

**AN ANALYSIS OF HOUSEHOLD DEVELOPMENT STRATEGIES AND THEIR
LINKAGE TO RIVER BASIN RESOURCES DEGRADATION IN TANZANIA**

**EEN ANALYSE VAN ONTWIKKELINGSSTRATEGIEËN VAN HUISHOUDENS EN DE
BAND MET DE VERSLECHTERING VAN HULPBRONNEN IN TANZANIAANSE
STROOMGEBIEDEN**

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Dedicated to my parents, my husband, and my daughters Victoria & AdelineAnna. I love you so much.

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LIST OF ABBREVIATIONS

BMUs	Beach Management Units
BWB	Basin Water Boards
CI	Critical Institutionalism
CPR	Common Pool Resources
CWCs	Catchment Water Committees and
DST	Development (Livelihood) Strategies
FGD	Focus Group Discussion
ILA	International Law Association
IOs	Irrigators Association
IWRM	Integrated Water Resources Management
KR	Kilombero River
LF	livelihood Framework
LVBC	Lake Victoria Basin Commission
LVBWB	Lake Victoria Basin Water Board
LVEMP II	Lake Victoria Environmental Management Project
MI	Mainstream Institutionalism
MoLFD	Ministry of Livestock and Fisheries Development
MOW	Ministry of water
MoWI	Ministry of water and Irrigation
MoWLD	Ministry of Water and Livestock Development
NAWAPO	National Water Policy
NGO	Non-Governmental Organisations
NIE	New Institutional Economics
NSGRP	National Strategy for Growth and Reduction of Poverty
NWB	National Water Board
NWB	National Water Board
OECD	The Organisation for Economic Co-operation and Development
PMORALG	Prime Minister Office - Regional Administration and Local Government
PO	President Office
PRA	Participatory Rural Appraisal
RBR	River Basin Resources
RUGs	Resources Users Groups
SACCOS	Savings and Credits Cooperatives
SR	Simiyu River
TASAF	Tanzania Social Security Funds
UNDP	United Nations Development Programme
URT	The United Republic of Tanzania
VEOs	Village Executive Officers
VICOBA	Village Community Banks
VPO	Vice president Office
WEOs	Ward Executive Officers together
WRM	Water Resources Management
WSDP	Water Sector Development Programme
WUAs	Water User Associations
WWDR	The World Water Development Report

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ABSTRACT

More than a decade ago, the Tanzanian government reformed its policy on the governance of water resources from a predominantly centralized system to a more participatory approach. The implementation of the policy required a simultaneous consideration of both the ecological and social cultural context of the basin and involvement of different stakeholders during the planning and management of water resources. The policy implementation was expected to conserve basins resources without negatively affecting livelihoods of people who depend on river basin resources (RBR).

Despite the water policy reform, RBR in Tanzania are still degrading. While the factors for the RBR degradation are well articulated in literature, there is still a knowledge gap in terms of individuals' characteristics that govern their use of RBR in Tanzania. From this vantage point, our study sets out to investigate in more depth the factors that influence the uses of RBR in different socio-economic and cultural contexts to inform policies on the improvement of rural livelihoods while at the same time protecting the river basin natural resource bases. More specifically, we analyse household characteristics that govern decisions regarding RBR use and assess linkages between people's access to RBR¹, choices of development strategies and degradation of RBR.

The study uses data collected from households residing along Kilombero Basin and Simiyu Basin. Intra-household data were collected from different household members aged 18 and above who carry out different socio-economic activities. A mixed methods research design, the qualitative—quantitative—qualitative approaches, were used in a sequential manner to answer the research questions.

Findings show that informal social relation factors influence both practical rights to use RBR and benefits from the use of resources, which further result in diversities in occupational choices. While almost everyone practices seasonal farming to provide food for household consumption, informal social relation factors and access to social and financial capitals, affect participation in activities that are used for income generation. Lastly, yet importantly, gender, participation in multiple activities and environmental awareness are important factors for people to practice pro-environmental behaviour.

¹ We define individual access to RBR in terms of practical rights to use household owned RBR to pursue different livelihood activities and the ability to benefit from the goods that were produced from the use of RBR.

The study provides important contributions to the literature on access to resources as well as to the policy settings by showing the importance of distinguishing between practical rights to use resources and benefits derived from their use. Furthermore, the study confirmed intersectionality and intra-household theories by demonstrating that both men and women are heterogeneous groups in societies. The findings that show that access to social and financial capitals are important factors for people to diversify away from non-environmental to environmental friendly activities provide important information to policy makers and other practitioners dealing with conservation. The study also sheds light on the importance of providing people with environmental education and incentives to encourage pro-environmental behaviour.

CHAPTER 1

POSITIONING THE STUDY

1. INTRODUCTION

Governance of river basin ecosystems is complex because its natural and social environments are “characterized by uncertainties, complex dynamics, natural variations and scale dependencies” (Bodin & Crona, 2009, p. 366). The quality of river basin environments depends on environmental factors such as weather conditions, changes in climate, and the behaviour of humans when interacting with river basin natural resources. The latter is related to the activities that people pursue for livelihood enhancement and the impact such activities have on the natural environment of river basins.

Diverse stakeholders in a large and a dispersed geographical area use river basin resources (RBR). Thus, different institutions exist for the management of RBRs, each with its own rules, norms, behaviours and decision-making processes (Kuzdas, Wiek, Warner, Vignolaa, & Morataya, 2015). Lubell (2015) points out that, “Complex institutional systems do not address just one resource such as a fishery, but simultaneously address multiple interconnected public goods and common-pool resource dilemmas” (p. 41). The way in which people interact with RBR and the outcomes of their interactions may differ between different stakeholders in the community and between communities through which the waters of the river basin flow.

This PhD work engages with the debate on the links between the livelihoods of rural people and the degradation of RBR resources. The study seeks to understand household characteristics that govern resource use decisions and how these decisions are interlinked to the degradation of the resource base. In particular, the study will analyse the relationship between households’ uses of RBR, choices of development (livelihood) strategies (DST) and degradation of RBR in Tanzania.

Section 2 of this chapter sets out the concept of the river basin and the reasons for focusing on river basins rather than a specific resource such as water. Section 3 provides an overview of the governance of river basins in the country under study, i.e. Tanzania. The central issue of the study is contextualized in section 4. Research questions and the significance of the study are subsequently presented in this section. Section 5 gives an overview of the structure of the thesis.

2. WHY RIVER BASIN RESOURCES?

The world has observed an unprecedented deterioration of the fresh water resource base in terms of both quality and quantity (Akhmouch & Correia, 2016; UN-Water, 2018). Factors such as urbanization, population growth, economic development and climate change are reported to trigger the demand for water in several socio-economic sectors, which further results in increased competition among water users (OECD, n.d.; UN-Water, 2018). The World Water Development Report (WWDR) revealed that because of rapid population growth, the global demand for water may increase by nearly one-third by 2050 (UN-Water, 2018). The WWDR also showed that climate change has affected the global water cycle by making the wetter regions wetter and drier regions even drier. Consequently, it is estimated that almost half of the world's population live in water scarce areas for a period of at least one month per year.² The rising demand for water also causes an increase in the use of other resources that form part of the water ecosystem. WWDR reports that, "Around two thirds of forests and wetlands have been lost or degraded since the beginning of the 20th century. Soil is eroding and deteriorating in quality. Since the 1990s, water pollution has worsened in almost all rivers in Africa, Asia and Latin America" (UN-Water, 2018, p. iv).

Further, the WWDR shows that the increase in water demand is expected to continue growing over the next two decades, with a higher increase in demand for agricultural uses compared to industrial and domestic uses. The effects will be particularly severe in developing countries where the majority of the users are small-scale farmers. As there is unequal distribution of fresh water resources between regions and among social groups within regions (Pahl-Wostl, Holtz, Kastens, & Knieper, 2010), the increase in demand for water may result in socio-economic problems such as mass migration of people seeking water and emergence of conflicts over water both within and between societies (UN-Water, 2018). The over exploitation of water resources constitutes a challenge on a global scale in terms of food security, people's livelihoods and environmental sustainability. In particular, the scarcity of fresh water creates a trade-off between on the one hand, the uses of water resources to sustain human demands, and on the other hand environmental sustainability (Spring et al., 2018).

