio-physical variables such as flow of resource units and available resource stocks determine how natural resource policies will be implemented.

The behaviours of the scheme and village leaders and government officials towards water monitoring activities also show how bio-physical factors can influence policies. As it has been explained earlier in this chapter, presence of excessive water has caused laxity in control of water use thus affecting the conservation strategies stipulated in the government policies. Apart from that excessive water in MIS has led to poor on farm management of water leading to emergence of conflicts as next chapter will indicate. Generally, the bio-physical challenges affect the ability of the farmers in MIS to implement the water conservation guidelines and have contributed to the farmers' tendency to continue with habitual practices in agriculture. This situation has in turn affected realisation of the water policy goals in efficient allocation and utilisation of the resource in irrigation farming (URT, 2002a and URT, 2002b).

The bio-physical conditions mainly affecting the KIS is its location. Although the leaders have adopted the rule that recognise rice as the only crop to be irrigated the geographical location of the scheme makes it difficult for such rule to be enforced. The

scheme originates from the highland areas where rice cannot be cultivated. Although the law has excluded the farmers at the head end because they don't cultivate rice and because their plots are outside the project area, such farmers have been able to access water secretly because the scheme passes close to their homes and gardens (see figure 6.5).

We always chase people who want to fetch water for domestic uses and those who connect their pipes illegally to divert water for irrigation. It is very difficult to stop such people because they live and work close to the scheme.

The problem portrayed in the above extract by the scheme secretary is incongruence between what the policy prescribes and the conditions in the implementation areas (Ostrom, 1990). Such incongruence is a result of simplicity assumption in rational choice traditions that once rules are clarified people will just follow them due to the fear of punishment. As the village and scheme leaders have generally indicated during the interviews, such coercive approaches have never discouraged the farmers to steal water from the scheme.

Figure 6.5: Location of the main canal in KIS



Source: Field Visits, 2014

Due to its closeness to people's residencies, and presence of other irrigation activities in the areas where it is crossing, the scheme has been vulnerable to free riding by those who do not contribute to its provision and production. As a result of its geographical location, the scheme faces difficulty in enforcement of the boundary rules (Ostrom, 1990), as insisted in government and UWAUKI regulations. Generally, the experience in the KIS shows how the bio-physical nature of the water resource may provide constraints in implementation of the policy instruments (Ostrom *et al.*, 2014).

6.4 Concluding Remarks

Throughout the chapter, the discussions have tried to show how different contextual factors affect the way that institutions are mediated by the actors (bricoleurs). The common tendency in the literature is to see scholars who emphasize on the focus on rational choice institutions and others who emphasize on cultural systems in management of the water resources in small scale irrigation schemes. The findings from this study have shown that in practice, neither of the two institutional frameworks operates in isolation of the material, physical, bio-physical or governance environments in which the resource is managed and utilised. Depending on the prevailing material, physical, bio-physical and governance conditions, both the rational and cultural institutions can be effective or not in guiding the water allocation processes in small scale irrigation schemes.

CHAPTER SEVEN

PREVALENCE AND FACTORS INFLUENCING WATER USERS' CONFLICTS IN THE SELECTED SCHEMES

7.1 An Overview

As it has pointed out in the previous chapters, water policy is implemented within an action arena in which multiple institutions and actors interact. Despite some advantages, multiple institutional and actor interactions sometimes fuel conflicts in the policy action arenas. Water allocation is one of the most contested and conflictive activities in water policy implementation due to presence of multiple institutions and actors in implementation arena. This chapter presents the results of the analysis of existence and prevalence of water users' conflicts in allocation processes and the factors determining their occurrence in the selected schemes.

7.2 Water Users Conflicts in Mkindo Irrigation Scheme (MIS)

At the outset it is important to indicate the socio-demographic and economic attributes of the farmers in MIS. Such characteristics, according to Lecoutere *et al.* (2010) and Mbeyale (2009), are important to identify because they determine an individual's predisposition to conflictive behaviours.

7.2.1 Socio-economic and Demographic Characteristics of the Farmers in MIS

In Mkindo Irrigation Scheme (MIS), the average household size is 5 members for the scheme members and 5.5 for the non-member irrigators. The average education level is 6 (years of schooling) for the scheme members while for the non-member irrigators is 5 years. The assets owned by the member households are land owned by majority (75%), followed by bicycles (10%), motorcycle (7%), power tiller (4%) and cars (1%). The average size of land possessed by the scheme irrigators is 2.5 ha acquired through cash (65%), inheritance (20%) and ranting (15%). The non-member irrigators have less access to the above asserts compared to the scheme members. In this group 60% of irrigators

own land with the average size of 2.0 ha, accessed through cash (55%), inheritance (25) and renting (20%). In addition, 15% of the non-member irrigators own bicycles while the rest do not own any assets. Moreover, no one owns a car or a power tiller among the non-member irrigators. The quality of housing has also been used as an indicator of the household wealth. The survey has indicated that the percentage of household with better houses (built with iron sheets, roasted bricks, concrete, lime and cement) is bigger among the scheme members (40%) than the non-member irrigators (15%). With regard to livelihood strategies, the results of the analysis showed that 84% of the member irrigators and 90% of the non-member irrigators in this scheme depend primarily on irrigated rice farming for meeting their livelihood needs. The remained percentages of these irrigators depend on non-farm waged and self employments.

Generally, the survey indicated that the non-member irrigators in MIS have less social and economic opportunities than the scheme members. As a result, the non-member irrigators have high dependence on irrigation farming and utilisation of the water resource for their livelihoods than the members. As it has been pointed out previously, high dependence on natural resources is linked to prevalence of allocation conflicts among the users.

7.2.2 Conflicts Types and Trends in Mkindo Irrigation Scheme (MIS)

Various types of water use conflicts exist in this scheme, but they can broadly be categorised as inter-micro micro and intra micro-micro (Warner, 2000) in Mbeyale (2009). FGDs with the farmers and interviews with the village and scheme leaders have revealed three major types of conflicts in the MIS falling the three categories. These are conflicts between the members in Mkindo Farmer Irrigation Scheme (MFIS) group and non-member irrigators from *Umoja Wa Umwagiliaji Mgongola* (UUMGO), conflicts between the irrigators in MFIS and UUMGO groups on one hand and the Maasai pastoralists on the other, and conflicts amongst the farmers inside MFIS and UUMGO groups. The first two types of conflicts fall within the category of inter micro-micro and the last one within the category of intra micro- micro conflicts.

In addition to interviews and FGDs the above conflicts were explored through review of estimated official statistics provided by the scheme and village government leaders. Such statistics show that within five years period from 2010 to 2014 approximately 35 conflicts involving members of MFIS were reported to the scheme leadership, Mkindo WUA and village government offices (see Table 7.1). Among these, 27 are intra micro-micro conflicts involving the farmers inside MFIS and 8 conflicts are between farmers in this group and the pastoralists.

Table 7.1: Number of intra and inter micro-micro conflicts in MFIS from 2010 to 2014

Type of Conflicts	Frequency annually					Total
	2010	2011	2012	2013	2014	
Inter-micro micro (between farmers and pastoralists)	3	4	1	0	0	8
Intra- micro micro (among MFIS members)	11	4	5	3	4	27
Total	14	8	6	3	4	35

Source: Mkindo Scheme and village government conflicts records

Basing on Table 7.1, there are decreasing trends in the number of inter micro-micro conflicts between the farmers and pastoralists in MFIS group. The main reason for such decreasing trends according to the scheme and village government leaders is strength of the irrigation infrastructures. As it has been pointed out earlier in chapter seven, the main canal in locations where the member irrigators in MFIS group access water is lined and constructed in such a way that it is difficult for the pastoralists to water their cattle. This has prevented encroachments by the Maasais and in turn reduced conflicts occurrences. In addition the scheme and village leaders indicated that the decreasing conflicts trends are due to patrol activities conducted around the scheme environment in the project area and severe punishment imposed to those who are caught using water illegally from the canal. Apart from the conflicts above there is a long standing conflict between the MFIS and UUMGO groups which has been persistent since the farmers extended irrigation activities to Mgongola area.

Conflict incidences in MIS have also been analysed basing on the number of intra micro-micro conflicts among the non-member irrigators in UUMGO and between this

group and the pastoralists (inter-micro micro conflicts) reported to the UUMGO leaders and village government office (*See Table 7.2*). Basing on Table 7.2, there are also some decreasing trends in inter-micro-micro conflicts between the UUMGO and Maasai pastoralists. According to the chairmen for Mkindo village, Mkindo WUA and MFIS leaders such decreasing trends have happened due to deployment of the traditional local militia group known as *Mwano*. As it has been indicated by the scheme and village government leaders, *Mwano* is the last hope the farmers in UUMGO have in their fight against the pastoralists after failure of the government to protect them. Through FGDs with the farmers and interviews with the group chairman, the study found that traditional militia group *Mwano* is believed to have magic power that is needed to fight the Maasais who are regarded by the farmers cruel and magical in their fighting techniques.

Table 7.2 Number of intra and inter micro-micro conflicts in UUMGO from 2010 to 2014

Type of Conflicts	Frequency annually					Total
	2010	2011	2012	2013	2014	
Intra- micro micro	15	10	12	9	11	57
Inter-micro micro	22	25	10	8	5	70
Total	37	35	22	17	16	127

Source: Scheme and village government records

7.2.3 Institutions, Bricolage and Water Users Conflicts in MIS

As it has been indicated earlier in chapter one, this study aimed among other things to explore the effects of institutional multiplicity on water users' conflicts. The findings from in-depth interviews with the scheme and village government leaders, officials in WRBWO and MVDC and interviews and FGDs with farmers revealed the mechanisms through which multiple institutions affect water users' conflicts in MIS. The findings show that, institutional multiplicity evolves as farmers mediate various formal and informal institutions through bricolage processes (*See chapter five*). Through such processes institutions are negotiated sometimes leading to improvement of water allocation processes but sometimes leading to distortions that fuel conflicts.

This study revealed that conflicts emerge as water users accentuate the traditional values and reject the formal institutions. For example, due to strong claims to nomadic culture the Maasai people have rejected the idea to reduce the number of cattle so as to conserve the environment and avoid conflicts, normally provided by the experts. According to the experts the pastoralists' behaviour contributes to existence of overgrazing and in turn fuels conflicts between the pastoralists and the farmers. Generally, differences in values guiding access and utilisation of the water resource between the pastoralists and the experts affect the government's efforts to prevent water use conflicts in MIS.

Apart from value heterogeneity between the government and pastoralists, conflicts in MIS also emerge due to presence of differences in belief about ownership of the scheme and how it should be managed (Polski and Ostrom, 1999). As it has been pointed out earlier in chapter six, the farmers in MFIS have declared exclusive ownership of the scheme while the non-members from UUMGO see that the water is everybody's property thus all people in the village have the right to use it. As a result of the perception that the non-members also have the right to own the scheme, the UUMGO group has been striving to obtain the water users' permit so as to legalise their abstractions and have equal ownership rights like the MFIS group. Such move however has been contested by the MFIS members who believe that the scheme is their private property as one of the leaders in this indicated during interviews:

The UUMGO group is now in the process of acquiring the water use permit. But this is not acceptable because this scheme belongs to MFIS. The group has paid a lot to make it exist. If UUMGO members want to use a separate permit they should have their own scheme because we do not accept separate permits to be used in our scheme.

While the farmers have such disagreements, the WRBWO has accepted UUMGO proposal to seek a water use permit although they have not yet approved the application. Currently, the WRBWO seems to be weighing the opportunity cost of endorsing or rejecting the application for the water use permit from the UUMGO group. In a real sense, WRBWO would not like to see its relations with MFIS ruined bearing in mind the

success and contribution this group has compared to many others in the basin including the UUMGO group.

Generally, the tensions existing in MIS show how water use permits are contested disapproving the view from the conventional institutional theory that formal institutions are rational and effective. As Meinzen-Dick and Nkonya (2007) have contended, in customary water management systems, allocation rights are always socially negotiated to reflect the reality on the ground; in this case the chance for reducing conflicts is likely to be high. Such room is difficult to find in the formal allocation mechanisms therefore conflict management is a bit difficult there. This argument can also be reflected in the conflicts between MFIS and UUMGO. The interviews revealed that MFIS leaders have no plan to negotiate with UUMGO in this matter. Instead such leaders have given the UUMGO members the ultimatum either to seek membership and pay fees to MFIS or stop using water from the scheme. Through the FGDs with the farmers and interviews with the group chairman in UUMGO, the study found that no discussions have been allowed between the two parts to see how they can resolve the matter.

The key lesson from the experience above is that, conflicts are embedded within the power relations of the actors. Sometimes actors use institutions in resource management to defend their power positions. The conflicts above emerge partly because each group wants to maintain power over control of the resource. As Lindbolm (1980), Polski and Ostrom (1999) have contended, possession of resources strengthens the actor's position in decisions making processes. Control of the water resource is important for both groups because it determines the decisions on how such resource should be distributed. In their side the MFIS members take the advantage of being at the upper course and the fact that they have been mandated by the government to own the scheme. As owners of the scheme the MFIS members have more rights as Schlager and Ostrom, 1992 have contended than the non-members. This group want to use such rights to control the non-member irrigators from the UUMGO group, something which the leaders and members in this group struggle to prevent. In establishment of the formal water rights, the

government aimed among other things to reduce conflicts among the users. Unexpectedly, the farmers in MFIS and UUMGO have used such rights as a weapon to maintain control on each other, something which have fuelled more conflicts between them. Despite having effects on actors' behaviours power relations have been overlooked in water policy design in Tanzania due to strong focus on rational choice traditions.

Apart from power contestations, the fight for identity is also evident in the conflicts between MFIS and UUMGO. As it has been pointed out earlier, the scheme leaders have instructed the UUMGO members to register with the MFIS group if they want to get water rather than seek their own water use permit. By registering with the MFIS group and paying the water use fees, the UUMGO group face the danger of losing not only finances but also its identity. The members and leaders of UUMGO have realised that danger and therefore decided to forward their case to Mvomero District Council and Wami-Ruvu Basin Water Office. In this case, the UUMGO members and leaders want autonomy in using the water from MIS.

In short this conflict has emerged due to presence of multiple identities. While the government recognise the irrigators in MIS collectively as farmers, in reality they have diverse interests and outlooks which make blanket regulations defined in the NAWAPO and WRMA difficult to operate. In line with these findings, Cleaver (2001) and van Koppen *et al.* (2004) have warned against the tendency by the policy makers to classify the resource users in static groups such as farmers or pastoralists. Their argument is that resource users have multiple identities which may promote or distort collective action in resource management.