In the literature, water resource problems are largely associated with the failure of water governance systems rather than physical water conditions (Alexandra, 2018; Hurlbert & Andrews, 2018; Pahl-Wostl, Lebel, Knieper, & Nikitina, 2012; Yu, 2018). The Organisation for

² For a detailed discussion, see the 2018 World Water Development Report (UN-Water, 2018).

Economic Co-operation and Development (OECD) defines water governance as: “The set of rules, practices, and processes through which decisions for the management of water resources and services are taken and implemented, and decision-makers are held accountable” (OECD, n.d., p. 1). Governance provides the guidelines under which management activities such as the monitoring, analysis and implementation of water resource programmes operate (Pahl-Wostl et al., 2012). Water resource programmes may vary in terms of development, management and distribution of water resources in a specific domain.

Traditionally the governance of fresh water resources has been conducted without taking into account other resources that are associated with river basins. Historically, countries/ districts were responsible for the management of water resources that are within their boundaries. Little or no interest was shown in the impact of the country/ district’s actions on the availability of water resources in areas beyond the administrative boundaries or the status of the basin (drainage system) as a whole.³ The International Law Association (ILA) first brought the concept of governance of water resources in relation to river basins on to the international agenda in 1966, though its focus was on interventions related to the governance of international rivers. The ILA adopted the Helsinki rules on the uses of international waters by defining an international drainage basin as: “a geographical area extending over two or more states determined by the watershed limits of the system of waters, including surface and underground waters, flowing into a common terminus” (McCaffrey, 1991, p. 141). Because of this attempt, the legal discipline joined with other disciplines such as environmental sciences, agricultural engineering and economics to emphasize that the basin as a whole, rather than a single stream or the water, should form an administrative unit for effective governance of waters (McCaffrey, 1991).

In line with the ILA notion, this study argues that the river basin is an important feature for the governance of water resources. As an entity, a river basin integrates different systems of the water’s natural environments such as upstream and downstream resources, land and water, groundwater and surface water (Mostert et al., 1999). The focus on the river basin as an administrative unit is not only related to flowing water, but also to other natural resources within the river basin areas (e.g. soil, land, forest, grasslands and croplands) because they affect both the quality and quantity of water. For instance while soil influences the quality, storage and transportation of water, vegetation is important for the process of water recycling and the

³ For a detailed discussion on the topic, see McCaffrey (1991).

protection of soil cover by preventing erosion (UN-Water, 2018). More importantly, in the context of our study, a river basin integrates its broader system of natural environment with the social, economic and political context (Manongi, 1991). Specifically, socio-economic policies together with cultural norms with regard to RBR use are likely to affect the river basin's natural environment, which in turn affects the socio-economic and political context of the basin.

While the ILA definition aims to describe the governance of rivers that flow through more than one country, it is also valid for the river basins that are found within a single country but whose waters flow through different administrative authorities (districts). These rivers often traverse different parts of the country and communities that hold different cultural norms in terms of river use, and sometimes with different formal rules on RBR governance. The governance of these river basins within the country can be as complex as governance related to international rivers. Hence, international organizations have been emphasising the need for different sectors and district authorities within countries to coordinate their efforts on RBR governance.

The idea of multi-stakeholder participation in river basin governance was first conceived in 1977 in the United Nations Water Conference at Mar del Plata.⁴ In the 1980s, the idea disappeared from the political agendas until 1992 when the World Summit on Sustainable Development (cf. Earth Summit) put it back on the agenda. The summit adopted Agenda 21, with its chapter 18 aiming to protect fresh waters through the application of integrated approaches. The Rio Summit highlights that "integrated water resources management (IWRM), including the integration of land- and water-related aspects, should be carried out at the level of the catchment basin or sub-basin" (Agenda21, 1993, p. 18.19). In the 2002 Earth Summit, the Technical Advisory Committee of the Global Water Partnership defined IWRM "as a process, which promotes the coordinated development and management of water, land and related resources in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems" (Rahaman & Varis, 2005, p. 15). In summary, both summits emphasize that water governance should be devolved to the basin level, with active participation of different stakeholders. The idea behind IWRM is to involve people who are affected by decisions on the governance of RBR in the process of arriving at those decisions (Pahl-Wostl et al., 2007). Because of these international summits,⁵ IWRM has

⁴ For a detailed discussion on the topic, see Rahaman and Varis (2005).

⁵ Other international organizations joined the Earth Summits to advocate for integrated governance of river basins. The term IWRM became part of the agenda of other international gatherings such as the Second World Water Forum

become the dominant model for water management in both rich and poor countries (Akhmouch & Correia, 2016). The participatory approach has replaced the notion of the centralization of decision-making authority. In Sub-Saharan Africa, water sector reforms have been undertaken to include the component of IWRM in planning and management, with the support from the international donor community. The reforms emphasise the use of laws and formal institutions for the governance of river basins at different levels of management (Lankford & Hepworth, 2010).

(2000), the International Conference on Freshwater (2001) and the Third World Water Forum (2003) (Rahaman & Varis, 2005).

3. GOVERNANCE OF RIVER BASIN RESOURCES IN TANZANIA

River basins in Tanzania contain a wide range of natural resources including water, arable and irrigable land, mineral deposits, fish, wetlands, natural forests and a number of tourist attractions, which contribute in diverse ways to the livelihoods of people. As a result, many people living around these areas depend on small-scale agriculture, subsistence forestry, artisanal fishing, livestock husbandry, artisanal mining and small-scale trade as sources of livelihoods. The intensity of these activities in any given area can vary depending on size, climatic and soil conditions, available technology, infrastructure network, market access and population pressure.

Like many other countries, Tanzania has seen a decline in its river basin natural resources base. Rapid population growth which in turn triggers competition over resource uses, is one of the major factors that contribute to this decline (IUCN, 2003; Mbonile, 2005). Market failures can also cause high rates of natural resource depletion because the poor tend to harvest the resources in order to meet current consumption (Perrings, 1989) rather than long term benefits (Pender, 1996).⁶ The fall of employment rates in agriculture, with no increase of employment in off-farm activities⁷ has caused more people to depend on natural resources (including RBR) for their survival. In addition, the poor functioning of institutions dealing with the management of RBR also contribute to unsustainable use of RBR in Tanzania (Rajabu & Mahoo, 2008; Rugemalila, 2015). Government interventions that rely on top-down approaches are also blamed for eroding the traditional or local system of land use arrangements and patterns (B. W. Miller & Doyle, 2014). Poor institutional capacity for RBR management may also create inequities of access to RBR and the flow of benefits from conservation, which may in turn affect the way in which people interact with the environment.

In the early 1990s Tanzania adopted an integrated water resources management (IWRM) approach (among other factors) to counteract the problem of RBR degradation. This approach

⁶ However, some researchers have found different resource consumption pattern among the poor. For instance, because land is the only asset available for the poor, the poor may have strong incentives to manage their land well (Pender, Jagger, Nkonya, & Sserunkuuma, 2004).

⁷ The share of agriculture in total GDP and its proportion in total employment have been declining relative to other sectors in spite of the fact that the majority of Tanzanians still depend on agriculture for their livelihoods (Deloitte, 2016; URT, 2010b; WorldBank, 2017).

was meant to promote the efficient and equitable use of, and access to, water⁸ for all stakeholders (Mutayoba, 2002; Van Koppen & Tarimo, 2014). IWRM was supposed to address the threats to RBR by bringing together different stakeholders in the management of those resources (MoWLD, 2002). The approach was followed by the formulation of the new water policy (MoWLD, 2002) and the water resources management act (URT, 2009b), which set out the guidelines for the management of river basins in Tanzania. The past policies (e.g. the 1991 national water policy and 1971 national rural water supply programme) failed to effectively manage the basin resources because they focused on the development of water resources rather than on their protection or management (MoWLD, 2002, p. 14). Maganga (2003) stressed that these policies were characterised by “fragmented planning and management; a lack of integrated approaches and conflicting sectoral policies which have contributed to increasing conflicts over water use” (p. 995), and other degradation practices such as water pollution and over exploitation by different water users. Since then, the institutions for the governance of water resources have been established. Within this new development, the notion of river basin activity is commonly referred to as “integrated river basin management”. It is in this context that different river basin bodies responsible for the management of river basins were established.