Effects of institutional multiplicity is also evident in the way that the farmers in one hand and the government and donors in another view importance of the drain canals. Due to existence of too much water in the farms, the drain canals are very crucial in MFIS. Although the experts insist construction of the drain canals, some farmers have

not constructed them. Through the FGDs the study revealed that the farmers think that construction of the drain canals reduce the size of their farms as one of them indicated:

We have been instructed by the experts to construct the drain canals for prevention of conflicts and increasing productivity. Some of us however are still reluctant because we think that our farms will be reduced. I think more education is needed.

Those who do not have the draining canals normally drain water from their farms through the adjacent farms. This behaviour fuels conflicts because sometimes the water from the nearby farms destroy crops or prevent farming activities as the conflicts between Mrs Kandy and Mr Njemi (not real names) illustrates. According to Mrs Kandy excessive water from Mr Njemi causes water lodge in her farm making it impossible for her to apply the fertilisers.

I have made several attempts to apply fertiliser but I failed due to water lodge in my farm. I have tried to ask Mr Njemi to stop draining water through my farm so that I could apply the fertiliser but he would not listen. I have reported the matter to the scheme leaders but they have taken no action. I am now intending to send this case to the village government or the court if necessary.

To some extent the conflicts above evolve from difference in values towards the drain canals between the government and donors in one hand and the farmers in the other. If the farmers, government and donors would have a common way of seeing things, the drain canals would have been constructed albeit traditionally and conflicts would have been reduced or avoided inside the MFIS group. Conflicts persist because the farmers and experts have differences in belief about the drain canals. While the experts consider them as appropriate tools for water control and conflicts prevention, the farmers as it has been pointed out in chapter five have stuck to old farming habits. As contended by Cleaver and Franks (2005) habits and conventions make adaptations difficult and sometimes prevent effective implementation of the policy goals.

7.2.4 Prevalence and Factors Influencing Conflicts in MIS

Prevalence of water users' conflicts in this study was first explored through determination of the frequencies of farmer's involvement in intra group conflicts (intra micro-micro conflicts). In the first place the farmers were asked to state whether they were involved in such conflicts in the past five years from 2010 to 2014 or not. The findings have shown that only 30% (15 out of 50) of the scheme members in MIS said that they experienced conflicts with the fellow members within five years from 2010 to 2014. This is smaller percentage compared to 92% (46 out of 50) of the non-member irrigators (from UUMGO group) who were involved in conflicts with the fellow farmers in the group during such period. The frequencies of farmers' involvement in water users' conflicts with fellow farmers for members and non-member irrigators groups in MIS are summarised in Table 7.3.

Table 7.3 Frequency of farmers involvement in intra micro-micro conflicts in MIS

Frequency of involvement	MFIS Group		UUMGO Group	
	No. of respondents	Percentage	No of respondents	Percentage
Never	35	70	4	8
Sometimes	7	14	5	10
Often	5	10	9	18
Very often	2	4	11	22
Always	1	2	21	42
Total	50	100	50	100

Source: Household Survey (2014)

Apart from intra-group conflicts, the non-member irrigators (from UUMGO group) also have higher frequencies of involvement in conflicts with the Maasai pastoralists than the member irrigators in MFIS. Findings show that 48 out of 50 farmers in this group equivalent to 96% have experienced conflicts with the Maasai pastoralists within five years from 2010 to 2014. In the members irrigator's group (MFIS) only 4 farmers out of 50 (8%) said that they have experienced conflicts with the pastoralists during such period. Frequencies of farmers' involvement in water use conflicts with the pastoralists for the members and non-member irrigators in MIS are summarised in Table 7.4.

Table 7.4: Frequency of farmers' involvement in conflicts with pastoralists in MIS

Frequency of involvement	MFIS Group		UUMGO Group	
	No. of respondents	Percentage	No of respondents	Percentage
Never	46	92	2	4
Sometimes	4	8	6	12
Often	0	0	10	20
Very often	0	0	12	24
Always	0	0	20	40
Total	50	100	50	100

Source: Household Survey (2014)

Basing on the findings from the household survey, conflicts are still rampant in MIS despite formalisation of the water allocation processes through the water users' permits and tariffs and presence of the formal Water Users Group (MFIS, UUMGO) and Water User Association (Mkindo WUA). After understanding prevalence of water users' conflicts in MIS the study probed to determine the factors contributing to their occurrence across a wider population of the irrigators by using the logistic regression model and the results are as shown in Table 7.6. Basing on the results from the analysis the farmers' involvement in water use conflicts is determined by four major factors namely; irrigation farming experiences, irrigation farming benefits, water scarcity and encroachments.

Table 7.5 Marginal effects on factors influencing water users' conflicts in MIS

Variables	dy/dx	P> z
Sex of household Head	-.054	0.353
Age of household head	-.001	0.653
Household head's education level	.048	0.716
Irrigation farming experiences	.180	0.000**
Water Scarcity	.184	0.002*
Encroachments	.156	0.003*
Irrigation farming benefits	-.248	0.000**
Exclusion	.079	0.253

*Significance level at $p < 0.05$, ** Significance level at $p < 0.01$

7.2.4.1 Irrigation Farming Experiences

The analysis as shown in Table 7.6, indicates that the variable irrigation farming experience was positively correlated (0.180) with involvement in water users conflicts and statistically significant at $p < 0.01$. This implies that an increase in irrigation farming experience in terms of the number of years the farmers spent in such activity, increases the probability of their involvement in water users' conflicts by 18%. This relationship is contrary to the expectation which assumed that farming experiences decrease the possibility for occurrence of conflicts in small scale irrigation schemes increase. The assumption was that, when people have long farming experiences they have long period of interactions, therefore, it is easy for them to develop the norms of trust and reciprocity and avoid conflicts (Ostrom, 2000). Such norms normally help people to reach common agreements more easily in various decision making arenas and avoid disagreements that can develop to conflicts. In addition it was assumed that long experience in irrigation farming is associated with greater skills in handling issues having conflicts potential (Kiende, 2013). The possible explanation for the result from the analysis above is that, perhaps the current competitions for water have eroded the culture of tolerance and togetherness and promoted more individualistic norms which fuel conflicts among the farmers than before.

Apart from that, farmer's experience is normally related to the ability to adapt to best farming practices (Tazeze *et al.*, 2012). Among other things, the ability to adapt is crucial for conflict avoidance in agricultural water allocations. The results showing increase in water use conflicts as irrigation experiences increase probably suggest poor adaptability to farming practices and technologies that have water conserving and conflicts reduction potentials. Such results relate to the findings from KIs interviews and FGDs which indicated presence of conflicts due to failure to construct the drain canals. When the farmer-pastoral conflicts are considered, the results are not surprising. As it has been contended by van Koppen *et al.* (2007) achievement of positive collective

action norms that can promote sustainable resource use and prevent conflicts is difficult in communities or groups with different cultural orientations. So, the longer the period the farmer has engaged in irrigated farming, the more the chances for participating in conflicts with the pastoralists.

7.2.4.2 Water Scarcity

Water scarcity was also positively (0.184) correlated with the farmers involvement in water conflict and was statistically significant at $p < 0.01$. This implies that an increase in water scarcity increases the probability of water users' conflicts by 18.4%. This association is logical and is as assumed by the study, because normally when the farmers do not have enough water to share conflicts prevail in allocation arenas as contended in Lecoutere, *et al.* (2010) and Mbeyale (2009). In MIS acute scarcity of the water resource happens during the dry seasons and experienced by the non-member irrigators. These irrigators experience scarcity not because there is no enough water in the source but because they lack effective technology for transporting such water from the source to the farms. As for the member irrigators such problem does not exist because their farms are located in the project area where the main canal is fully lined.

In addition to technology induced, in MIS there is also distributional and relational scarcity faced by the non-member irrigators (from UUMGO group) arising from asymmetrical power relations (Kramm and Wirkus, 2010) between them and the scheme members. The KIs interviews and FGDs revealed that access to water is controlled by the scheme members who use the advantages of possessing a water use permit and their upstream location against the out of scheme irrigators who do not have water use permit and who are located at the tail end of the scheme. Whenever some misunderstandings happen, the scheme members in MFIS cut off the supply of water to the UUMGO causing complaints and sometimes active quarrels between them. The resulting scarcity the UUMGO members face is distributional and relational in nature because it arises not due to inadequate water supplies but due to deliberate decisions by the MFIS group to

manipulate the supplies. Generally, the analysis has revealed that water scarcity is a catalyst for water use conflicts similar to what Mbeyale (2009), Lecoutere *et al.* (2010) and USAID (2014) have found although findings in other studies (Bogale and Korf 2007) in Lecoutere *et al.* (2010) show that scarcity is not one of the factors determining prevalence of water use conflicts. Other factors have shown positive correlation with water users' conflicts in this scheme but are not statistically significant. These are sex, education level, primary occupation, encroachment, exclusion, rules awareness, involvement and scheme membership.

7.2.4.3 Irrigation Farming Benefits

Variable benefits had negative correlation (-0.025) with water users' conflicts and was statistically significant at $p < 0.01$. These results unexpectedly suggest that decrease in benefits accrued from irrigated rice farming by one unit increases the probability of farmer's involvement in water use conflicts by 2.5%. As argued by Sesabo (2007), most poor people in developing countries depend on natural resources for their livelihoods. As a result, benefits accrued from natural resource based economic activities determine their behaviours in resource allocation arenas. According to Mbeyale (2009), there is a close link between dependence on natural resources and users' involvement in conflicts. Hardin (1968) had once pointed out that the more users benefit from a resource, the more they will be tempted to increase its exploitation.

Obviously, this trend increases competition over the resource and leads to conflicts in the future as more exploitation take place and resource becomes scarcer. It is due to this logic that this study assumed increase in the probability of farmer's involvement in water use conflicts as benefit from irrigation farming gets higher. By showing that the probability of farmer's involvement in water use conflicts increases as benefit from irrigation framing decreases, the results from the analysis are contrary to the initial expectations of the study.

The possible explanation for these results is that because the farmers who do not have access to modern irrigation technologies are aggrieved in most cases they oppose the water use fees. Probably, the more they experience decrease in their harvests, the more they diverge from the fees, putting themselves in a high chance of falling into conflicts with the scheme leadership.

7.2.4.4 Encroachments

Variable encroachment was positively correlated (0.156) with the water users conflicts and was statistically significant at $p < 0.01$. These results imply that increases in encroachment by one unit increases the probability of a farmer's involvement in water use conflicts by 16%. The results are expected because, initially, it was assumed that people get offended when others trespass into their properties and use their resources without agreements. Furthermore, the results are not surprising because they prove what is provided in the literature. For example, the study by Mbeyale (2009) showed that pastoralists' encroachments on the farms had positive association with occurrence of conflicts between farmers and pastoralists in the Mountain villages of Pare community in Pangani Basin. The results are also as expected because they coincide with what farmers and leaders provided during FGDs and KIs interviews respectively. The FGDs and KIs interviews indicated prevalence of encroachment behaviour in areas where the non-member irrigators are located. It was found that, due to presence of poor irrigation infrastructures, the canals in this area can easily be entered by the pastoralists and fellow farmers when they want to steal water.

The member irrigators in MFIS group also experience conflicts resulting from encroachment behaviour though not to a large extent as the non-member irrigators. The conflicts arising due to absence of drain canals, as discovered through the FGDs and KIs interviews (*See Section 7.2.3*), provides a good example for this. Generally, findings from the household survey support what the study found about encroachment, as a factor

contributing to occurrence of water use conflicts in MIS through qualitative research procedures.

Generally, the results from analysis of the household survey, KI interviews and FGDs indicate existence of factors other than institutional multiplicity contributing to water users' conflicts in MIS. In particular, the findings indicated that water users' conflicts in MIS are also induced by the existing physical, bio-physical and demographic conditions in addition to tensions triggered by institutional multiplicity.

7.2.5 Institutions and Conflicts Resolution in the MIS

The NAWAPO and WRMA have insisted resolution of conflicts through the Water Users Associations (WUAs) and use of formal rules and regulations. In MIS there is Mkindo WUA; whose aim among other things is to resolve the water use conflicts. Apart from the Mkindo WUA, the village and ward governments have also been used in resolving the conflicts. According to the MFIS chairman, most of the conflicts happening among the farmers are solved within the group using the group by-laws. Rarely such conflicts are sent to the Mkindo WUA, Village government or Mkindo Ward for resolutions. In case the conflict has been forwarded to such higher organs, the group by-laws are first used then if the case is still unresolved the government by-laws are applied. In case the fines need to be paid, the matter is normally forwarded to the Village or Ward governments because the Mkindo WUA currently has not been endorsed by the WRBWB to collect the fines as the chairman of the WUA indicated during interviews:

We are willing to work with the government to make sure that water resource is prudently used and shirkers punished. Our efforts however are constrained by lack of the legal mandate to collect the fines.

This leader is of the opinion that fine is the simplest penalty that can be used to regulate the water users' behaviour. In a way his ideas conform to the emphasis on graduated sanctions found in NIE works pioneered by Ostrom (1990). Despite emphasis on formal sanctioning mechanisms, the prevailing situations sometimes force the leaders to solve

the conflicts informally through such ways like telling the offenders to clean the irrigation canal or farm paths. Basing on these leaders such informal mechanisms are mostly used when the offenders do not have ability to pay or when the labour force is needed to carry out some cleanliness works around the canal or farms. In some circumstances the elders in Mkindo village have been used in mediation of the conflicts. In such situations the customary norms (mostly forgiveness or payment of fines in cash or goods) are used.

As interviews with the leaders and farmers revealed, the above formal and informal mechanisms apply mostly to the conflicts involving the farmers within the scheme or between them with the other farmers in the village. The study has found that none of these mechanisms have been effective in solving the conflicts between the farmers and pastoralists. Due to absence of reliable formal mechanisms for resolving conflicts with the pastoralists, farmers have used the traditional militia group known as *Mwano*. The study has found that, when it comes to prevention of the Maasai aggressions, most of the farmers in MFIS and Mkindo village have faith in this local militia group than the government institutions. According to the farmers, deployment of the traditional army has helped to minimise the frequency of invasions by the Maasai pastoralists. This has in turn contributed to minimisation of conflicts between the pastoralists and the farmers in the scheme and the entire Mkindo village. Generally, most of the villagers have the feeling that the government has no capacity to take strong measures against the conflicts whenever they emerge, so they prefer to solve them in their own traditional ways. The farmers' discourses towards water use conflicts are in a way similar to the view from the critical institutional scholars like Cleaver (2001) and scholars in conflicts literature like Nkonya *et al.* (2009) who posit that, states in developing countries lack strong systems for resolving resource use conflicts. This situation then calls for synergetic approach between the formal and informal systems as the empirical study by Maganga (2003) has indicated.