Despite the introduction of a new policy in 2002 and a new institutional framework for water resources management introduced in 2009, the 2013 rapid assessment report by the United Nations shows that RBR in Tanzania are still under pressure. The problem of water scarcity in river basins still exists and other RBR are still degraded (UN-WATER, 2013). For example, water use competition between different stakeholders is still reported to degrade RBR. The nature of competition over RBR use is explained within four main areas of concern (IUCN, 2003; MoWLD, 2002), which are farming, pastoralism, urban uses and industrial concerns. What is evident is that the differing concerns and interests over the use of basin resources have not only brought about the depletion of available resources, but have at times also led to conflicts among the users.⁹ As many users are vying for the same limited resources, competition coupled with the

⁸ River basins are termed as water resources in Tanzania. For administrative purposes, the basins are divided into nine river basins (MoWLD, 2002).

⁹ For example, the drying up of wetlands and reduced levels in hydroelectric reservoirs are thought to be the results of ‘wastage’ of water by irrigation and therefore authorities seek to restrict the flows to agriculture during the dry season (D. J. Merrey, Drechsel, de Vries, & Sally, 2005). As discussed in D. J. Merrey et al. (2005), these oversimplified perspectives on agricultural water use in the context of river basin water management can lead to serious harm to

desire to increase income has increasingly led to destructive practices. These destructive practices have led to other problems such as water shortages, poor water quality and environmental degradation, which constrain efforts to alleviate poverty, improve health in local communities, ensure food security, economic development and the protection of natural resources (IUCN, 2003; MoWLD, 2002).

The degradation of RBRs presents a considerable challenge to poverty alleviation and the sustainable management of basin resources because the two appear to be interlinked. This is because, like many other households in the world, Tanzanian households utilize natural resources with the aim of improving their livelihood. As a result, natural resource degradation, household development strategies and poverty are often locked in a vicious cycle in rural Tanzania.

the productivity and wellbeing of people.

4. FORMING A RESEARCH PROBLEM

The ways people make decisions on the use of natural resources, including RBR, are affected by institutional contexts that surround them. The literature shows that a wide range of factors influence natural resource use in terms of determining or affecting the way in which people interact with their natural environment, these include: institutional rules and regulations (North, 1990; Ostrom, 2008), informal practices and social relations (Cleaver, 2001; Leach, Mearns, & Scoones, 1999; Mehta, Leach, & Scoones, 2001), market, infrastructural development and the presence of organizations that provide social services to the community (North, 1990), technological innovation (de Janvry, Sadoulet, & Farfchamps, 1989), and government policies (Ellis, 2003). The institutional contexts in the governance of river basins are complex as diverse stakeholders (with different interests in the use of natural resources) use RBR in a large and dispersed geographical area. This may result in the presence of different rules, behaviours and decision-making processes on the use of resources (Kuzdas et al., 2015). Formal and informal institutions may operate together to determine issues such as who has the rights to use, when and how to use a certain resource, etc. (Bandaragoda, 2000; Meinzen-Dick, 2014; Meinzen Dick & Pradhan, 2002). They both create the rules and determine the behaviour that is expected in society regarding the use of resources. This is also the case in Tanzania, where human activities and actions are regulated and influenced not only by the formal system of laws but also by informal customary systems and norms (see for example, Maganga, 2003). These institutions may either work together or contradict each other. For instance, the Sukuma ethnic norm treats water as a gift from God, thus nobody can be denied the right to use water from any source (Drangert, 1993). Such a norm affects the ways the water resource is used in two ways. Firstly, it contradicts the formal government rule, which obliges all water resource users to obtain a legal permit from the basins water boards (URT, 2009b). Secondly, such a norm may result in the over-exploitation of water resources if there are no informal practices to protect them. In addition, socially constructed practices defined by, for example, gender and age, may create social differences that favour some groups and put others at a disadvantage. These socially constructed practices may determine relations such as the distribution of roles related to RBR uses among different groups in the society (the roles of elders vs. youths, men vs. women). All these may affect the ways in which RBR are used and which in turn may influence the status/conditions of the resources.

This study argues that adequate knowledge of the factors that influence the uses of RBR in different socio-economic and cultural contexts is needed to inform policies on the improvement of rural livelihoods, and the protection of the river basin natural resource bases. This study aims

to analyse household characteristics that govern RBR use decisions and how these decisions are interlinked to the degradation of resource. Specifically, the study assesses the links between people's access to RBR, choices of development strategies and degradation of RBR in Tanzania. To achieve the objective, this study will address the following research questions:

1. How do the existing governance structures affect people's uses of RBR?
2. How do different groups of people within and between societies access resources and how does the access to resources affect the choices of development strategies?
3. Are the development strategies that individuals choose and the RBR degradation interlinked and if so, in what way?
4. Is the awareness of RBR degradation linked to pro-environmental behaviour, and if so, in what way?

In line with the literature on the roles of informal practices and social relations in the access to resources (Leach et al., 1999; Ribot & Peluso, 2003), the study argues that assuming homogeneity in access to resources creates obstacles to achieving the goal of sustainability of RBR because rural communities differ in their behaviour regarding the uses of natural resources. Thus, the study assumes that informal rules in terms of cultural norms guide the behaviour with regard to the use of natural resources; in other words, different communities access RBR in different ways. Differences in norms over access to RBR imply that even the resulting outcomes in terms of occupational choices and conservation behaviour differ between communities. In addition, the cultural norms surrounding socially constructed practices also create differences in access to resources between different social groups within the community and even within households. Thus, the study also gathers information on intra-household differences in access to RBR and their resulting gendered outcomes in terms of choices of DST and degradation of RBR.

The study makes an academic and policy contribution to the governance of RBR in Tanzania by assessing how governance in terms of formal and informal institutions affect the ways people use resources and their resulting impact on the conditions of RBR. Thus, the study aims to provide relevant evidence that will feed into the design of effective conservation policies that capture information on behaviours of the rural people in terms of RBR uses. Further, the study is also important for recommending policies to promote development initiatives that take into account the different roles played by different groups in society.

5. THESIS CHAPTERS

The book is organised into nine chapters. **Chapter 1** (this chapter) has introduced the study by explaining the background and rationale for conducting the study as well as presenting the key research questions.

Chapter 2 discusses different theoretical views on the governance of natural resources with a special focus on the factors that influence access to resources and their impact on choices of DST and degradation of RBR. The concepts from different theories are integrated to build the analytical framework that is used in the study. The analytical framework shows different relations that are used to guide our research in answering the research questions.

Chapter 3 describes our research methodology. The chapter describes the study areas as well as the underlying selection rationale. The chapter also gives overviews of the philosophical stances that underlie different research designs, and the ways different research designs were combined in this study to answer the research questions. The methods that were used to collect and analyse data in each of the research designs and the limitations of data collection activities are also presented in this chapter.

Chapter 4 gives a summative account of the Tanzanian government policies on river basins and their resources. The chapter focuses on linking the policies and institutional arrangements for the governance of RBR with the people's behaviour on the use of RBR for the improvement of their livelihoods and resource sustainability. The evidence from this chapter helps us to address our first research question that aims to understand the forms of governance structures that exist in the management of RBR and how they affect people's access to RBR.

Chapters 5 and 6 address the second research question, which seeks to study the determinants of access to RBR. In chapter 5,¹⁰ a comparative analysis of fishing and agro-pastoralist communities is conducted to zoom in on cultural differences in access to RBR. The chapter uses data from Mofu ward that is comprised of three villages, each formed by people of different ethnic backgrounds, which provides a useful setting to investigate cultural differences on access to RBR.

¹⁰ This chapter was accepted for publication in *Afrika Focus* (June 2018).

Chapter 6 presents an intra-household analysis of the ability to benefit from the uses of household produced goods in Meatu district.¹¹ Households in Meatu are largely characterised by organisation into extended families who pool resources that are directly used in production. However, while household members may use similar resources to produce goods, our study draws upon the intra-household literature to argue that there might be conflicting interests among household members in terms of decisions regarding the uses of goods. Consequently, some household members' utility from the uses of goods may not be maximized if they do not possess decision-making powers on the uses of goods. In order to gain insights into the possible differences in ability to benefit from the produced goods between different members of household, an intra-household analysis is performed. The variables that show members' relationships with the head of households are further intersected with informal social relation variables to investigate whether social diversity creates (more) differences in benefits between different household members.