7.2.6 Conflicts Management Approaches

Basing on the interview results, the choice of conflicts resolution approach depends on the type of conflict at hand. The collaborative approaches such as forgiveness apply mostly when the conflict emerge within the farmers groups. When the conflicts involve the farmers and the pastoralists, the chance for collaboration is very slim. In most cases the famer-pastoral conflicts are resolved through competing approach. In this case, conflicts are normally resolved through open fighting and interventions by the police. Currently, the government has jumped to more aggressive approach ever; digging and constructing a ditch to separate the Maasais in Kambala village with the farmers in all villages found in the area (Mwananchi, Jumanne April, 2016 pg 34). This decision reinforces the use of competing approaches in resolving the conflicts between the farmers and pastoralists in villages surrounding the MIS.

Although the government has faith in this aggressive approach, both the farmers and pastoralists do not believe that it will solve the conflicts (Mwananchi, Jumanne April, 2016: p 34). Actually, according to the farmers and pastoralists such approach will give more confidence on both sides to fight and kill if necessary in case any of them breach the order and cross the ditch to the other side. Contrary to the belief by the government that these two parts cannot be reconciled peacefully, the study has found some possibilities of ending the conflicts through negotiations because the farmers and pastoralists said during the interviews that they are now tired of the conflicts. Moreover, interviews with the village and traditional leaders in Mkindo and Kambala villages have shown that, both sides support formation of a joint committee that will receive and mediate the conflicts before they escalate. If the government capitalise on these local efforts there is a great chance of solving the conflicts in peaceful means.

7.3 Water Users' Conflicts in KIS

Experiences from water allocation processes in KIS also indicate prevalence of water users' conflicts. As it has been assumed before, water use conflicts in this scheme arise

from both institutional and non-institutional factors. At the outset, it is important to provide the general picture on social-demographic and economic characteristics of the water users in KIS before providing the detailed discussions of the conflicts incidences and the contributing factors.

7.3.1 Socio-demographic and Economic Characteristics of the Water Users in KIS

In Kiroka Irrigation Scheme (KIS) the average household size is 5.6 members for those irrigating through the scheme and 5.8 for the non-member scheme irrigators. The average education level of the household head is 5 (years of schooling) for the scheme members while for the out of scheme irrigators is 4. The assets owned by the households having membership to the scheme irrigating in the scheme are land owned by majority (70%), followed by bicycles (18%), motorcycle (7%), power tiller (4%) and cars (1%). The average size of land possessed by the scheme irrigators is 2.0 ha acquired mostly by cash (60%), followed by inheritance (10%) and renting (30%). The non-member irrigators have less access to the above asserts compared to the scheme members. The survey showed that (32%) of these farmers own land with the average size of 1.5 ha acquired through cash (17%) inheritance (35%) and renting (33%). Moreover, (15%) own bicycles while no one owns a car or a power tiller. The quality of housing has also been used as an indicator of the household wealth. The survey indicated that the percentage of household who own better houses (built with iron sheets, roasted bricks, concrete, lime and cement) is bigger among the scheme members (35%) than the out of scheme irrigators (10%). Regarding the livelihood strategies, the results of the analysis showed that 90% of the member irrigators and 86% of the non-member irrigators in this scheme depend primarily on irrigated rice farming for meeting their livelihood needs. The remained percentages of these irrigators depend on non-farm waged and self employments.

Generally, in KIS the member household heads have more access to the livelihood resources than the household heads among the non-member irrigators. Such differences however are not accidental. As interviews conducted to the farmers prior to this survey

indicated, farmers who benefit most from the irrigation improvement initiative are those owning or renting pieces of land in the project areas. In such areas irrigation infrastructures have been improved hence farmers have easy access to water, high productivity and consequently higher capability to improve their access to various livelihood resources. Most of the non-member irrigators however, own or rent pieces of land outside the project areas where irrigation infrastructure is still traditional and whose productivity is low. This situation affects their capacity to acquire different livelihood assets.

7.3.2 Conflicts Types and Trends in Kiroka Irrigation Scheme (KIS)

Among the notable outcomes of the water allocation processes in KIS is persistence of the farmers conflicts over water access and use. Despite the government efforts to improve irrigation infrastructures in the scheme the study findings show that conflicts are still rampant. The common conflicts found in the KIS are inter-micro micro conflicts between the members of *Umoja Wa Umwagiliaji Kiroka* (UWAUKI) and non-member irrigators from around the Kiroka and Kiziwa villages and intra-micro micro conflicts involving the farmers inside UWAUKI. The intra group conflicts among the non-members of the scheme are not common in this area because these irrigators mostly use pipes to divert water from the rivers thus difficult for them to encroach on each other.

Existence of water users' conflicts in KIS was first explored through the in-depth face to face interviews with the village chairpersons for Kiroka and Kiziwa Villages. In the first place the estimated statistics on conflicts incidences were sought. Basing on these leaders, within five years period from 2011 to 2014 about 124 cases of conflicts were reported in the village government office for resolution (*see table 7.7*).

Table 7.7: Water users' conflicts for five years by reported cases in KIS

Types of Conflicts	Frequency annually					Total
	2010	2011	2012	2013	2014	
Intra- micro-micro	22	10	8	7	5	52
Inter-micro-micro	12	15	20	15	10	72
Total	34	25	28	22	15	124

Source: Scheme and village government conflicts records

The official records in Table 7.7 shows that, 58% of the water users' conflicts in this scheme fall within the inter micro-micro conflicts category involving the UWAUKI group and the non-member irrigators from the surrounding villages. The intra micro-micro conflicts within the UWUKI group happen mostly in Block 'B' and 'C' where the main canal is still not lined. Due to improvement of the irrigation infrastructure in block 'A', occurrence of intra-micro-micro (intra-group) conflicts among the farmers has somehow decreased. According to the scheme chairperson, existence of improved irrigation scheme in Block 'A' has eliminated the scramble over water the farmers used to face previously.

7.3.3 Institutions, Bricolage and Water Use Conflicts in KIS

During the in-depth interviews with the scheme, village leaders and farmers the causes of conflicts were explored. As it was initially assumed, institutional multiplicity was found to have a contribution on water use conflicts in the scheme. Specifically, the findings from the study revealed existence of values differences between the member of the scheme and non-member irrigators. While the members emphasize formal management and allocation of the water resource through UWAUKI, the non-members are interested in the informal groups and mechanisms. Differences in value between the UWAUKI members and non-member irrigators has led to frequent clashes which sometimes have left the scheme infrastructures destroyed as the scheme chairperson indicated during the interviews: *"Those who do not like to pay for water have decided to vandalise the scheme. But we the UWAUKI members have decided to protect it because we understand how it is beneficial to us"*.

Generally the prevailing situation in KIS shows how implementation of the water policy is confronted with resistance from those whose interests seem to be threatened (Thomas and Grindle, 1990). Before construction of the scheme the villagers enjoyed free access to water for agricultural production. The study has found that most of the villagers resist joining UWAUKI because they do not see the logic of having restrictions on water while they used to get it free of charge.

Due to opposition against the formal grouping and mechanisms, the non-member irrigators have chosen to access water from the scheme through the informal means; mostly water theft. As a result of encroachment behaviour most of the time the non-member irrigators have been in confrontations with the UWAUKI group as indicated by the scheme chairperson during the interviews: *“Illegal connections pose great challenge to sustainability of our scheme. The big problem is that the thieves connect their pipes during mid night making it difficult to stop them”*.

The experience above shows how specification of the boundary rules is more of a theory than a practice in KIS. Theoretically, access is only to those who have the water users permits’ (URT, 2009), but in reality one can use any other means outside the formal system to get water. These informal mechanisms for water access in small scale irrigation schemes like the KIS have been overlooked in the formulation of NAWAPO and WRMA.

Besides institutional multiplicity there are other factors emanating from the physical and bio-physical environments, governance system and social-demographic characteristics of the farmers. With respect to physical conditions the main issue is the existing water conveyance technologies. Besides value differences, the conflicts in KIS are indicative of distribution problems contributed mainly by lack of effective water conveyance infrastructure. As a result of poor infrastructure, the non-member irrigators face great uncertainty in water access and utilisation. Specifically, crude diversion and storage technologies used by the non-member irrigators make withdrawal of water from the rivers challenging. The only easy way for such irrigators to get water is to use shortcuts

such as connecting pipes in KIS' main canal during the midnights. By doing so, the non-member irrigators find themselves in constant clashes with the UWAUKI group.

Poor irrigation technologies also promote scramble among the member irrigators contrary to the assumption in the policy that organisation of the water users in formal groups will promote orderly. As farmers who divert water through unlined canal explained during the FGDs, distribution of water in their area depends on one's power either physically or economically. For those with physical power they manage to guard their irrigation turns (*zamu za umwagiliaji*) to prevent interruptions from the illegal users or fellow members who want to steal the turns. The farmers with economic power normally use money to higher the guards. Not only that, the rich farmers also manage to augur their supplies through sophisticated technologies such as water pumps which normally drain most of water from the canal leaving others with little to share. This experience shows that conflicts in the KIS are triggered not by poor conveyance technologies alone but also asymmetrical access to effective technologies needed for conveying water. Generally, technological challenges exacerbate scarcity which in turn causes distributional scrambles and consequently conflicts. According to the farmers' scarcity of water in this scheme is experienced mostly during the dry season when the intake receives too little water from the rivers and the canal becomes almost empty (see *Figure 7.1.*). In such situations too little water reach the lower course farms due to the use of earthen canals in transportation of water.

Figure 7.1: Dry season flows in KIS



Source: Field Visits, 2014

Unequal distribution of water has triggered resentments from the poor and powerless farmers such as women, widows or the elderly who normally have no means to protect their turns. In general, this situation reflects the argument by Kramm and Wirkus (2010) that a bundle of power is more important in water distribution than a bundle of rights. In this case the disadvantaged farmers have no assurance to get water despite the fact that their rights are formally recognised by the national law.

Apart from technological challenges, the farmers and village government leaders perceive the existing governance systems as contributing factors to conflicts in KIS. In their argument the farmers refer to the recent leadership crisis between the chairperson and secretary of the group. In this particular case the chairperson of the group was accusing the secretary for insubordination and interference in her responsibilities. Moreover, the use of informal procedures in determination of the water use prices for the external customers is also considered as a conflicts triggering factor. As it was revealed by the scheme leaders during the interviews, KIS depends on the resolutions from the past meetings to make the decisions on the various issues concerning the scheme and the water resource. Interviews with the scheme and village leaders and FGDs with the farmers indicated that the meeting resolutions up on which all decisions are normally made are open to violation by the unfaithful leaders due to lack of legal power. Violation

of the meeting resolutions is regarded by the farmers and leaders as one of the factors fuelling frequent conflicts in the group.

Basing on the opinions by the farmers, and the village government, ward and scheme leaders the leadership tensions could not exist if the leaders were legally bound to follow the rules as reflected in the quote that: *“I am sure when this group gets its constitution; most of the leadership problems will be avoided”*. This comment as provided by the Kiroka ward councillor shows optimism on the role of the formal rules on management of the water resource and the scheme in general. The argument provided is that the loopholes for violation of the rules by the leaders exist because the meeting resolutions are easy to breach due to lack of legal back up. In this way the farmers and village government leaders in KIS argue in favour of the rational choice systems because such systems work through the formal legal rules (Pettit, 1996; March and Olsen, 1995; Scott, 1995).

While the formal systems are emphasised in KIS, in the critical institutional thinking the focus is on synergetic approaches in which both formal and informal institutions are given considerations in water resource management (Merrey and Cook, 2012). In such a view, the formal systems are considered too remote to capture the daily realities in resource management contexts. Deliberation of the scheme affairs through the meeting resolutions in the KIS reflects flexibility insisted in critical institutionalism. However; instead of leading to improvements as suggested in critical institutional theory, the exiting flexibility has been a source of conflicts in the scheme. The main problem which the study has found is lack of commitment to make sure that the meeting resolutions are well kept and used or changed through consensus rather than few peoples' interests. The challenges existing in KIS do not invalidate the focus on informal systems insisted in critical institutionalism but rather indicate the importance of synergy in management of the water resources in small scale irrigation schemes. Generally, such challenges confirm the argument that between the formal and informal institutions neither is superior to the other (Cleaver and Franks, 2005; Merrey and Cook, 2012; van Koppen *et*

al., 2007). Depending on the prevailing circumstances in which the resource is managed each of them can be effective or ineffective.

7.3.4 Prevalence of Water Users' Conflicts in KIS

Prevalence of water use conflicts in KIS has been determined through the frequencies of farmers' involvement in such conflicts obtained through the household survey. In the first place the farmers were asked to state if they had participated in any water use conflicts with the fellow farmers within five years from 2010 to 2014 or not. The results have shown that majority of the farmers (30 out of 50) in UWAUKI equivalent to 60% have experienced conflicts within such period. After participation of the farmers in water use conflicts with fellow farmers in the KIS was explored, the frequencies of their involvement in such conflicts were quantified and the results are as shown in table 7.8.

Table 7.8 Frequency of members' involvement in intra-micro-micro conflicts in UWAUKI

Frequency of involvement	No. of respondents	Percentage
Never	20	6
Sometimes	8	10
Often	7	12
Very often	5	18
Always	10	56
Total	50	100

Source: Field Survey, 2014

Apart from the intra group (intra micro-micro) conflicts, the study sought to understand the prevalence of inter-micro micro conflicts between the members of UWAUKI and non-member irrigators. These were explored by asking the non-member irrigators to state their involvement in conflicts with the UWAUKI group in the past five years from 2010 to 2014. Findings from the survey have shown that, 42 out of 50 non-member irrigators (equivalent to 84%) have been involved in conflicts with the UWAUKI group within such period. The frequencies of their involvement in water use conflicts with the UWAUKI group have been indicated in Table 7.9.

Table 7.9: Frequency of non-member irrigators' involvement in Conflicts with UWAUKI in KIS

Frequency of involvement	No. of respondents	Percentage
Never	6	8
Sometimes	2	4
Often	4	8
Very often	9	18
Always	29	62
Total	50	100

Source: Household Survey in KIS, 2014

7.3.5 Factors Determining Water Users Conflicts in KIS

After determination of farmers' participation and their frequencies in water use conflicts, the logistic regression model was estimated in order to determine the contributing factors, and the results are as shown in Table 7.10. The logistic regression model was estimated so as to understand the factors contributing to water use conflicts across the wider population of the farmers in KIS and the surrounding the villages. Basing on logistic regression model, three major factors influence water users' conflicts in KIS namely irrigation farming experiences, benefits from irrigated farming and exclusion.

Table 7.10: Marginal effects on factors determining water users conflicts in KIS

Variables	dy/dx	P> z
Sex of household head	.061	0.464
Age of household head	.004	0.410
Household head's education level	-.026	0.834
Irrigation farming experiences	.090	0.004**
Water Scarcity	.134	0.297
Encroachment	-.059	0.649
Irrigation farming benefits	.187	0.037*
Exclusion	.197	0.018*

*Significance level at $p < 0.05$, ** Significance level at $p < 0.01$

7.3.5.1 Irrigation Farming Experiences

Farming experiences correlated positively (0.090) with water use conflicts in KIS and statistically significant at $p < 0.01$. This implies that an increase in farmers' experiences in irrigated farming by one unit increases the probability of conflicts occurrence by 9%. This is against the expected sign which implied that increase in farmers' experiences in irrigation farming reduces the possibilities for the conflicts to occur. The initial assumption was that the longer the period the farmers participate in irrigation farming the greater the skills on how to predispose themselves away from conflicts (Ostrom, 2000; Kiende, 2013). As far as the non-member irrigators are concerned, the results may not be that much surprising. Possibly the existing results indicate that those having long experiences have great courage to violate the rules (through water theft). This being the case their chance of experiencing conflicts is higher than the new comers who may not be courageous enough to steal water from the scheme. With regard to the UWAUKI members the results possibly suggest that as farmers' duration in irrigation farming increases their chances of having confrontations over water increases due to scarcity which the experiences have shown increases as more people join irrigation activities. As a result of being offended for long period of time, the farmers lose patience thus increasing their chance of falling in to conflicts with colleagues. Although elsewhere farmer's experiences are positively associated with innovative behaviour (Tazeze *et al.*, 2012) and possibly low conflicts rates, in irrigation farming in KIS, as this study has indicated, it has been a catalyst for conflicts.

7.3.5.2 Exclusion

Exclusion was also significant and positively (0.198) correlated with water use conflicts in KIS and had statistical significance at $p < 0.05$. This signifies that exclusion increases the probability of farmer's involvement in water use conflicts by 19.8%. Specifically these results imply that the more the farmers are excluded from enjoying the benefits of the irrigation farming, the more the chance for conflicts to happen. These results are expected as far as the situation in the KIS is concerned. The study has found that the

non-member irrigators, especially from Mahembe hamlet in Kiroka village have not been happy because of being excluded from the scheme. According to the UWAUKI chairperson, the non-member irrigators have not been allowed to use water from the scheme because they do not cultivate rice which is the only crop allowed in the project. According to the farmers from Mahembe when the proposal to establish KIS was discussed, the agreement was that the scheme would also provide water for irrigation in their area where farmers can irrigate vegetables and other crops instead of rice. The farmers agreed to provide portion of their land to allow for construction of the scheme (*as evidenced in Figure 6.4 Chapter six*) with the hope that they will also benefit from the scheme. Although the leaders promised to construct diversion structures so as to distribute water to this area until now, such structures have not been constructed, and Mahembe villagers have not been allowed to use the water from KIS to water their gardens.

The village government and UWAUKI leaders want the Mahembe villagers either to join the association and cultivate rice or buy the water as independent users if they want to use water to irrigate vegetable gardens. Because most of the villagers in Mahembe do not have plots at the lower course where rice can be grown, they will have to hire the rice plots first before they can be members to the association. This option has not been suitable to Mahembe villagers who do not have experiences with rice cultivation. Buying the water as independent users has not been a viable option either, due to low ability to pay the fees charged by the UWAUKI group. The members of UWAUKI claim that they have contributed a lot in order to make the scheme operate, thus the non-members should pay some fees so as to compensate them. Considering the costs of hiring the plots and paying the bills most of the villagers in Mahembe find options of being members of UWAUKI or buying the water as independent users very expensive. As a result, some of the villagers from this area have opted to steal water from the scheme. In most cases the Mahembe villagers deciding to steal water find themselves in the arms of the UWAUKI members. This situation makes them feel excluded. It is not

only the out of scheme farmers who feel excluded from the benefits of the scheme but also the members of UWAUKI who abstract water from the unlined canal. Although they contribute equally with the other members, the share of water that they get is smaller because most of it gets lost on the way due to poor conveyance infrastructures.

7.3.5.3 Benefits from Irrigation

Benefits accrued from irrigation is positively correlated (0.187) with water use conflicts and is statistically significant at $p < 0.05$. Expectedly, this implies that an increase in benefits from irrigated farming increases the probability of water use conflict by 18.7%. Opening of the market opportunities in Dar es Salaam and Morogoro Municipality has made irrigated farming more beneficial. As a result of increased benefits, irrigated farming for vegetables, fruits and rice has expanded significantly in KIS and the surrounding areas; as a result, demand for water has also grown higher than before in the surrounding villages.

As descriptive statistics have indicated, 45 out of 50 members of UWAUKI (90%) perceived irrigated rice farming as a major source of their livelihoods. On the other hand 43 out of 50 (equivalent to 86%) of the non-member irrigators out of scheme irrigators, perceived irrigated vegetable and fruits farming as crucial for their livelihoods. These statistics show how water is a central livelihood resource to the farmers in UWAUKI and the surrounding villages. Due to its centrality to human survival irrigation water has been a centre for stiff competition between the rice growers in UWAUKI group and vegetables and fruits growers from outside the group. While the UWAUKI members seek to control access to the water from the KIS, the out of scheme irrigators always negotiate their way to get such water. This situation fuels frequent conflicts between the two groups.

Although in Lecoutere *et al.* (2010) the socio-economic and demographic characteristics of the farmers (sex, age, and education level, income, family size, and the primary occupation of the household) were found to have significant effects on water users

conflicts, in this scheme the analysis has shown that they are negatively correlated with the water users conflicts. Other factors have positive correlation but are not significant. These are laws awareness, encroachment, technology, involvement and scheme membership.

7.4 Institutions and Conflicts Resolutions in KIS

As interviews with the traditional elder in Kiroka village indicated, during the period of active *Mwana Banzi* leadership, the villagers made maximum use of the elders or elders' council to solve the conflicts. This elder still perceive the use of the elders or elders' council as a better way of addressing the conflicts than depending on the formal court systems. However, the study has found that direct use of the traditional elders in solving the conflicts is currently not common in UWAUKI group. Furthermore such mechanism is fading away day after day in villages surrounding the scheme. Currently, the elders' council (*Wazee wa Milunga*) participate mostly in solving the cases involving witchcraft issues or violation of some traditional rituals than water use conflicts.

With respect to water use conflicts the common tendency that the study has found is for the parties to resolve the issues through informal face to face discussions mediated by the scheme leaders or solve the case through the village government office or if necessary the Ward Tribunal. Although the power of the elders' council as decision makers in various conflicts has been reduced, they play an important role in modern conflicts management system through provision of some clarifications and advices on matters related to application of the customary laws in Ward Tribunals.

Due to the absence of written rules in KIS, decisions are normally guided by UWAUKI'S resolutions agreed during the various general or emergence meetings. The meeting resolutions by UWAUKI are also used by the village government leaders when resolving the conflicts. This is due to the fact that the village government has no clearly defined guidelines for resolution of the water users' conflicts. When the matters fail to be resolved at the village government level, the case is then forwarded to the ward

tribunal or primary court. In these levels, the scheme guidelines and some customary laws are also used but, if these fail the government laws are normally applied.

In all levels where conflicts are reported, the use of informal mechanisms for penalising the offenders is common. Generally, the punishments in KIS do not reflect the graduated sanctions emphasised in conventional institutional (the rational choice) theories. Instead of the graduated sanctions, the leaders sometimes take the humanitarian approaches in punishing the offenders as the scheme secretary provided during the interviews:

In punishing the offenders we use different means. Sometimes we tell them to pay monetary fines. But some people do not have ability to pay therefore; we allow them to provide goods or their labour for various O&M activities.

According to the ward, village and scheme leaders, before the offenders are penalised the factors such as poverty, sickness or any other social problem which may prevent a person from paying the fines are normally considered. In some incidences the offenders have been forgiven, especially when they are found to cooperate and regret their mistakes. Generally, the penalties in KIS are not always formal, graduated and intended to inflict an offender with pain or make one part feel victorious over the other as conventional institutionalism advocates (Ostrom, 1990). In some cases penalties are approximated aiming to regulate behaviour while maintaining good social relations between the parties (Meinzen-Dick and Nkonya, 2007; Cleaver, 2001; Cleaver and Franks, 2005).

7.5 Approaches in Conflicts Resolution in KIS

The study has found some collaborative initiatives, especially forgiveness in resolution of the conflicts among the farmers in the KIS. Although the culture of forgiveness is preferred, competing approach is also used in conflicts resolutions. According to the scheme and village government leaders, the UWAUKI group have attempted to end their conflicts with the non-members connecting illegally to the scheme by allowing them to buy water as external customers. But the non-member irrigators have refused to buy

water claiming that the prices are too high. Since they have refused to buy water, the group has remained with no choice but to catch and punish them whenever they are caught abstracting water from the scheme. This is purely a competing approach to management of water use conflicts between the UWAUKI and the rest of the irrigators in the surrounding villages. Some of the non-UWAUKI members have succumbed and decided to completely stop using water from the scheme so as to avoid clashes. Such decision indicates existence of accommodating approach in conflicts management. In this decision the non-UWAUKI members have displayed unassertive and cooperative behaviour to the conflict. This is because instead of keeping on with the fight, these irrigators have decided to sacrifice their own interests in order to satisfy the interests of the UWAUKI group although it is against their wishes. In addition to competition and accommodation, avoidance approach is also applied in conflicts management in this scheme. This approach is used mostly by the government agencies. According to the non-member irrigators, despite sending their complains to the government leaders that they are not satisfied with the rules and regulations passed by UWAUKI group regarding access to water no measure have been taken by the government to address the situation. While the farmers expect interventions by the government, the guideline give greater autonomy to the irrigators' groups to make decisions with regard to water allocation in their scheme. According to the government officials at the village and ward levels, in this conflict the government is not a major decisions maker. The final decision is in the hand of UWAUKI members. This argument by the government leaders is seen by the aggrieved farmers as an excuse to avoid the conflicts.

7.6 Concluding Remarks

As it has been shown in this study, the MIS and KIS are among the schemes that have high magnitude of water users' conflicts despite existence of statutory control instruments. In fact, adoption of water use permit and tariff systems has resulted in new types of conflicts between the users with permits and those having no permits to use water in addition to intra-group conflicts used to happen before. Those with water use

permits (the UWAUKI and MFIS) assume that they have exclusive ownership to the schemes and the water resource. Whenever they see users without permits using it, they feel bitter and try to stop them. Sometimes force is used leading to escalation of conflicts. On their side, the users outside the schemes assume that they too have the right to use water. In short, the study indicates that inter-group conflicts persist in the selected schemes due to differences in values between the users who have adapted to modern access and utilisation mechanisms and those who still want to use conventional ways such as free abstractions and theft. On the other hand, the intra-group conflicts persist mainly due to scarcity of water aggravated by poor irrigation infrastructures and unequal power relations. Generally, the study has found that water users' conflicts are influenced by multiplicity of the existing institutions. Across the wider population of the users however, institutional multiplicity is not the only factor. Some other factors emanating from the physical, material, social and bio-physical conditions in which the policy is implemented as well as the social-economic and demographic factors have significant contribution on water use conflicts in the scheme.

CHAPTER EIGHT

CROSS-CASE DISCUSSIONS AND COMPARISONS

8.1 Overview

This chapter compares and contrasts the study findings across Mkindo and Kiroka irrigation schemes. The two schemes are compared and contrasted basing on the study objectives. The discussions and comparisons are made basing on the theoretical assumptions implicit in each study objective. The major aim of the chapter is to identify experiences which are similar across the schemes and those which are different as far as the study objectives are concerned before arriving at specific and the general conclusions about the study. This approach is similarly explained in Yin (2003).

8.2 Actors' Roles and Interactions across the Schemes

As it has been indicated in the study findings, both schemes under the study operate under the influence of multiple actors which evolved through various institutional reforms in water resource governance. The first category of actors responsible for water resource management in the schemes comprises the scheme leaders. In both schemes the leaders are organised into formal committees endorsed by the respective district councils. When the two schemes are examined, more stable leadership is found in the MIS than the KIS. In the KIS, absence of written constitutions is considered a factor contributing to fragmented and unstable leadership. On the other hand, stable and systematic leadership has developed in MIS due to utilisation of written constitution in which all rules governing the scheme have been stipulated. In addition to written constitution, stable leadership in MIS is attributed to frequent exposure to training and education programmes on scheme management offered by Mkindo Farmers Training Institute. As it has been discovered in this study, such training and education opportunities do not exist in KIS.

Generally, the competence existing in MIS are associated with adherence to formal rules in the way activities are managed. This situation, however, does not provide justification for bias towards the rational choice systems, because there are other circumstances in which the informal systems have played a role in management of the schemes. For example the use of informal approaches in carrying out the O&M activities known as *Kiwili* in MIS and *Msalagambo* in KIS is evidence that the informal systems are useful in management of the water resources in small scale irrigation schemes.

When the findings on roles of leadership from the two schemes under the study are compared, the need for the actors to establish communication with the external systems is evident. While the role of external facilitation is crucial, in critical institutionalism it has not been strongly and openly emphasised. The rational choice theory tries to show how actors are influenced by explicit formal and informal rules. This theory however ignores cultural affiliations and agency exercised by the actors in utilisation of rules. It is in this light that Merrey and Cook (2012) insist on a focus towards facilitated bricolage. In this approach, both, the externally imposed rational rules and internally evolved cultural rules are considered in government efforts to enhance management of the water resources in small scale irrigation schemes.