Chapter 7 addresses part of the second research question as well as the third research question. The chapter studies the impact of access to other livelihood resources on the choices of DST and its implications on conservation strategies. A comparative analysis is conducted to investigate whether there are differences in impacts between Kilombero and Meatu districts.

Chapter 8 is related to the fourth research question, investigating the links between awareness of degradation and attitudes towards conservation of river basins. As in chapter 7, a comparative analysis is conducted between two study areas to assess locational differences.

Chapter 9 presents conclusions and the way forward. Summary of the findings, some policy recommendations and contributions of the study findings to the literature are also set out in the last chapter.

¹¹ This chapter was accepted for publication in the International Journal of Women Studies (August 2018 issue).

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CHAPTER 2

THEORETICAL FRAMEWORK

1. INTRODUCTION

This chapter presents different theoretical views on the governance of natural resources, with a special focus on the factors that influence access to resources and their impact on livelihood outcomes in terms of occupational choices and degradation of natural resources. In section 2, we explain the concept of livelihood framework (LF). The LF is used because it recognizes people's dependencies on different resources, including natural resources, as the means of earning a living and escaping poverty. Thus, the framework serves as a guiding tool to analyse the interaction between livelihood resources, development strategies, and livelihood outcomes. The framework also allows the assessment of livelihood outcomes at different levels of analysis (Scoones, 1998) including the individual level which is also used in this study.

Section 3 zooms in on the theory debate concerning the governance of natural resources. Governance systems affect the ways in which people interact with natural resources. There are different theories on governance of natural resources ranging from neo-classical theory, new institutional theories, to mainstream and critical institutionalisms. It is not the aim of this research to study in detail theories such as neoclassical theory or new institutional economics (NIE) theory. However, as they are foundational to the development of some of the institutional theories, they are briefly elaborated on this paper in order to widen our understanding of the development of institutional approaches. The mainstream and critical institutionalism approaches are presented to explain the current debate in the field on the governance of natural resources.

Section 4 gives an overview of the theories relevant to access to natural resources. This includes presentation of the factors that affect access to resources among different groups of people in society and their livelihood outcomes. The theories help us to gain insight into questions such as why resources are not equally accessed among different people in communities.

Recognizing the fact that resources are not equally accessed between men and women in some communities, section 5 presents a brief discussion on intra-household differences in access to and control over resources, with a special focus on how social relations derived from institutional contexts affect the way different groups of people access household resources.

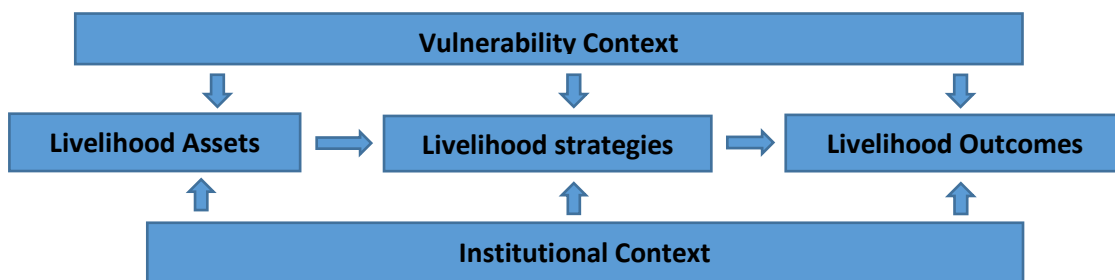
Section 6 introduces intersectionality theory which shows how different social categories intersect to affect people's lives in different ways, compared to the impact of a single social category. In chapters 5 and 6, intersectionality theory is applied to study how informal social relations factors interact to affect people's access to RBR.

In section 7, the LF is combined with the theories on the governance of and access to natural resources to build an analytical framework that addresses the multiplicity of factors affecting the sustainable use of RBR. The framework is designed to explain how household development strategies (natural resources based and non-natural resources based activities) depend on household's access to resources, and how these strategies affect conservation of RBR. The framework also shows how informal social relation factors mediate the processes of both access to resources and achievement of livelihood outcomes.

2. LIVELIHOOD FRAMEWORK

Livelihood is defined as having an amount and flow of food and cash that is high enough for a living or to meet basic needs (R. Chambers & Conway, 1992; Hogsvorst, 2003). In Scoones (1998), livelihood is said to comprise the “capabilities, assets (including both material and social resources) and activities required for a means of living” (p. 5). In development thinking, however, livelihood refers to the way people make a living, and analysing livelihood systems entails examining factors involved in the manner in which people make a living (Kamuzora, 2004). In this paper, the analysis of livelihoods includes the analysis of economic (livelihood) activities pursued by individuals in households and the factors that affect the choices behind those activities, and an analysis of the resulting outcomes.

Figure 1. The Livelihood Framework



Source: Adopted and modified from (Ellis, 2003, p. 3)

Figure 1 shows an example of the LF. The framework shows that people use different livelihood assets to carry out different activities (livelihood strategies) in order to achieve different livelihood outcomes. Five types of livelihood resources (assets) are identified in the livelihood frameworks, namely human, social, natural, physical, and financial capitals (DFID, 1999). Different livelihood strategies require the use of different resources. Those who are endowed with resources are more likely to perform different activities in order to maximize their livelihood outcomes rather than being forced into any given strategy because it is their only option (DFID, 1999). This means that, no single category of assets on its own is sufficient to achieve varieties of livelihood outcomes. It is assumed that people combine several types of assets¹² in order to achieve their livelihood outcomes.

¹² These assets are not ends in themselves: other forms of assets that are deemed important in particular areas of study can be identified and added Scoones (2009).

According to Hogsvorst (2003), livelihood strategies may be defined as the actions undertaken by people with the aim of improving their livelihoods in the long term. However, people may also carry out livelihood strategies in order to cope with uncertainties such as droughts, i.e. coping strategies. Carver, Scheierb, and Weintraub (1989) identified coping strategies as specific efforts pursued by households to overcome or to minimise the impacts of stressful events. In this paper, livelihood strategies that are pursued with the aim of improving wellbeing are referred to as development strategies (DST). Development strategies that are pursued in rural areas include both farming and off-farm employment (Ellis, 2000). Households use resources to carry out those strategies; this includes the use of natural resources, which in turn means that these strategies have implications for the natural resource conditions in the areas where they are being pursued.

Livelihood outcomes from DST can range from increased income, increased well-being, reduced vulnerability, and improved food security, to the more sustainable use of natural resources (DFID, 1999). According to R. Chambers and Conway (1992), "livelihood is sustainable when it can absorb and recover from stresses and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generations" (p. 6). Sustainable livelihoods are the ones that develop the assets on which they depend, without destroying the natural resource base.

Access that people have to resources and the choices of DST are modified by the institutional context. These factors shape the extent to which people are able to draw on or develop assets in order to sustain their livelihoods. Ellis (2000) categorised the institutional context into organisations, formal rules and cultural norms. Organisations may affect rural livelihoods through policy formulation and implementation (DFID, 1999). In terms of formal rules and regulations institutions constrain people's behaviours when interacting with environments (North, 1990). Cultural norms create differences in informal social relations in terms of factors such as gender, class and age. These differences in informal relations create inequalities in the way resources are accessed in the society, which leads to differentiated livelihood outcomes among different social groups (Ellis, 2000).

Vulnerability contexts are factors that are beyond the household's control, for example trends, shocks and stresses. Trends might involve changes in demography, technology and international prices, and may affect the choices of DST (Ellis, 2000). Environmental changes such as droughts and floods may create shocks and stresses as natural resources are destroyed and the ability of the ecosystem services to provide positive livelihood outcomes to human beings is

compromised. Due to the lack of other livelihood resources, over-exploitation of natural resources may be the immediate strategy for poor people to cope with the vulnerability context.

The LF is an important concept in this study as it shows how people can use resources to enhance their livelihoods and at the same time maintain their natural environment. Sustainability in the social context is connected to this because livelihoods have to enhance the local and global assets on which they depend (Hogsvorst, 2003). In river basin areas, the concept may be related to global and local concerns about the degradation of RBR, for instance physical degradation of land and water resources due to human activities undertaken at the upstream or water catchment areas. Such activities include irrigation, livestock keeping, illegal fishing, and industrial activities.

Despite its usefulness, the LF has faced several criticisms. The framework has been criticised for its failure to conceptualize the issues of access to resources (L. de Haan & Zoomers, 2005). It is argued that access to resources is gained not only through the physical ownership of resources, but also by the ability of people to benefit from those resources (Leach et al., 1999; Ribot & Peluso, 2003). Section 4 of this chapter addresses this criticism by presenting the theories or perspectives that explain how access to natural resources is gained.

The LF is also criticised for limiting itself to the economic indicators of wellbeing as the main measures of livelihood outcomes (L. de Haan & Zoomers, 2005; de Herdt & Bastiaensen, 2008). People do not only care about the income and material things in their lives, but also about other non-material factors that give meaning to their lives. These factors include the freedom to make individual or collective decisions, the ability and opportunity of people to live the kinds of lives they value, and the ability of people to make their own choices (UNEP, 2007). Section 4 of this chapter addresses this criticism by presenting the concept of the ability of people to benefit from the use of household resources.

An additional criticism of LF is that it does not sufficiently consider the impact of social relations issues on livelihood outcomes (L. de Haan & Zoomers, 2005). However, there are different views on this point. Some authors (for example, L. de Haan, 2012; Scoones, 2009) have argued that social relations issues were incorporated in various LF frameworks. Section 3 and 4 discusses how social relations issues are included in our study.

3. GOVERNANCE OF NATURAL RESOURCES

3.1. NEOCLASSICAL THEORY

Different theories were put forward to aid analysis of the governance of common pool resources (CPR).¹³ Under the assumption of zero transaction costs and perfect information to all resource users, neoclassical theories associated the problem of unsustainable use of natural resources with the market failure to allocate resources efficiently (Sang-Hoon, 2007). People create social costs (externalities) to the community if their consumption and/ or production decisions involve the degradation of the environment. Social costs can be a source of economic inefficiencies if they are not reflected in market prices. Thus, government intervention in terms of price structure is needed to internalize the social cost to be part of private costs of consumption or production (Lenka, 2010). The government can internalize environmental costs either by introducing taxes and penalties on the degradation of natural resources or by requiring those who create the costs to compensate those who are affected by the damage (Coase, 1960; Pigou, 1920). Neoclassical economics is useful to explain how market failures can cause environmental resources degradation, and how the government can intervene to correct them. However, neoclassical economics does not include the analysis of institutional arrangements in their models. Institutions are not regarded as a factor that affects people's behaviour with regard to natural resource use decisions (Cosmin, 2014).

3.2. NEW INSTITUTIONAL ECONOMICS THEORIES

The new institutional economists (NIE) recognize the role of institutional arrangements in governing human behaviour when interacting with the natural environment. When people are left to pursue their own interests, they tend to overexploit resources: thus, institutions are there

¹³ CPR are natural resources that are shared by different users for example fish, wildlife, surface and groundwater, rangelands and forests (Feeny, Berkes, McCay, & Acheson, 1990, p. 3). These resources share a common characteristic; they are rivals in consumption but non-excludable (Feeny et al., 1990). CPR, such as RBR, are rivals in consumption because they are used by different groups of people to earn their livelihoods, sometimes in a competitive way. A non-excludability characteristic is attributed to the fact that is difficult to exclude people from the consumption of CPR. In his well-known publication, 'The Tragedy of the Commons', Hardin (1968) shows that if the rights over the use of CPR are not claimed by the state or individual part/ organization, CPR are overexploited and turn into open access.

to constrain human behaviour on the use of natural resources (North, 1990). Institutions in terms of rules, regulations and organizations affect people's choices, negotiations and agreements in the society, thus they help to reduce transaction costs associated with governing human behaviour (Coase, 1960). For instance, while the establishment of property rights can help to identify parts that have the rights to use resources, rules can specify how and when the resources should be used and sanctions can be used to punish those who violate the rules. Coase (1960) showed that when institutions are not well established the market cannot yield efficient outcomes concerning natural resources. He argued that if the initial delimitation of rights is not established, transactions in the markets are impossible because it may be difficult to identify the person/ organisation with the right to use a resource. The literature on property rights in natural resource management shows that property rights can be held as private property rights, public/ state property rights, and/ or common property rights (FAO, 2002). Private and public/ state property rights refer to property rights that can be claimed by individual people/ organisations and the public, respectively. Individuals or a group of individuals who use shared resources can claim common property rights.

3.3. MAINSTREAM INSTITUTIONALISM AND CRITICAL INSTITUTIONALISM PERSPECTIVES

From the literature of institutional theories of CPR two schools of thought emerged, namely; mainstream institutionalism (MI) and critical institutionalism (CI). The MI's ideas are partly drawn from NIE, which among other things, assert that, "the role of institutions is to provide information and assurance about the behaviour of others, to offer incentives to behave in the collective good, and to monitor and sanction opportunistic behaviour" (Cleaver, 2012:8). In this perspective, natural resources are considered to be effectively managed by community through creating their own institutions. Ostrom (1992) suggested that robust and ideal institutions can be "crafted" by resource users and policy makers in order to attain a specific goal (p. 60). Collectively, community can identify their natural resources goal, establish strategies to achieve their goal, impose rules and regulations, and monitor people's behaviour using sanctions. Communal management of natural resources is thought to lead to the sustainable management of resources as its practice is highly participatory and it transfers responsibility to the people who are most affected by environment degradation (see for example, Mutamba, 2004; Ostrom, 1990). The MI is probably the most influential approach on policy formulation and applications in the area of governance of natural resources, as their ideas have been most visibly translated

into policy documents and used in CPR governance (Patel, 2014). However, some studies have shown that not all communities are successful in governing natural resources they collectively use (Bray, 2003; Nagendra, 2002).

CI, on the other hand, applies historical, sociological and anthropological views to construct their approach towards the management of natural resources. From the CI perspective, local institutions cannot be designed or predicted as suggested by the MI. Instead, everyday actions of people's lives, which are also affected by their cultural norms, taboos and values, histories, and the mix between formal and informal practices shape local institutions (Hall, Cleaver, Franks, & Maganga, 2014). Like MI, CI agrees that rules are important in shaping institutions, but they view rules in a more complex way. Rules are not a given; they are constantly shaped and reshaped through people's practices that are also affected by culture and norms (Leach et al., 1999). One of the major contributions to the CI perspective is the institutional bricolage theory developed by Frances Cleaver. Institutional bricolage is defined as "a process by which people consciously and unconsciously draw on existing social and cultural arrangements to shape institutions in response to changing situations" (Cleaver, 2001, p. 26). The resulting institutions are considered dynamic and hybrid, which combine both modern and traditional and, formal and informal practices (Cleaver, 2001; Cleaver, Franks, Maganga, & Hall, 2013). Such institutions are expected to be accepted by a wide range of stakeholders since their formation is grounded in traditional and socially acceptable ways of doing things, which function together with the existing formal rules. These institutions are dynamic and uneven, and they differ from community to community.

While MI assumes that communities have certain attributes that bind them together and give them a common interest in resources use, the CI perspective recognizes the importance of the social differences that exist between individuals in the community. Diversity in social relations such as differences in wealth, knowledge, gender, social or political affiliation creates differences in power relations among actors. Some actors may use their power to benefit more from resources than the others (Cleaver, 2001; Cleaver & Toner, 2006; Mehta et al., 2001). For instance, people who possess certain skills and/ or other forms of resources may have substantial capacities to negotiate and/ or manoeuvre and shape collective actions to their advantage and thus accrue more benefits from collective outcomes. Furthermore, some groups of actors with power may deny some other groups the rights to access important resources for their livelihoods. L. de Haan and Zoomers (2005) have referred to this as social exclusion, i.e. "a process in which groups try to monopolize specific opportunities to their own advantages" (p. 33).