Another category of actors comprises farmers who have been categorised as members and non-member irrigators. The study has found different experiences across the schemes with respect to the roles and interactions of the scheme members. While the members are internally well organised in MIS, in KIS the members are fragmented. The major factor contributing to fragmentation of the members in the KIS is unequal technological improvements. The study has found that the members, who abstract water from the earthen canal, are not strongly affiliated with the scheme. In most cases, such members do not have common understanding towards the policy instruments with their colleagues in Block 'A' where the canal is lined and water is easily accessible.

While the schemes show differences with respect to members' interactions, they have similar experiences with respect to interactions between the members and non-member

irrigators. The study has found that the members and non-member irrigators do not have common understanding concerning various water management issues. For example in both schemes the non-member irrigators have not been willing to join the member groups and pay the water use fees. The main factor behind such resistance among the non-members according to the findings is lack of effective irrigation infrastructures. The non-member irrigators in both schemes do not feel motivated because their productivity is low due to utilisation of poor technologies. Basing on findings from both cases, technological improvements are crucial for effective management of the small scale irrigation schemes and enforcement of the water allocation institutions. Despite their importance, technological developments should focus on empowering the poor resource users to manage resource and meet their livelihood needs; otherwise, as Keraita *et al.* (2012) found out that, technology may lead to intensifications of water use crises in such schemes.

8.3 Evolution of Water Allocation Institutions

As contended by Abrams (1982), the efficacy of institutions depends on the historical paths through which they have evolved. Influence of historical paths on performance of water allocation institutions has been observed in both schemes under the study. Specifically, the study findings have indicated that performance of water resource institutions in both schemes have been influenced by the pre-colonial, colonial and post-colonial governance systems. Governance aspect from the pre-colonial period having influence on the current water resource institutions in the schemes is leadership systems in the communities in which the schemes are located. While Mkindo Irrigation Scheme (MIS) is influenced by *Mfumwa* leadership system, Kiroka Irrigation Scheme is influenced by Kingalu Mwana Banzi chieftaincy existed during the pre-colonial societies. Accentuation of traditional values existed in pre-colonial leadership systems in both schemes has affected adaptations towards the modern water management institutions. The same case applies to the colonial and post colonial systems. In areas surrounding both schemes under the study, impetus of the colonial and post-colonial

governments towards irrigated farming was low. This being the case there were no significant measures to control access and utilisation of the water resource in the areas. At the same time traditional leadership systems were eroded following establishment of modern governance systems. Lack of government control and decline of the traditional eldership systems led to evolution of open access in areas surrounding both schemes under the study. Although both schemes showed slow adaptations towards the formal water allocation rules in colonial and post colonial periods, from the post-independence period up to now, adaptations towards formal systems have been faster in MIS than KIS. Fast adaptations in MIS seem to happen due to exposure to external environment, which in KIS seems to be low.

Moreover, differences between the two schemes have been noted in their establishment approaches. The Mkindo Irrigation Scheme (MIS) was established during the period of party supremacy where the development policies were mostly centralised. Despite such non-democratic approaches, the MIS through the Mkindo Farmers Irrigation Scheme Group (MFIS) has managed to have enduring institutions in water allocation. The study has found stable and systematic formal organisation of the scheme through different committees and rules clarified in the Constitution adopted in 2004 by the Mkindo Farmers Irrigation Scheme (MFIS) group. Stability in the formal management systems, has contributed to evolution of constructive informal systems for management of water resource and the scheme in general. For example, the informal system for accomplishment of the O&M activities known as *Kiwili* is a good example of how informal systems have been used constructively to complement the formal systems in management of the scheme. Generally, according to the Village Chairman for Mkindo village, the MIS has been used as a learning point for various irrigation projects initiated in Morogoro Region and Wami-Ruvu Basin in general. The study has found that existence of effective collective action rules in MIS is partly a result of technological and scientific improvements in rice farming happening due to continuous government and donors' support.

In the other hand the KIS has been established during the period of NAWAPO and WRMA where participatory and bottom-up procedures were emphasised. Although the community members were given the opportunity to participate in formulation of the scheme, there were no political will to empower them to assume the management role effectively. As a result, the farmers have lacked the required skills and attitudes to sustainably manage the scheme. While their colleagues in MFIS have managed to write their constitution and rules, the farmers in UWAUKI are still struggling to establish the written constitution for more than a decade since the group and scheme were established in 2004. Instead of a written constitution, all decisions in the scheme are guided by the meeting resolutions. Due to poor documentation and record keeping, such resolutions have been inconsistent and in most cases open to violation by the unfaithful leaders during application. Generally, compared to the MIS, the policy arena in the KIS is less organised.

The findings from the two schemes under the study emphasize the importance of government support for the small scale irrigation schemes not only institutionally, but also technologically and materially. Technological developments provide assurance on access to water and lead to the increase in productivity. The study has found that increased productivity is a factor which enhances farmers' compliance towards the allocation rules in MFIS. While the scheme members in MIS enjoy such opportunities, their colleagues in KIS, with the exception of the few located in areas where the scheme is lined, face enamours challenges due poor irrigation technologies. The irrigation challenges facing the farmers in KIS have prevented evolution of collective action experienced in MIS particularly within MFIS group.

The study has also found differences between the two schemes with regard to non-member irrigators. In MIS the non-member irrigators (UUMGO group) are registered and administratively more organised than the non-member irrigators in the KIS. However both of the groups have failed to device effective collective action rules in

water allocation due to poor abstraction technologies. Generally, the two schemes under the study are both governed through multiple institutions, evolved from the formal and informal systems but constructive formal-informal interfaces in both schemes seem to exist in areas where the irrigation technologies are effective.

8.4 Factors Affecting Water Allocation Processes

According to Polski and Ostrom (1999) the policy action arenas are affected by information processing capacity, valuation and selection processes, physical and material conditions of the resource, attributes of the community and the rules-in use. In addition, Ostrom *et al.* (2014) emphasize attention to bio-physical factors and governance systems in analysing the policies. Some of these factors are institutional and some are non-institutional but generally affect the actors' capacity to make different choices in policy arenas. These factors are compared and contrasted across the two schemes.

8.4.1 Institutional Factors

As indicated in the study findings, institutions play central role in successes or failures of the policy processes. To understand how institutions affect behaviours towards water policy decisions the study has analysed the attributes of the communities, the rules-in-us, valuation processes and governance systems. In this section, findings with respect to these aspects across the two schemes under the study are provided.

8.4.1.1 Attributes of the Communities

Implied in the rational choice theory is the assumption that communities are systems constituted by members with homogenous interests (Cleaver and Franks, 2005). Acting under the influence of rational choice view, the policy elites have adopted blanket measures to improve water allocation processes in small scale irrigation schemes in Tanzania while the reality in different local areas indicate diversities in communities' characteristics. Comparative analysis between the communities in MIS and KIS indicate existence of differences in community characteristics and effects on implementation of the water policy.

The Mkindo Irrigation Scheme is surrounded by the communities of farmers and Maasai pastoralists. These communities are to a large extent culturally heterogeneous and therefore have different values, norms, beliefs and preferences towards the water policy strategies and outcomes. In addition, the irrigators in MIS are divided between those having membership to the scheme and the non-members. These have different perspectives on how the water resource needs to be managed and allocated to the users. In the other hand the KIS is surrounded by the communities which are ethnically homogenous but with members who differ in their beliefs and preferences towards the water policy initiatives and outcomes. Both, the MIS and KIS are faced with challenges in implementation of the water policy instruments due to heterogeneous nature of the communities in which they are embedded.

The main challenge in the MIS is how to reconcile the competing interests between the farmers and pastoralists and between the members of the scheme and non-member irrigators, while in the KIS the challenge is mainly found in reconciling the interest of the UWAUKI members who mainly cultivate rice and those of the non-member irrigators who are mainly fruits and vegetable growers. The differences in values and preferences between the pastoralists and farmers in villages surrounding the MIS have prevented development of collective action rules for control of access and utilisation of the resource across the two groups. Not only that, the differences is also the beliefs between the scheme members and none-member irrigators on how the water resource and the scheme in general should be managed provide challenges in MIS.

On the other hand, the KIS is affected by existence of heterogeneous interests between the members of UWAUKI and non-member irrigators.

As it has been pointed out in the literature, the rational choice perspective considers presence of common beliefs about the policy goals and strategies as one of the factors for effective policy implementation (Polski and Ostrom, 1999). For critical

institutionalism however, development of common beliefs about the policy seems to be illusory due to presence of competing interests among the community members. The realities existing in MIS and KIS seem to reflect the critical institutional view on the nature of communities.

8.4.1.2 Rules- in- Use

With respect to these rules, similar experiences have been observed across the two schemes under the study. In addition to the national legal and policy frameworks, the water users in both schemes have also utilized the rules which have evolved out of their lived experiences. Several practices exist in both schemes showing how the water users are guided by rules different from those stipulated in the policy and law. These include the decision to sell the rights to access and withdrawal water to the non-permit holders contrary to the government guidelines, free abstractions of water, the use of traditional farming and irrigation methods, use of competition in accessing water instead of orderly access stipulated in timetable and calendar, especially among the non-member irrigators, and use of non-monetary penalties in punishing the offenders.

When the practices above are examined none of them conforms to what the policy instruments provide. Instead of the government policy, such practices have been guided by the communities' rules or what Schlager and Ostrom (1992) call the rules-in-use. In this light the findings from this study dispute the underlying notion in the rational choice theory that actors normally conform to rules to avoid consequences and predispose themselves to the benefits accrued for those showing cooperation (Scott, 1995). The findings generally indicate actors' abilities to mediate rules to suit their interest as advocated in critical institutional theory (Cleaver, 2001).

8.4.1.3 Valuation Processes

Among other things, the valuation processes have influence on the choices made by the actors in water allocation processes. Basing on the study findings, economic and cultural factors influence actors' valuation of the policy issues before making the decisions. Due to the cultural values the pastoralists in MIS have refused to collaborate with the farmers in formulation and management of water allocation rules as instructed by the national water policy and law. The differences in preferences towards the water allocation rules have also been noted among the irrigators having membership to the scheme and the none-member irrigators. Like the MIS, the KIS also faces value tensions between the member of the scheme and the non-members however no farmers-pastoral tensions have been experienced due to absence of pastoral activities in the surrounding areas. The existing value tensions indicate multiplicity in institutional values guiding the water users in water allocation processes. When the farmer-pastoral tensions in MIS are considered one can logically conclude that, cultural issues arising from ethnic differences are behind the low preferences towards the policy goals. But the analysis within and across the two schemes shows that value differences can also be exacerbated by differences in livelihood strategies. As it has been explained before, the possibilities that the pastoralists resist the water allocation rules in MIS due to low livelihood incentives are evident. The same case applies to the irrigators who do not have membership to irrigation schemes. These irrigators in both schemes have low preferences towards the water policy instruments because they do not see any incentives in applying them. In their side the members of the scheme have all reasons to support the new policy instruments because out of such instruments the chance for improving their livelihood strategies is high.

Another area in which the valuation processes across the schemes can be compared and differentiated is on preferences towards the modern farming methods particularly the SRI and rice species particularly the *Salon* species. According to the irrigation experts in Mvomero and Morogoro District Councils, the SRI method and *Salon* species need great

control of water flows in the farms. Such control is possible only if the canals are properly lined and control devices are available. When adoption of the SRI farming method and *Salvo* rice species is considered, the MIS is found to be ahead of KIS. The KIS lag behind in modern farming practices because the big part of its main canal is still unlined. In addition, due to utilisation of poor irrigation infrastructures, most of the member and non-member irrigators in this scheme get low yields and therefore low income. Generally, poor infrastructure and lack of adequate financial resources have made most of the farmers in this scheme (except few member irrigators using the lined canal) develop low preferences towards the modern farming methods. On the contrary, in MIS preference towards modern farming practices and use of modern seeds is high among the member irrigators but generally low among the non-members. The members of the scheme in MIS have high preference towards the modern farming practices because they get high yields from such farming practices and seeds due utilisation of lined main canal to transport water from the source to the abstraction points. Generally, findings across the two schemes show that, the valuation processes guiding the choices towards the water policy instruments are affected by the cultural values and material and physical conditions in which the resource is managed and utilised. As it has been explained earlier, scholars are normally biased towards the rational choice view embracing the economic values or critical institutional theory embracing the social and cultural values in explaining the behaviours of the water users towards the water policy (Ostrom, 1990; Cleaver and Franks, 2005). However, the findings across the two cases under this study have shown that neither of the two theories can on its own provide sufficient accounts of how institutions influence valuation of the policy instruments on management of water allocation. In addition, the findings from the study have shown that none of them can provide adequate accounts of the water users' preferences towards the policy instruments independent of the physical and material conditions in which the resource is allocated.

8.4.1.4 Governance Systems

With respect to governance systems, attention of this study has been paid to the property right systems governing the resource and collaboration between the water users' groups and the governmental and non-governmental organisations dealing with water resource issues. Both schemes have been governed through the water right laws established by the government and managed through the WRBWO. In addition, both schemes have been kept under the supervision of the agricultural and irrigation experts from the respective district councils therefore expected to operate according to government guidelines on irrigation farming.

Despite being under similar governance control, the schemes under the study have displayed differences in management of the scheme activities. While the MIS has been more formal in its approaches, the KIS has mostly operated through informal mechanisms. Saying that the MIS is more oriented towards the formal systems does not mean that informal practices are not found in that scheme. In both schemes, the informal practices and institutions have been entrenching the formal systems; however, in MIS the informal systems have been kept under control by the formal rules and regulations from within the group or the higher governance levels. In KIS the informal practices have overridden the formal systems and have been operating without any strong checks from the formal systems.

Apart from the operating procedures, governance systems in the schemes have been compared and contrasted basing on their relations with the government and non-government organisations in the higher levels. While the MIS seems to have a link with the higher governance organs in particular the WRBWO and MVDC, the KIS seems to be isolated from such organs due to absence of an umbrella organization (the WUA) to link it to higher levels. With respect to NGOs and private organisations, both schemes seem to have connections; as interviews with the scheme and village government leaders and the official records from Mvomero District Council have revealed the horizon of

relations with these organisations is wider in the MIS than the KIS. Extensiveness of the NGOs and private organizations' activities in MIS has not happened accidentally. As the chairman of Mkindo village explained during the interviews, the area surrounding the scheme is well endowed with the water resource and fertile land suitable for agriculture. The natural resource potential existing in these areas has attracted extensive agricultural activities which have in turn stimulated growth in extension services such as agricultural researches and training and education programs for the farmers. Being the first and largest irrigation scheme in the area the MIS has been a beneficiary for many agricultural projects under the government, NGOs and private sectors.

Compared to the villages in MIS, the KIS has not been involved extensively in agricultural projects. This situation has led to limited exposure of this scheme to the external governance environments. Consequently, the KIS has remained uninformed of various opportunities important for their development. The experiences across the cases stress the importance of continuous support after establishment of the irrigation schemes. The current tendency where experts spend most of the efforts and resources in establishment of governance structures without having sustainable strategies for making them perform has proved to be problematic in this study. The critics of formal governance systems see such tendency a consequence of the rational choice belief that once programs are systematically adopted implementation is automatic (Thomas and Grindle, 1990). Such belief is unrealistic because it ignores the realities in the environments in which the programs are implemented.

8.4.2 Non-institutional Factors

Apart from the institutional related factors, the schemes are also influenced by some factors from the physical, material, and biophysical contexts in which the water resource is managed. Like the institutional factors, the schemes have shown some convergences and divergences in the way that they have been affected by these factors.

8.4.2.1 Physical and Material Conditions of the Resource

According to Polski and Ostrom (1999) and Ostrom *et al.* (1994), the physical and material conditions of the resource comprise of varieties of the physical and material inputs required for realisation of the policy outcomes. With respect to physical inputs attention was paid mostly on technologies used in irrigation. When the technological factors are considered some developments have been noted in both schemes under the study although at different levels. Both schemes are beneficiaries of the ongoing government programs to enhance irrigated rice farming through scheme wise and subject wise improvements (URT, 2002b).

Despite being under similar government programs, the schemes have shown variations in the level of technological development. While the MIS uses the lined main canal, the KIS uses the main canal which is partly lined and partly earthen. Due to the use of earthen canal by many farmers, the KIS has been losing big quantities of water leading to low irrigation efficiency. Poor technology has also affected adherence to equity principle in distribution of water to the scheme members. While the scheme members in MIS are equally distributed with the water resource, the members in the KIS get unequal shares of water although they contribute equally to scheme development, due to unequal technological improvements. This situation is contrary to fiscal equivalent principle advocated in rational choice theory (Polski and Ostrom, 1999).

Another important aspect in water allocation processes affected by technological differences across the two schemes is participation. While the members in the MIS show mutual commitments towards scheme activities, their colleagues in the KIS have been divided due to poor water conveyance technology. As it has been indicated by the study findings, only few farmers irrigating in the areas where the scheme has been lined show commitments towards the scheme activities in the KIS. Generally, adherence to participation principle among the member irrigators is higher in the MIS than the KIS.

Both schemes, however, have poor participation experience when the non-member irrigators are considered. Due to lack of improved infrastructures of their own, these farmers have been forced to irrigate under the control of the formal groups (MFIS and UWAUKI) entrusted to manage the schemes. But these farmers are not willing to contribute their resources through such groups because they think that they are exploitative. As a result, participation among the non-member irrigators has been more coercive in both schemes under the study.

Apart from the aspects above, irrigation technologies have an important role in implementation of the boundary rules insisting exclusion of the ineligible users from the resource (Ostrom *et al.*, 1994; Ostrom, 1990; Polski and Ostrom, 1999). In the other words, technologies determine the degree of excludability and subtractability of the irrigation schemes (Polski and Ostrom, 1999). As Polski and Ostrom have indicated irrigation schemes are classified as common pool resources; therefore they have low excludability but high subtractability. This makes them open to multiple accesses, free riding and depletion. With the existing technological devices such negative outcomes can be reduced however, it all depends on the quality of the devices.

In MIS the level of free riding especially for agricultural water uses has been low due presence of irrigation structures which cannot allow easy diversion of water to unplanned areas. Although some pockets of illegal activities such as cloth washing have been observed to a large extent, the large scale illegal abstractions have been prevented. In the other hand the KIS has been encroached very easily by the illegal users due to presence of weak irrigation structures. Basing on the findings from the study, technological developments are central to the ongoing government efforts to improve water resource management in small scale irrigation schemes. To the critic of the rational choice approaches, technological developments are just used to enhance marginalization of the exploitation of the haves not by the haves (Montouri and Purser, 1996). This study has found that if well managed the technological investments can lead

to positive outcomes even among the poor users. The important thing, as the critical institutional theorists contend is to make sure that the technological developments enhance the actors' capacity to manage the institutional environment in which they interact with the resource.

Generally, technological developments have great effects on evolution of collective action in small scale irrigation schemes. Although existence of multiple institutions in resource governance (Cleaver, 2002, Cleaver and Franks, 2005) poses some challenges in implementation of the policy instruments on water allocation, the chances of minimising such challenges are greater when technologies are improved than when the technologies are poor (Keraita *et al.*, 2012).

Apart from physical conditions, the material resources in particular the financial resources are important for effective management of the water resource in small scale irrigation schemes. The major sources of finance for both schemes are contributions and water use fees from the farmers. The study has found that such sources are more reliable in the MIS than the KIS. The sources of income in the MIS are reliable because they are well organised within the national and local legal frameworks. These frameworks enhance collection of the funds for different administrative purposes through granting the power to the scheme leaders to collect the fees, contributions and penalties. In KIS no formal legal system is in place to supervise payments of the fees and other financial contributions due to lack of constitution. The scheme relies on informal rules to mobilize contributions and supervise the water charges for the non-member irrigators. Due to lack of legal power and local systems to enforce them, such rules have frequently been violated making collection of the financial contributions and penalties difficult for KIS. In MIS collection of the fees and penalties has been effective because such fees and penalties have been stipulated in the constitution. Although cultural rules have been effective in management of the schemes including mobilization of resources (Cleaver, 2002, Cleaver and Franks, 2005, Ostrom, 2008), evidence from this study shows that, in some circumstances such rules need support from the formal systems. Generally, the

study supports the argument by van Koppen *et al.* (2007) that between the formal institutions emphasized in rational choice and informal systems embraced critical institutionalism, neither is necessarily effective than the other. Their efficacy depends on the circumstances under which they are utilised.

8.4.2.2 Bio-physical Conditions

As far as the bio-physical characteristics of the schemes are concerned, the focus was on quantity of water the schemes can provide to the farmers. Basing on interviews with the farmers, scheme and village leaders as well as the government officials in Mvomero and Morogoro District Councils and Wami-Ruvu Basin Water Office (WRBWO), the two schemes do not have equal water resources endowments. While the MIS enjoy abundant supplies of water throughout the year, in KS supplies are seriously flowed during the dry seasons.

Another important bio-physical aspect is geographical location (Ostrom *et al.*, 2014). As far as the MIS is concerned, geographical location of the farmers does not have any impact because availability of abundant supplies and effective technology allows adequate flows from the head end in phase I to the tail end in phase II. Those facing location challenges are the non-member irrigators in UUMGO who have extended the irrigation activities beyond the project area. In the other hand the farmers in KIS face challenges emanating from their location. Those who are located at the upper course in Block ‘A’ get enough flows while those located at the middle and tail ends in Block ‘B’ and ‘C’ face scarcity due to inadequate flows caused by poor conveyance infrastructures. Generally, the bio-physical challenges are more pronounced in the KIS than the MIS due to utilisation of poor irrigation technologies. The study has found that in the situation where effective technologies are used like the phase I and II in MIS and Block ‘A’ in KIS the bio-physical factors have been easy to control. For example, flow of water resource units from the source to the farms is easy to control when the scheme is lined than when it is earthen. Generally, as it has been indicated above the experiences from

the two schemes under this study stress the importance of technology in water policy implementation as argued in Keraita *et al.* (2012) and Green (2002).

8.5 The Practice and Effects of Bricolage Processes

Among other things the study aimed to explore the institutional bricolage practices and their effects on water allocation processes. Findings from both schemes indicate that, water policy instruments have been mediated through bricolage processes of articulation, alteration and aggregation. In this section these processes are compared and contrasted across the two schemes under the study.

8.5.1 Articulation Processes

The study has noted presence of some articulation process indicated mostly by accentuation of the traditional values in management of access and utilisation of the water resources across the two schemes under the study. Basing on the study findings, accentuation of the traditional value has resulted to some positive and negative outcomes on the policy instruments in both schemes. For example, sharing of the water basing on brotherhood values, the culture of forgiveness than justice seeking, beliefs about the powers of the Chiefs and the Gods are all a result of accentuation of the cultural values. Such cultural values have been found to have a positive role in management of the water allocation processes. For example, accentuation of brotherhood values has induced the scheme members in both sides to share water with the none-permit holders. To some extent the decision to share water with irrigators who have no water use permit has helped to reduce tensions between the scheme members and none-members in both schemes despite some disagreements over the prices that have been charged. Despite the noted merits, accentuation of some traditional values has also brought some undesirable effects to both schemes. More specifically, continuation of some traditional values has prevented fully enforcement of the policy instruments towards efficiency, equity and participation in water allocation processes in the two schemes under the study. For example in both schemes, the long lived belief that water is a free gift from God has led

to rejection of the water use permits and tariffs. In addition, the undesirable outcomes from accentuation of the traditional values and systems are indicted by continuation in the use of the traditional seeds and farming practices, and rejection of the modern farming systems by the farmers in both schemes under the study. Moreover, the tendency of the farmers to reject the technical designs for construction of the irrigation infrastructures articulated in DADP and other government guidelines has been noted in both schemes.

In addition, accentuation of the traditional values has also led to rejection of the local organisations (UWAUKI, MFIS and Mkindo WUA) designed to represent the water users in various water provision and management processes. Instead of joining such groups or forming the other formal groups, as insisted by the government, majority of the water users have preferred to remain in their traditional groups. When the two schemes under the study are compared, the rejection to join the formal water users groups among the farmers is strong in the KIS than the MIS. Although the authors in critical institutional theory (Cleaver, 2002; Cleaver and Franks, 2005; de Koning, 2011) see rejection of the formal institutions as behaviour resulting mostly from habits, and strong cultural affiliations, in KIS it has been accelerated by poor implementation of the government programs on irrigated agriculture.

8.5.2 Alteration Processes

Another bricolage practice common to both schemes is institutional alterations. There are different ways through which institutions have been altered in the schemes under the study. For example contribution of harvests instead of finances shows how institutions can be adapted in order to fit with the prevailing situations. Other good examples of institutional alteration practices that are common to both schemes are rule bending which has led to assignment of communal works instead of fines as a punishment for the offenders. Not only that, the rule bending that led to extension of water allocation to illegible users is also common to both schemes. To some extent the noted innovations

through bricolage processes in both schemes under the study have been contributed by the existing flexibility in NAWAPO, WRM Act, DADP, NIP, NIMP and other policies and laws regulating the water resource and irrigation farming in the country. The flexibility found in these policies, law and programs, have provided the chance for the farmers in both schemes to devise some local mechanisms for enhancing participation in various activities.

Apart from the positive experiences, some negative outcomes have been noted from the alteration processes. For example, the study has found some rule bending practices that have jeopardized the disciplinary measures against the offenders. In addition the decision to sell water rights to non-permit holders without the government approval shows how rules have been altered contrary to government guidelines. Another rule bending act that has resulted to violation of the government guidelines noted in this study is the decision to reduce the construction standards for the KIS so as to align with the villagers' feelings and the available financial resources. Rule bending in KIS is also indicated by the tendency of the leaders to skip the guidelines in meeting resolutions and make decisions basing on their own interests. The good example here is the tendency to set water prices basing on their own feelings instead of the group's guidelines. Rule bending in the KIS is also indicated by the tendency to leave those committing different offences unpunished even when the evidence to convict them is clear. The rule bending practices in KIS have resulted to some negative effects on water allocation processes.

Although the rule bending practices are found to be common in both schemes under the study, the frequency is higher in the KIS than the MIS. In addition to leadership vacuum lack of regular communication between the UWAUKI group and the Wami-Ruvu Basin Office (WRBO) and MDC is a major source of acute rule violations in the KIS. The study has found that the KIS is almost cut off from government regulation when it comes to water abstractions. Such alienation has been caused by presence of an idle water use permit and absence of a WUA in the area where the KIS operates. Presence of a WUA and an active water use permit in MIS has improved communication between

MFIS and the WRBO. In addition to that presence of Mkindo WUA has helped to monitor the rules in MFIS, thus reducing the possibility of violation by the members. The experiences across the two schemes under the study show how external support from the government or private sectors is crucial for internal organisation and performance of the water users groups as argued by Ostrom (1990). This generally, indicates the importance of facilitated approaches (Merrey and Cook, 2012) or regulated autonomy (Bruns, 2007) in the manner that the schemes are supervised by the higher level governance organs.

8.5.3 Aggregation Processes

The last but not least bricolage practice according to de Koning is institutional aggregation. This process is also common to both schemes under the study. With respect to this process, the study has found combination of the formal and informal institutions that has been used in managing the O&M activities and solving various conflicts in the two schemes. Specifically, the study has found combination of the government procedures and the informal mechanisms known as *Msalagambo* in UWAUKI and *Kiwili* in MFIS in conducting of the O&M activities. Generally, the use of *Kiwili* and *Msalagambo* has promoted participation of the farmers in the O&M activities in both schemes. According to the scheme leaders the group depend largely on these institutions for management of the O&M activities in their groups. As it was indicated by these leaders during the interviews, the use of these institutions is insisted so as to fill the gap that has been left by the government agents in management of the schemes and its water resource. Combination of the statutory and local rules and mechanisms in resolution of the various conflicts involving the farmers was also found to be common in the two schemes under the study.

8.6 Prevalence and Management of Water Users' Conflicts across the Schemes

The two schemes under the study can also be compared and differentiated basing on prevalence and management of water users conflicts. The findings have shown that

water users' conflicts are still prevalent in both schemes despite the reforms to improve management of water allocation processes. In both schemes under the study the findings from the interviews and FGDs indicated that multiplicity of institutional values contribute to occurrence of water users' conflicts. Such findings also indicated that non-institutional factors, particularly poor irrigation infrastructures contribute greatly to water users' conflicts in both schemes. Regarding the influence of the social-economic and demographic factors in both schemes the results are contrary to initial assumptions. Initially it was assumed that the social-economic and demographic characteristics determine the farmers' predispositions to conflictive behaviours. The expectation was that water users' conflicts decrease as peoples' social-economic statuses improve. In both schemes however; water users' conflicts seem to be indifferent to people's status, either economically or socially.