Unlike the MI approach that views institutions as a static mechanism (Rocheleau, 2001) designed to address a specific resource problem, the CI perspective sees institutions as dynamic, i.e. they change as society and its priorities change. Changes in factors such as population, technology and global policies (Mehta et al., 2001) and changes in the way in which people do things through the process of social interactions, social and political practices (Berry, 1997) are some of the factors that lead to changes in institutions. For instance, global factors may set the agenda for the governance of natural resources, and so affect the design and functioning of local institutions. For example, a country's adherence to international water management treaties affects the country's water policy, which further affects the water governance practices at lower levels and the structures of organizations that manage water resources (Bandaragoda, 2000). Because of these changes, individuals have found themselves changing their strategies and adopting new ways of living, which also results in changes in their norms and rules, and changes in the routine ways of dealing with environment management issues, which in turn affects their institutions.

As with other approaches, CI also has its challenges, especially in terms of the application of its concepts in research and the development of policy interventions. Most of the CI arguments are built upon a critique of the mainstream approach but they fail to provide "concrete instruments or actions" that can be used by policy makers (del Callejo & Cossío, 2009, p. 48). This failure is even admitted by the founder of the theory of institutional bricolage who argued that "critical institutionalism perspectives, though growing in academic literature, often lack policy purchase, partly because they fail to offer clear direction for policy-makers" (Clever, 2012, p. 9). This failure can be partly attributed to the fact that the CI ideas are built on aggregating different roles played by different actors in natural resource management. The many roles that are played by individuals in their daily lives make the application of the concept difficult, which render the process of institutional change a "messy, unpredictable and a creative process" (D. Merrey, 2013, p. 142). The idea of incorporating many everyday contexts, as suggested by Mehta et al. (2001) may entail studying every individual action in people's daily lives (p. 5). The unpredictability of individuals' actions and differences in individual behaviours result in the presence of too many variables with not only interrelated, but also unpredictable relationships. This imposes a challenge on the conceptualization of the ideas and the design of frameworks/models that incorporate so many ambiguous and unpredictable social relation variables. The comparison of the indicators between different social groups becomes difficult as the definitions of most of their concepts differ between different social groups/ societies/ individuals. Even within the society, they cannot be compared across time as the definitions change from time to

time. Furthermore, the presence of many roles played by different individuals in their daily lives may result in bias towards some groups/ behaviours that seem of interest to the researchers. This will also pose challenges in terms of recommending policies that target all social groups in the society.

4. ACCESS TO NATURAL RESOURCES

Different theories have been put forward to explain how natural resources are accessed by different individuals/ organizations. The property rights approaches hold that different people/ organizations possess the rights to use and control resources in terms of property rights. Commons (1968) defined property right as the authority to carry out particular actions in a specific domain i.e. “the set of rules, laws and customs that contribute to the establishment of everyone’s rights regarding the appropriation, usage and transfer of goods” (Cosmin, 2014, p. 473). The rules can be formal i.e. formulated by state/ government authorities (*de jure*), although in practice they may originate from communities themselves/ resources users (*de facto*), backed by social arrangements such as religious and cultural values and customs (Cosmin, 2014; Schlager & Ostrom, 1992). Sometimes, both *de jure* and *de facto* rules may exist in one setting at the same time, and they are both important in the determination of people’s rights on the use of natural resources (A. P. Gautam, Shivakoti, & Webb, 2004).

Different people/ communities/ organisations may possess different property rights on a certain natural resource. These rights are broadly grouped into user rights and control rights (see for example, Meinzen Dick & Pradhan, 2002; Schlager & Ostrom, 1992). Individuals/ society may hold more than one form of right in terms of the ‘bundle of rights’ (Schlager & Ostrom, 1992). These bundles may contain several rights ranging from the rights to use the resource and earn income from it, to the right to control the resource (Schlager & Ostrom, 1992). Control rights can be held in the form of, for example, a power to determine who can use resources, when and where the resources can be used and a power to transfer the resource through leasing/ selling.

Property rights theory is useful in that it explains how holdings/ possession of rights affects the access that people have to natural resources. However, the theory fails to address the impact of socially based (non-right based) mechanisms on access to resources. Ribot and Peluso (2003) in their study of a theory of access challenged the property rights theory for conceptualizing access by only looking at the perspective of ownership/ right to use. According to them, access is not only a matter of property rights, but also “the ability to benefit” from the resources that one owns/ uses (Ribot & Peluso, 2003, p. 153). Although it is one of the criteria for gaining benefits, possession of property rights alone does not guarantee the holder the ability to benefit from the resource. According to them, the ability to benefit is influenced by the right based access and structural and relational mechanisms. The right based access is synonymous to property rights; it exists when the ability to benefit from resource is derived from laws, custom,

or convention. Property rights can be held formally in terms of title deeds, permits or licences to use a resource or in informal ways through social acceptance or agreements in the community. Those without the rights can gain the rights from the rights holder by, for example, paying for the use of the resource. Structural and relational mechanisms mediate the ability of individuals to utilize access mechanisms as well as the ability to benefit from the resource. More specifically, structural and relational mechanisms, such as access to technology, labour, knowledge, authority and social relations facilitate or hinder the ability of individuals to benefit from resources, i.e. they shape the extent to which resource benefits are gained, controlled and maintained. For instance, the areas with access to water and fertile soil may have comparative advantages on producing high value perishable goods such as vegetables. However, that advantage may be irrelevant if the markets are not accessible or roads to transport the products are poorly developed (Pender et al., 2004). The long distance from production areas to markets, together with the lack of private means to reach markets, may force rural people to sell their products at a price that is often determined by the merchants. Due to lack of information on prices, merchants may lie to rural producers on the commodities prices that prevail in urban or international markets in order to lower the prices of rural products (Ribot & Peluso, 2003). The government may also prevent farmers from selling food crops to international markets that pay high prices in order to meet domestic demand.

The theory of access by Ribot and Peluso (2003) is useful because it recognizes that people benefit differently from the owned/ shared resources. The theory considers the analysis of benefits by focusing on variations of benefits among individuals in terms of who benefits, the types of benefits, and the circumstances of receiving those benefits, etc. Despite its usefulness, the theory does not show the processes of gaining the benefits i.e. how access and rights to resources are transformed to the benefits.

Leach et al. (1999), in their work on environmental entitlements, defined access as the process of gaining endowments, entitlements and capabilities over resources (p. 233).¹⁴ They defined

¹⁴ Sen (1984) was the first author to explain that access is gained through endowment and entitlement. While endowment refers to the control that individuals have over productive resources, entitlements are defined as the set of alternative commodity bundles that a person can command in a society using the totality of right and opportunities that he or she faces" (Sen, 1984, p. 497). Devereux (2001) and Leach et al. (1999) criticised Sen's approach for not showing the process of gaining endowments and the role of non-market mechanisms such as cultural and customary norms in determining the access to resources.

endowments as both “the rights and resources that actors have, for example, land, labour, skills and so on”. They also defined environmental entitlements as the “alternative sets of utilities derived from environmental goods and services over which social actors have legitimate effective command and which are instrumental in achieving wellbeing”. Unlike Sen who defined entitlements as material things, Leach et al. (1999) considered other forms of utilities that are derived from the resource use such as the use of environmental goods for cultural, recreational and religious purposes.

Leach et al. (1999) extended the concept of ability to benefit (as given by Ribot & Peluso’s theory of access) by moving beyond the notion of being able to produce and to sell goods to the markets. They also defined the ability to benefit in terms of capabilities i.e. “what people can do or be with their entitlements” (Leach et al., 1999, p. 233). This entails the possibility of the entitlements contributing to people’s wellbeing. People use endowments and entitlements to achieve personal goals in life; and by doing so, they are able to increase their wellbeing. Wellbeing may differ among people as they have different goals and needs. Sen (1984) considered income as one of the means to achieving desired wellbeing, but it is not the end product in itself. The same level of income may imply the same level of purchasing power but not necessarily the same level of wellbeing (de Herdt & Bastiaensen, 2008). From this perspective, what is important to individuals is not what they have in monetary/material terms, but also whether they are free to use what they have to achieve the kind of life they value.