With respect to conflicts management approaches, some similarities and differences have also been observed across the schemes. In both schemes, the competing approaches such as fighting for water have been common; however, bloody violence are more pronounced in MIS than KIS due to presence of heterogeneous cultural beliefs between the farmers and pastoralists. In some circumstances informal approaches such as using the traditional elders or forgiveness have been used in solving the conflicts in both schemes under the study.

8.7 Concluding Remarks

The overall findings show great difference between the two schemes under the study in terms of the level of infrastructural development and formalisation of the scheme management. Despite having such differences, the schemes have been found to have some similar experiences with regard to management of water allocation processes and prevention of the water users' conflicts. Specifically, the findings have indicated existence of poor control of the water resource in both schemes due to poor infrastructures. Poor infrastructures have also been the major cause of conflicts to both schemes despite having different levels of development. With respect to enforcement of

the water allocation institutions, both schemes have demonstrated some practices that indicate presence of bricolage processes. Such processes have resulted on both positive and negative outcomes on enforcement of the government policy and legal instruments in both schemes under the study. Although the gap in implementation of the water policy has been found in both schemes under the study, many challenges are experienced in the KIS than the MIS, due to delays in construction of the main canal and existence of poor organisation of the allocation rules.

CHAPTER NINE

CONCLUSIONS AND RECOMMENDATIONS

9.1 An overview

The study on which this thesis is based aimed to unveil implementation of the National Water Policy in small scale irrigation schemes in Tanzania in the context of multiple institutions existing in such schemes. Specifically the study aimed to explain how interactions between actors and different institutions in water allocation processes and outcomes in water users' conflicts are shaped within the material, physical, bio-physical conditions and broader governance systems. The study was guided by the theoretical frameworks from the rational choice and critical institutional perspectives and focused on four specific objectives: To explore actors' roles and assess interactions in water policy implementation in Tanzania, to explore and assess the water allocation processes and institutions in the selected schemes, to identify and assess institutional and non-institutional factors affecting actors roles and interactions in water allocation processes and to determine prevalence of water use conflicts and factors contributing to their occurrence in water allocation processes. The chapter provides specific conclusions with respect to each of these objectives before providing the overall conclusion and recommendations for the whole study.

9.2 Specific Conclusions

9.2.1 The Actors and their Roles and Interactions in Water Policy Implementation

The core value in the National Water Policy (NAWAPO) of 2002 and its legislation (Water Resource Management Act (WRMA) No. 11 of 2009) is integration of the key actors in various water governance processes. As a result of this value, the water governance structures at different levels have been designed to reflect the IWRM ethos. While the focus of the government and donors is on IWRM strategy, reality shows poor coordination among the ministries and other implementing agents due to competing

interests, lack of communication strategies and resource constraints. Coordination challenges are also found in Wami-Ruvu Basin Water Office (WRBWO). Due to resource constraints, the Basin Office has failed to identify the stakeholders and educate and sensitise them on various water resource management issues.

Apart from poor horizontal coordination, there is also poor vertical integration of the local communities in the higher water resource governance levels. As a result of this, the small scale water users have been excluded in the decisions making processes taking place in the higher levels.

9.2.2 Water Allocation Processes and Institutions in the Selected Schemes

In this objective, the study aimed to analyse water allocation processes and institutions guiding them. With regard to this the main focus was on evolution paths of water allocation institutions in the selected scheme and the way such institutions affect and are affected by the actors. The evolution paths in both schemes have revealed influence of the cultural norms from traditional governance systems. Apart from the cultural norms, water allocation institutions in the selected schemes have evolved from the colonial and post colonial policies and laws. Generally, the study has found existence of multiple institutions in the selected small scale irrigation schemes.

Moreover, the study found poor management of water allocation processes. In particular, the study found divergence from the formal water allocation principles of efficiency, equity and participation in the selected schemes, especially among the water users who are not formally reregistered. Instead of abiding by rules guiding these principles, as instructed in the scheme constitutions and national policy and legal frameworks, the water users mediated them through institutional bricolage processes, which took place under the influence of culture and the prevailing physical, material, bio-physical conditions as well as the broader governance frameworks.

9.2.3 Factors Affecting Actors' Roles and Interactions in Water Allocation Processes

The study has revealed different institutional and non-institutional factors affecting the actors in water allocation processes. The main institutional issue facing actors in water allocation is multiplicity of institutions guiding behaviours. The non-institutional factors emanate from the material, physical and bio-physical conditions in which the policy instruments have been implemented. Although there are several non-institutional factors, technologies used in storing and transporting the water resource from the sources to the farms seem to be a central factor affecting actors' behaviours in water allocation processes. Analysis of the institutional and non-institutional factors affecting the actors' roles and interactions helped to explain how behaviours towards the policy instruments are induced in the selected schemes. While the conventional and critical institutional theories seem to create demarcations between the economic incentives and cultural factors in explaining the water users' behaviour towards the water allocation rules, in this study both were found to have an influence, but within the framework of the exiting physical, bio-physical, material conditions and governance systems.

9.2.4 Prevalence and Management of Water Users' Conflicts

In the first place, this objective aimed to explore conflicts incidences in the selected schemes. The study findings showed that conflict incidences are still common among the water users in the selected schemes despite adoption of the IWRM institutions. Apart from exploring the conflicts incidences, the study also aimed to examine the factors determining their occurrence in the selected schemes. Basing on findings from interviews and FGDs, water users' conflicts in the selected schemes are contributed by different factors emanating from the material, physical, bio-physical conditions and governance systems. Although water users' conflicts are common to all farmers, the interviews and FGDs indicated that they are mostly experienced by the non-member irrigators in both schemes and some of the member irrigators in KIS due to scarcity of water caused by poor irrigation technologies. This experience leads to a conclusion that

poor technological conditions are the major cause of water users' conflict in the selected schemes. Across the wider population of irrigators, the household survey did not indicate any direct influence from the technological conditions. But this does not mean that irrigators are not widely affected by technological conditions. When closely examined, the four factors (Water scarcity, irrigation farming benefits, encroachments, and exclusion), out of five, which had significant statistical influence on water users conflicts have direct relation with the existing technological conditions in the selected schemes. In addition to technological challenges, the survey has also aimed to find out influences from the social-economic and demographic characteristics of the farmers. Although the socio-economic status is relatively higher in MIS than in KIS, both schemes face frequent emergence of water use conflicts. This leads to a conclusion that water use conflicts in the selected schemes are indifferent to social-or economic status of the farmers.

9.3 Overall Conclusion

This study aimed to assess the effects of multiple institutions on water policy implementation. Specifically, the study aimed to explain how interfaces between formal and informal institutions affect water allocation processes and users conflicts in selected small scale irrigation schemes in WRB in Tanzania. The overall findings have confirmed existence of multiple institutions in water policy implementation from the national to the scheme level. At the national and basin levels, institutional multiplicity is indicated by existence of different policies and laws addressing similar water resource management issues in isolated ways. The study findings show that, harmonisation of these laws and policies has been difficult due to existence of conflicting interests and goals and low capacity among different actors due to resource constraints. At the scheme levels, institutional multiplicity has been contributed by presence of heterogeneous ethnic cultures and economic interests among the water users. As a result of being under the influence of multiple institutions, policy instruments for management of water allocation processes and users' conflicts have been under constant negotiations through

institutional bricolage processes. These processes are conducted under the influence of broader social and cultural frameworks in which the actors are embedded as well as the prevailing technical, bio-physical, material and governance systems.

As critical institutionalism assumes in bricolage processes the actors do conform to rules or norms, but sometimes they exercise agency through questioning and even changing of these structures. In this study questioning of the cultural values is indicated by adoption of modern farming practices and water pricing by some farmers as mechanisms for water use control. Moreover, agency in this study is also indicated by water users' questioning of the fiscal equivalency of the water use fees and legitimacy of the formal WUGs and WUAs. To some extent the institutional bricolage processes have enhanced implementation of the policy instruments on management of water allocation processes but sometimes they have distorted them. Distortion of the policy instruments is indicated by violation of the policy and legal principles of efficiency, equity and participation happening due to bending or rejection of the rules. Generally, the study has rejected the view in rational choice institutionalism that that water policies in developing countries, Tanzania included are influenced by the rational rules alone. In addition the study has rejected the idea that actors are slaves to regulative and normative structures propounded in this theory.

But, the study findings have indicated some divergences from both the rational choice and critical institutionalism in conception of the actors' motivation behind their choices towards the water policy instruments. In explaining the actors' choices the rational choice institutional theory pays most of its attention on economic incentives while the critical institutional theory posits that choices are influenced by the cultural frameworks of the actors. In this study demarcation between the economic and cultural influences was found to be blurred because both elements have been found to play central role in shaping the choices made by the actors in the selected schemes. Generally, the study findings indicated that institutions guiding management of water allocation processes, whether rational

choice or critical, shape and are also shaped by actors within the limits and possibilities provided by physical, material and bio-physical conditions as well as the governance systems in which the resource is contextualised. The influence of these factors in water use conflicts was also revealed by the study findings, confirming the hypothesis that conflicts are more prevalent in small scale irrigation schemes when the physical, bio-physical, material and governance conditions are poor than when they are better.

9.4 Recommendations

The study has identified various challenges in enforcement of the legal and policy instruments on water allocation processes in the selected schemes. In the light of the existing challenges, the following recommendations are provided:

9.4.1 Strengthening of Coordination Units and Multi-Stakeholders Platforms

One of the challenges in implementation of the NAWAPO is poor coordination of activities among the actors at different levels. The study recommends strengthening of the coordination units at the Ministry of Water and Irrigation and other ministries and departments having activities related to water. Apart from financial support such units can be strengthened through supply of communication facilities and establishment of effective internet services. In addition, the Public Relations and Community Development Unit in the Wami-Ruvu Basin Water Office (WRBWO) must be empowered to enhance its capacity to identify the actors and activities which they undertake in relation to water. Furthermore, capacity of WRBWO in monitoring of what other stakeholders are doing with respect to water must be enhanced through provision of adequate financial and human resources. Apart from that, the government must enhance legal capacity of the WRBWO so as to enhance its capacity to undertake some legal charges against the rule breakers in the basin.

Apart from effective coordination, effective implementation of the policy also depends on availability of multi-stakeholders platforms through which the water users can

participate in decisions making. The national policy has defined the Basin Water Board as the platform at which the water users can participate in decision making. To enhance participation of the users in this platform, there is a need to empower the water users groups and enhance establishment of effective Water Users Associations (WUAs) through provision of continuous financial support.

9.4.2 Improvement of the Capacity for the Government Agents

Among other things, the water policy instruments depend on the capacity of the government agents at the Basin and District Council levels. To enhance capacity of the agents it is important to design policies as interactive rather than linear. To achieve this, the policy elites must ensure thorough consultations with the lower level agents to understand their capacity and limitations so as to come up with realistic decisions. It is not only during formulation that such communications are important but also throughout the implementation processes. Continuous monitoring of the implementation process by the policy elites will help to identify the obstacles and develop appropriate corrective measures before the problems become complicated.

9.4.3 Enhancement of Government Support for the Water Users

Although the users are the key actors in implementation of the water policy, their role depend on the resource endowments at their disposal. To enhance their participation in water governance processes there is a need for the government to enhance its support to the users groups and associations in terms of the various resources that they need in their daily performance. Apart from commitment of resources, enhancement of government's efforts in construction and rehabilitation of the irrigation infrastructures to improve availability of sufficient quantities of water for production in small scale irrigation schemes is crucial. In Kiroka Irrigation Scheme, urgent interventions by the government are needed to rehabilitate the collapsing structures and construct the remaining parts of the scheme. In Mkindo Irrigation Scheme, government interventions to make sure that the farmers construct the drain canals for effective farm level management of the water

resource are needed. In addition, the government's fulfilment of its promise to improve irrigation infrastructures in UUMGO is important for enhancing access to the resource and preventing conflicts.

Furthermore, implementation of education, awareness and sensitisation programmes as insisted in NAWAPO is crucial for promoting support from the water users. Through effective education, awareness and sensitisation programmes, positive outlook by the water users can be promoted and resistance toward the policy instruments can be minimised. Another measure that can be taken to enhance commitment by the water users is establishment of multiethnic structures for deliberation of water resources issues. Such structures are crucial for reconciliation and development of collective action between the farmers and pastoralists. Moreover, it is important for the government to establish effective and inclusive structures in which the government can mutually communicate with all citizens regardless of their social and economic status on various issues affecting conservation and allocation of the water resources.

9.4.4 Enhancement of the Capacity to Enforce Rules in Water Allocation Processes

To enhance capacity of agents to enforce rules, there is a need to make policy formulation processes as consultative as possible. The current practice where few elites at the top and prominent people in other levels dominate decision making processes in policy arena need to be revised to create a room for more actors especially from the community levels to participate. Apart from that, institutional reforms in water governance need to go hand in hand with improvement of the technological, physical, bio-physical and material conditions. This is important for promoting willingness of the water users to pay the fees and participate in O&M activities.

9.5 Theoretical and Policy Implications of the Study

9.5.1 Theoretical Implications

Findings from this study have indicated how institutions play a central role in policy implementation processes particularly in management of water allocation processes and users conflicts. Basing on findings from this study, institutions both rational choice and cultural shape behaviours in water allocation and conflicts management processes. These findings therefore, challenge the tendency to focus either on rational choice or cultural institutions when using the institutional theory to explain influence of institutions on water policy implementation. Generally, the findings emphasise development of synergetic frameworks for explaining how formal and informal institutions affect policy implementation, in particular the water policy implementation. Moreover, the findings challenge the existing tendency whereby institutions in policy implementation processes are analysed in isolation of the physical, material, and bio-physical conditions as well as the governance systems in which they are contextualised. They call for a framework which can link institutions with the contexts in which they are implemented. This study has contributed some knowledge; however, this body of knowledge is still evolving. Therefore, more studies are needed so as to come up with more adequate frameworks for understanding policy implementation under multiple institutions.

9.5.2 Policy Implications

This study has great implications on the central-local relations in policy design. The findings from this study show how the current practice where the policy elites at the top government levels dominate policy designs prevents adequate consideration of the grassroots actors and institutions in decision processes. The findings implies the need for creating structures in which local level actors can critically and creatively utilise the formal and informal institutions to enhance management of the water resource and in particular water allocation processes in their areas.