Leach et al. (1999) incorporate the impact of social relation factors as a determinant of access to resources. They argued that livelihoods in some societies might be affected not only because resources might be unavailable, but also because of socio cultural factors, which restrict the use of certain resources. For instance, some resources may not be utilised for the improvement of livelihoods due to factors such as religious beliefs or norms and traditions that prohibit the use of those resources. The work of environmental entitlements has been criticised by L. de Haan and Zoomers (2005) because it combines many dimensions of institutions (social relations, institutions and organizations) together in one dimension. That is, too many dimension variables with different impacts are merged and assessed at one level of analysis. It then becomes impossible to clearly see the impact of individual variables. According to L. de Haan and Zoomers

(2005), the institutional context can be studied when it is broken down into different categories, as Ellis (2000) does in his study.¹⁵

5. INTRA-HOUSEHOLD DIFFERENCES IN ACCESS TO RESOURCES

In the unitary approaches or common preferences models (Haddad, Hoddinott, & Alderman, 1997), the household is considered a single unit of analysis. All household members are assumed to have the same resource use preferences and to share the same level of welfare maximization (Becker, 1965; Sadoulet & De Janvry, 1995; Singh, Squire, & Strauss, 1986). Household members include not only family members but also other people who are related through kinship (Ellis, 1998). Members of the household collectively use the household's resources such as land to produce goods. In addition, the goods that are produced from the household's resources are collectively consumed within the household. While the common preferences models are useful in explaining consumption and production decisions in rural households, they have been criticized for assuming that household members share the same levels of preferences for goods and the same level of welfare maximization (Alderman, Chiappori, Haddad, Hoddinott, & Kanbur, 1995; C. R. Doss, 1996). Some studies have shown that members of households differ in their preferences in terms of the production and consumption of goods (Appleton, 1991; Hoddinott & Haddad, 1995; Kazianga & Wahhaj, 2017).

The studies of intra-household differences were developed as alternative approaches to unitary models whereby it is assumed that different household members differ in preferences. The intra-household resource allocation refers to the processes in which different productive resources are allocated among household members and the resulting outcomes of those processes (Haddad et al., 1997). These processes in allocation of resources may result in inequalities in access to resources between household members and the way benefits from resources are used. These processes are affected by "socially constructed" factors, in terms of norms and practices rather than "biological" reasons (Agarwal, 1997, p. 2). Socially constructed

¹⁵ Ellis (2000) categorized institutions into social relations (gender, caste, class, age, ethnicity, and religion); institutions (formal rules and conventions and informal codes of behaviour, including laws, property rights and markets); and organizations (groups of individuals bound by the purpose of achieving certain objectives, such as government agencies, NGOs, associations and private companies). According to L. de Haan and Zoomers (2005), the approach by Ellis is more useful as it moved from "general and abstract to specific and concrete" definitions, (p. 36). However, they also criticized it for its failure to include the impact of power relations in the analysis.

practices create intra-household differences in terms of access to and control over resources, labour allocation, decision-making processes within households, etc. Jones et al. (2010) pointed out that these socially constructed practices “are not inherently good or bad”. However, when they create “inequality, discrimination and exclusion, they become detrimental to development” (p. 7). Institutions of cultural norms and practices can be detrimental to development, for example, if they deny women rights to access and control over certain productive activities, and if they limit women’s abilities to use their capabilities to improve their livelihood outcomes as well as the outcomes of their households.

In developing countries, different groups of people play major but different roles in the management of natural resources. For example, women may assume substantial responsibilities with regard to the management of natural resources because they are responsible for providing their households with firewood, water, vegetables and food from subsistence farming etc. (UNEP, 2007). Despite their important roles, women often lack control over resources. The access that they have to important productive resources such as land is limited and often mediated through their male partners (Agarwal, 1997; Ellis, 2000); and in the case of divorce or death of the husband, most women are denied the access they previously had (Agarwal, 1997). In addition, women’s roles in resource management may not be fully recognized as they have subordinate roles in decisions regarding the use and management of natural resources, both within households and societies. Men often make natural resource management decisions on women’s behalf (Ellis, 2000), and women’s contributions in decision-making may be undervalued because of the perception that they are unskilled (Agarwal, 1997). Women are also markedly affected by environmental degradation as this affects the time they spend on care taking activities such as fetching of water and firewood. This in turn affects their livelihoods, as they have less time for productive activities.

In studies that look at situations in which resources are owned collectively by different members of households, an analysis of access to resources should consider “whether individuals have access to and can use the resources, which individuals or groups have access and which ones do not, in what ways do people access resources and how do they put them to use” (see for example Farnworth et al., 2016; Karuhanga, 2008; Kristjanson et al., 2017). The analytical framework in this study considers the intra-household differences in the access to resources and distribution of works between different groups of people in the society and their resulted outcomes.

Drawing on the common preferences models, the study assumes resources are owned collectively by different members of households. However, in line with the literature on intra-household differences and access to resources, we argue that in rural areas, what matters is not the issue of ownership but rather whether individuals have access to the shared resources for livelihood enhancement. Thus, the analytical framework in this study takes into account the questions of whether individual household members have “access to and can use the resources, which individuals or groups have access and which ones do not, in what ways do people access resources and how do they put them to use” (Karuhanga, 2008, p. 59). The framework considers intra-household differences in access to resources and distribution of work between different groups of people in the society and their outcomes.

6. INTERSECTIONALITY THEORIES

While intra-household literature shows that not all household members do equally access resources, intersectionality theories show that some people may fall into more than one category of social marginalization. Some people may experience double marginalization compared to other groups because they belong to more than one group of social marginalization for example gender, age, marital status, religious background and race (Crenshaw, 1989; Hill Collins, 1990). Crenshaw (1989) showed that in the US legal system, cases of gender and race are treated as separate social categories, while in real-life situations the two categories interact to produce greater oppression for an Afro-American woman compared to people in other groups. She showed further that Afro-American women may be subjected to a double act of marginalization by being black (in ethnicity) and female (gender) compared to either an Afro-American man, who is marginalized only because of his ethnicity, or a white woman, who is marginalized only because of her gender. Hill Collins (1990) demonstrated the concept of intersectionality by giving an example of an Afro American woman in United States. She showed that black women were economically oppressed because of the history of Afro Americans being slaves for whites; politically oppressed, as they were not allowed to vote and to hold places in public offices; and ideologically oppressed because of the stereotypes that perceived them as prostitutes and people of low class in society.

While the theory of intersectionality was originally used to study how interaction between gender, ethnicity (race) and class affect Afro-American women in the United States, it was further extended to include other social identity variables, such as disability, religion and sexuality (Tariq & Syed, 2017; Turner, 2011). In this study, the theory is applied to study intersectionality of social identities in communities with different and similar ethnic and cultural backgrounds. Traditionally, intersectionality studies have focused on the interaction of social categories related to race, gender, class, comparing mainly people of different cultural backgrounds. Valdez (2016) contended, "Different family members within an ethnic household may experience unequal opportunities" (p. 1619). Valdez (2016) argued further that, in some cases, these intra-ethnic group differences might exceed the differences that are found between ethnic groups. In this paper, first people with similar cultural norms are studied. Subsequently, the scope is broadened towards a comparison between different cultural groups.

7. ANALYTICAL FRAMEWORK

The analysis of quantitative data is based on the interrelationship between variables displayed in the analytical framework in figure 2. Our analytical framework illustrates how livelihoods are enhanced through access to RBR and access to other livelihood resources.

The framework is broken down into five parts as shown by the numbered arrows in the figure. Arrows 1, 2 and 3 correspond to the **second research question**, which addresses the ways in which resources are accessed by different groups of people and the influence of access to resources on the choices of DST. In line with the literature on access to resources, the study defines access to RBR in terms of practical rights (cf. rights) to use resources and the benefits from the use of resources (Leach et al., 1999; Ribot & Peluso, 2003). The analytical framework applies common preference models and intra-household theories to study access to resources. Drawing on the common preferences models, the study assumes productive resources are owned collectively by different members of households¹⁶ for the production of goods. Further, the study applies the findings of literature on intra-household differences and access to resources to argue that what matters is not the issue of ownership of resources but rather whether individuals use the shared resources for livelihood enhancement. Due to socially constructed practices, rights to use household resources and the ability to benefit from the household's produced goods may differ between household members. As a result, the livelihoods of some people might be affected because of differences in access to RBR. For example, the wellbeing of some household members may not be maximized in the households where a single member makes production and consumption decisions on behalf of other members.

Because the framework categorizes access to RBR in terms of rights to use RBR, and benefits from the use of resources, two relations (from the analytical framework) are used to analyse the determinants of these categories. The first relation (arrow number 1) examines whether informal social relations (box A) affect individual right to use household's owned RBR (box B).