9.6 Areas for Further Studies

As it has been indicated in this study the Wami-Ruvu Basin covers five Mainland regions. The study was conducted in one region only, which is Morogoro, with a focus on two districts, Mvomero and Morogoro Rural and two schemes Mkindo and Kiroka. There is a need for a similar study to be conducted in other areas of the basin so as to generate more knowledge on how policy implementation can be affected by multiple institutions. In addition to that, this study has focused only on micro level comparisons involving small scale irrigation schemes operating at the community level. Studies for understanding role of institutions on policy implementation can also be done through macro level comparisons involving large scale irrigation schemes.

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Appendix A: Interview guides for Basin Water Officials

1. How do the irrigators acquire the right to use water?
2. Are all irrigators in the basin registered by the government?
3. Who makes water allocation decisions in the basin?
4. How are the water allocation decisions made in the irrigation schemes?
5. Who influences the water allocation decisions? How and Why?
6. What kind of institutions govern water allocation decisions in the basin?
7. Do you think that water is equitably and efficiently distributed to all irrigators in the basin?
8. How effective are the statutory rules in ensuring equity, efficiency and participation in water allocation processes?
9. How prevalent are the water allocation conflicts among the non-domestic small scale water users in the basin?
10. What can be done to improve equity, efficiency and participation of the water users in management of water allocation processes and users conflicts in the basin?
11. What are the challenges confronting the WRBO in implementation of the WDM and cost recovery institutions?

Appendix B: Interview guides for WUGs, WUA and village leaders

- 1 How is water allocated in irrigation schemes and around the villages?
- 2 Which kind of institutions regulates water allocation decisions in the schemes and the surrounding villages?
- 3 Who have influence in water allocation decisions within irrigation groups and in the surrounding villages?
- 4 Why do they have more influence than other actors?
- 5 Is water allocation in the scheme and the surrounding villages equitable, efficient and participatory? Why?
- 6 How effective are the existing rules in promoting equity, efficiency and participation in water allocations decisions in the schemes and the village in general?
- 7 In the past five years have you participated in any training, or awareness creation program (s)?
- 8 If yes, who offered it, when and where?
- 9 What kind of knowledge/skills did you acquire through such program(s)?
- 10 What are the causes of conflicts in irrigators groups and the village in general?
- 11 How do you solve conflicts in your scheme and the village?
- 12 How does your group communicate with the WRBO, District council and other key actors in water governance arena?
- 13 What are the challenges facing you in control of water abstractions and users conflicts?

Appendix C: Interview guides/FGDs for the farmers

1. Did you participate in decision making processes that led to establishment of the scheme?
2. How did you participate?
3. Do you participate in various decision making processes concerning water allocations and management of the scheme infrastructures in your scheme/village?
4. How do you participate?
5. Are you satisfied with the water allocation processes and rules in your scheme/village? Why?
6. Have you experienced any conflicts with the water users in the past five years?
7. If yes what were the causes of such conflicts?
8. How was that conflict solved? Who solved it?
9. Are you familiar with the modern farming practices and rice species advocated by the agricultural experts?
10. Have you tried to practice the modern farming practices and use the modern rice species within the past five years? Why?
11. What are the challenges that you as a small scale water user face in accessing and using the water resource?

Appendix D: Interview guides for the traditional elders

1. What kind of leadership system existed before and after the arrival of the colonial rule in your village?
2. How was the water resource controlled during that period?
3. Who managed the water resource allocations during that period?
4. What changes took place in water resource control after arrival of the colonial rule?
5. How did such changes affect access and utilisation of the resource?
6. How did the people react towards the resource management changes in the colonial period?
7. What kinds of institutions have governed the water resource in your village since the country got its independence in 1961?
8. What kind of rituals are involved in accessing and utilising the water resource in your area?
9. What are your roles in water resource allocations and conflicts management in your village?
10. Are you a member of any formal water users group?
11. If not why?
12. Are you satisfied with the current rules governing access and utilisation of the resource in your village? Why?

Appendix E: Questionnaire on Prevalence and Management of Water Conflicts in MIS & KIS

The information collected in this survey is confidential and purely for academic purposes.

Date...../...../.....Name of Respondent.....Sex: Male ()
Female ()

Tick the Area Profile Applicable

Area Profile: MIS ()

District	Mvomero
Ward	Mkindo
Scheme	Mkindo Irrigation Scheme (MIS)

Area Profile: KIS ()

District	Morogoro Rural
Ward	Kiroka
Scheme	Kiroka Irrigation Scheme (KIS)

PART 1: GENERAL INFORMATION ABOUT HOUSEHOLD MEMBERS

Section 1: Permanent Place of Residency (Tick your choice)

Place	Code
Mkindo Bungoma village	1
Kiroka village	2
Kiziwa	3
A nearby village (specify)	4
A distant area (specify)	5

Section 2: Permanent Household Members

Please list all household members who have been living in the house permanently in this order: *Head, Spouse, Children (include the infants)*

HH Member S/N	102 Sex Male=1; Female=2	103 Age	104 Marital Status <i>Code a</i>	105 Relation <i>Code b</i>	106 Highest Education <i>Code c</i>	107 Current Employment <i>Code d</i>	
						Primary	Secondary
01							
02							
03							
04							
05							
06							
07							
<i>Code a</i> 0= Not Applicable 1=Single 2=Married 3=Widowed 4=Separated		<i>Code b</i> 1=Head 2=Wife/husband 3=Son/daughter 4=Other relatives 5=Others (specify)		<i>Code c</i> 1=No formal education 2=Not completed primary 3=Completed primary 4=Not completed secondary 5=Secondary or higher		<i>Code d</i> 0=Not Applicable 1=Schooling 2=Irrigated Farming 3=Rain fed farming 4=Off farm wage employment 5=Off farm self-employment 6=On farm wage employment	

Section 3: Household Income Level

Income Level Per Annum	Code
500,000 - 1,000,000	1
1,000,000 – 5,000,000	2
5,000,000 – 10,000,000	3
Above 10,000,000	4

Section 4: Migration Information (*Include those aging 10 and above who are away from home for an employment but maintain contacts with home in terms of remitting money/gifts*)

	201 Sex Male=1; Female=2	202 Age	203 Marital Status <i>Code a</i>	204 Relation <i>Code b</i>	205 Highest Education <i>Code c</i>	206 Current Employment <i>Code d</i>	
						Primary	Secondary
01							
02							
03							
04							
05							
06							
07							
<i>Code a</i> 0=Not Applicable 1=Single 2=Married 3=Widowed 4=Separated		<i>Code b</i> 1=Head 2=Wife/husband 3=Son/daughter 4=Other relatives 5=Others (specify)		<i>Code c</i> 1=No formal education 2=Not completed primary 3=Completed primary 4=Not completed secondary 5=Secondary or higher		<i>Code d</i> 0=Not Applicable 1=Schooling 2=Irrigated Farming 3=Rain fed farming 4=Off farm wage employment 5=Off farm self-employment 6=On farm wage employment	

Section 4(2): Information about in-migration (*Include those aged 10 and above who migrate to your household seasonally for agricultural purposes*)

HH Members S/N	207 Sex Male=1; Female=2	208 Age	209 Marital Status <i>Code a</i>	210 Relation <i>Code b</i>	211 Higher Education <i>Code c</i>	212 Current Employment <i>Code d</i>	
						Primary	Secondary
1							
2							
3							
4							
5							
6							
7							
<i>Code a</i> 0=Not Applicable 1=Single 2=Married 3=Widowed 4=Separated		<i>Code b</i> 1=Head 2=Wife/husband 3=Son/daughter 4=Other relatives 5=Others (specify)		<i>Code c</i> 1=No formal education 2=Not completed primary 3=Completed primary 4=Not completed secondary 5=Secondary or higher		<i>Code d</i> 0=Not Applicable 1=Schooling 2=Irrigated Farming 3=Rain fed farming 4=Off farm wage employment 5=Off farm self-employment 6=On farm wage employment	

Section 5: Information about houses

301 How was the house acquired?

Acquisition mode	Code
Built by the family	1
Rented	2
Given by a relative, friend or neighbour	3
Other means (specify)	4

302 What are the materials used in construction of the walls and floor?

Construction material	Code
Cement/roasted bricks	1
Mud and woods, earthen floor	2
Cement and lime	3
Other materials (specify)	4

303 What are the materials used in construction of the roof and floor?

Construction material	Code
Iron sheets	1
Grass	2
Coconut leaves	3
Others (specify)	4

PART II: IRRIGATOR AFFILIATION AND EXTRACTION TECHNOLOGY

Section 1: Scheme Profile

201 Are you a member of Irrigation Scheme or out of scheme irrigator? *(Tick your choice)*

Irrigator Type	Code
Member of the scheme	1
Out of scheme irrigator	0

Section 2: Abstraction Technology

202 What type of technology do you use in water extraction? *(Please tick your choice (s))*

Technology	Code
Lined main canal	1
Lined secondary canal	2
Earthen main canal	3
Lined secondary canal	4
Earthen secondary canal	5
Lined tertiary canal	6
Earthen tertiary canal	7
Others (Specify)	8

PART III: HOUSEHOLD LIVELIHOOD STRATEGIES IN THE ORDER OF IMPORTANCE

301 Which of the following activities are the major sources of livelihood? (Please circle the appropriate rank for each activity: 1=Most important, 5=least important).

Activity	Rank				
Irrigated rice farming	1	2	3	4	5
Rain fed rice farming	1	2	3	4	5
Rain fed maize production	1	2	3	4	5
Irrigated vegetable production	1	2	3	4	5
Waged or salaried work	1	2	3	4	5
Pet business	1	2	3	4	5
Livestock keeping/Poultry	1	2	3	4	5
Others (specify)	1	2	3	4	5

302 What is your annual income from your livelihood activities?

Livelihood Activity: Code 1	Income per Annum: Code 2	% in Total Income: Code 3
Irrigated Rice Farming		
Rain Fed Rice Farming		
Rain Fed Maize Farming		
Irrigated Vegetable Farming		
Pet Business		
Livestock Keeping/Poultry		
Off farm wage employment		
On farm wage employment		

303 What are the major challenges facing your livelihood activities? (Please circle the appropriate rank for all challenges below. 1=most important challenge, 5= least important challenge).

Challenge	Rank				
Lack of capital/credit	1	2	3	4	5
Higher input and lower output prices	1	2	3	4	5
Inadequate market	1	2	3	4	5
Poor/lack of infrastructures	1	2	3	4	5
Other (specify)	1	2	3	4	5

PART IV: ASSETS ACQUISITION AND OWNERSHIP

401 Provide information about your assets

Assets (codes): 1=Land in the project area, 2=Land out of project area,
3= Transport assets, 4=Farm equipments,
5=Irrigation equipments, 6=Storage facilities,
7=Others

Duration with the asset from to-date (*since the year of data collection*) (codes): 1=1-5 years, 2=5-10 years, 3=10-15 years,

4=15-20 years, 5=More than 20

years

Mode of acquisition (codes): 1=cash, 2= credit,
3=rent, 4=Inheritance,
5=Other (specify)

Asset estimated value (codes): 1=Less than 500,000/=,
2=Between 500,000/= and 2 million
3=More than 2million but less than 5million
4=More than 5 million but less than 10 million
5=More than 10 million

Asset controlled by (codes): 1=Head, 2=Spouse (Wife/husband),
3=Son/daughter, 4=Other relatives, 5=Others (specify)

Assets	Quantity /size	Acquisition		Estimated Value (Tshs)	Who controls it
		Duration with the asset from to date	Mode of acquisition		
1					
2					
3					
4					
5					
6					
7					

PART V: PARTICIPATION IN IRRIGATION AND INVOLVEMENT IN WATER USE CONFLICTS

501 For how long have you participated in irrigation farming in this place?

Response	Code
One year	1
Two year	2
Three year	3
Four year	4
Five year and above	5

502 Since you have started to participate in irrigation farming in this place have you engaged in water use conflicts with the other farmers?

Response	Code
Yes	1
No	0

If the answer is No, skip 503 and 504, then go to 505

503 If yes how often have you engaged in such conflicts? *(Please circle your choice)*

Response	Code
Sometimes	1
Often	2
Very often	3
Always	4

505 Since you have started to participate in irrigation farming in this place have you engaged in water use conflicts with the pastoralists?

Response	Code
Yes	1
No	0

506 If yes how often have you engaged in such conflicts?

Response	Code
Sometimes	1
Often	2
Very often	3
Always	4

507 Do you consider the following to be factors that contribute to occurrence of conflicts in your scheme? *Please put a circle on your choices. You can circle more than one factor.*

Factor	Codes	
	Yes	No
Scarcity of water	1	0
Excessive water	1	0
Technology	1	0
Encroachment by illegal users	1	0
Violation of rules	1	0
Exclusion from using the resource	1	0
Migration	1	0
Benefits from irrigation	1	0

PART VI: INSTITUTIONS AND CONFLICTS MANAGEMENT

601 Do you know any formal and informal laws, rules or regulations that govern access and utilisation of the water resource in your scheme?

Response	Code
Yes	1
No	0

602 If yes can you mention any formal and informal laws, rules or regulations that you know?

Formal laws, rules or regulations	Informal laws, rules or regulations

604 Were you involved in preparation of the laws, rules and regulations that govern access and utilisation of water in your scheme?

Response	Code
Yes	1
No	0

603 between the formal and informal rules which one do you prefer in conflicts resolution?

Response	Code
Formal	1
Informal	2
Both	3

Thank you for your cooperation

Appendix F: Coefficients of logit regression model on factors influencing water conflict in KIS

Variables	Coef.	P> z
Sex of household head	.5641301	0.467
Age of household head	.0401746	0.412
Household head's education level	-.2434332	0.834
Irrigation farming experiences	.8278704	0.011
Water Scarcity	1.225549	0.307
Encroachments	-.5435375	0.649
Irrigation farming benefits	1.708738	0.046
Exclusion	1.807753	0.028
Constant	-5.533615	0.084

Appendix G: Coefficients of logit regression model on factors influencing water conflict in MIS

Variables	Coef.	P> z
Sex of household head	-1.046894	0.363
Age of household head	-.0365774	0.655
Household head's education level	.9413054	0.717
Irrigation farming experiences	3.460073	0.000
Water Scarcity	3.542246	0.016
Encroachments	3.007154	0.016
Irrigation farming benefits	-4.777594	0.005
Exclusion	1.519886	0.266
Constant	-14.89379	0.005