Although it is one of the criteria for gaining benefits, possession of rights alone does not guarantee the holder the ability to benefit from the resource (Ribot & Peluso, 2003). This idea of access in terms of benefits brings us to our second relation of access to resources (as shown

¹⁶ Livelihood resources are owned at two levels, i.e. the individual level such as skills and household (collective) level, for example land and shared natural resources (Niehof & Price, 2001).

by arrow number 2), which investigates whether informal social relations (box A) and individual right to use household's owned RBR (box B) determine the benefits that a person gains on the use of livelihood resources (box C). The benefit from the use of resources is achieved when the rights to the use of resources are transformed into the improvement of a personal wellbeing. In line with the literature, the freedom to act defines the benefits from the use of resources (Leach et al., 1999; Sen, 1999; UNEP, 2007). This includes freedom to make individual or collective decisions regarding resource uses and on the uses of household produced goods. This means that people use endowments to achieve personal goals in lives; and by doing so, they are able to achieve their personal wellbeing.

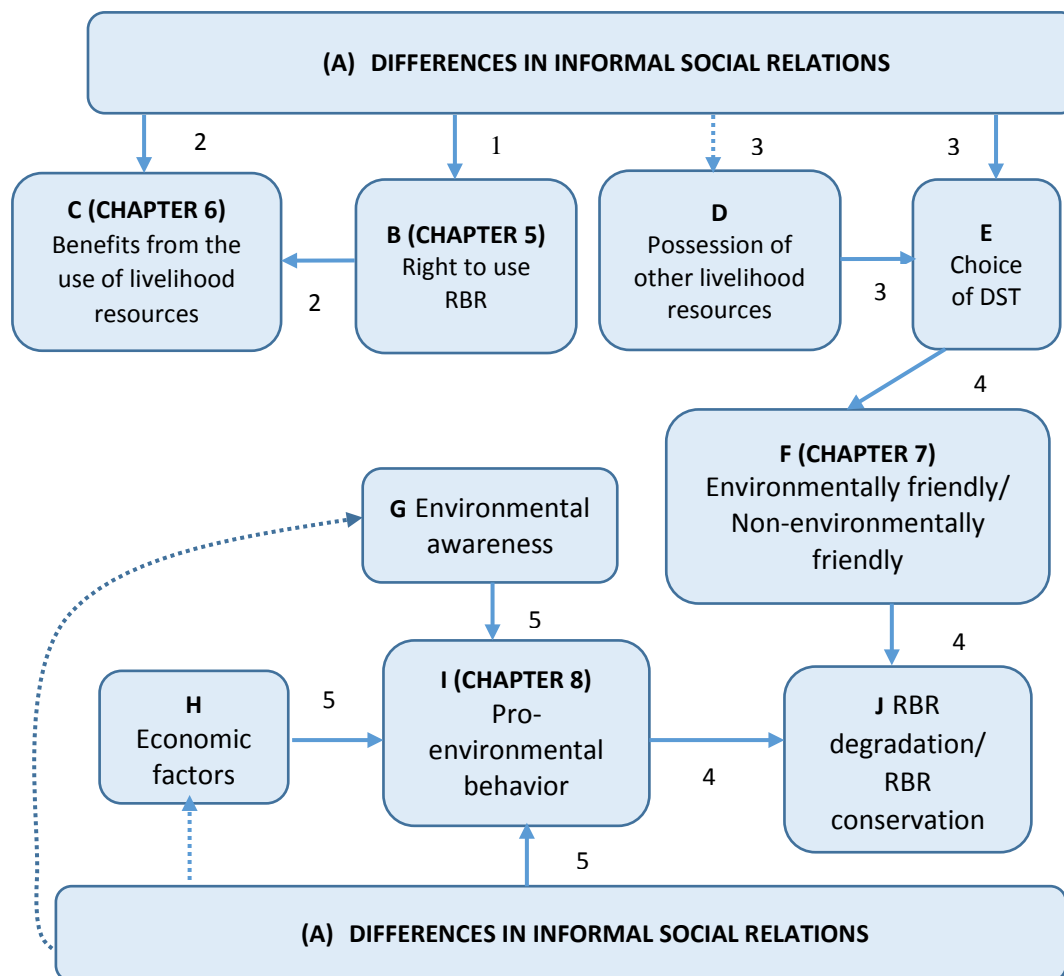
The institutional context in terms of informal social relations are assumed to create differences in social identities and social status in categories such as age, gender and marital status. These may create further differences in access to resources in terms of right to use productive resources and the ways in which people benefit from activities that use those resources (Cleaver et al., 2013; Leach et al., 1999). Social identity and status are used as sources of power in society, and those who hold the power may use it to gain more rights and benefits from the use of common resources than those who do not possess power.

Furthermore, drawing on the LF, people use resources to carry out DST, which include the use of natural resources. Our analytical framework shows that people's choices of DST (box E) depend on possession of livelihood resources (box D) and informal social relation factors (box A). While the LF entails that different assets (physical, natural, human, social and financial capitals) are combined to pursue different DST, relation 3 of our conceptual framework focuses only on the role of social and financial capital in the choices of DST.¹⁷ It is assumed that social and financial capital are not usually employed in the production of goods directly, and an individual member of a household normally owns them. For instance, an individual household member can have access to financial capital in terms of credits, or can possess social capital in terms of being a member of a youth or women's group. The possession of these kinds of assets helps people to engage in different DST, particularly non-traditional DST. Leach et al. (1999) argued that the livelihoods of some people in the society might be affected because of socio cultural factors, which restrict those people's engagement in certain activities. These socially

¹⁷ Human capital is not included in this specific analysis because there was no notable diversity in education levels of individuals in our study areas.

constructed practices create differences in the occupational choices between different groups of people in the societies.

Figure 2. Relationships between Access to RBR, Development Strategies and Degradation of RBR



Source: Adopted and modified from Ellis (2003) and Leach et al. (1999)

The DST that people choose have implications on natural resources conditions in the areas where they are being pursued. DST that are pursued in river basin areas can be either environmentally friendly or non-environmentally friendly depending on the impact they have on the conditions of RBR. Environmentally friendly DST are those that make less/ sustainable use of RBR and thus they are assumed to lead to RBR conservation. This brings us to **our third**

research question, which concerns the link between DST that people choose and RBR degradation (equivalent to relation 4).

The **final research** question examines whether awareness of RBR degradation raises people's pro-environmental behaviour with regard to the use of RBR. Pro-environmental behaviour is defined by Kollmuss and Agyeman (2002) as the "behaviour that consciously seeks to minimize the negative impact of one's actions on the natural and built world" (p. 40). In this study, pro-environmental behaviour refers to the practice of methods that reduce chances of degrading RBR when pursuing DST. These methods are more likely to conserve RBR. In the literature of governance of natural resources, pro-environmental behaviours are influenced by policies and institutional contexts that govern the use of natural resources. In attitudinal studies, environmental awareness i.e. awareness of the importance of conserving natural resources affects pro-environmental behaviour (see for example Aregay, Zhao, & Xu, 2018; Pothitou, Hanna, & Chalvatzis, 2016). Environmental awareness is regarded as an outcome of environmental knowledge i.e. "factual knowledge about the environment and recognition of environmental problems" (Zareie & Navimipour, 2016). In LF, knowledge is one of the forms of human capital (DFID, 1999) which is gained through education (formal and informal), experiences that people have accumulated in life (Aregay et al., 2018), beliefs and norms on environmental issues and interaction with other individuals (Pothitou et al., 2016). People with environmental knowledge are regarded as being more aware (mindful) of magnitudes and consequences of degradation of natural resources. In this study, it is assumed that RBR problems in the area (such as over fishing, deforestation, river banks degradation etc.) are primarily determined by the livelihood practices of individuals in the households when pursuing their DST. Thus, the local or learned knowledge on river basins' ecosystems and its impact is expected to raise people's awareness of the degradation of RBR, which in turn promotes conservation behaviour. Further to that, we also assume that people's awareness of RBR degradation and conservation behaviour differ according to the differences in informal social relation factors.

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CHAPTER 3

RESEARCH METHODOLOGY

1. INTRODUCTION

This chapter explains the research methods that are used in the study. In section, 2 an overview is provided of different research designs and the ways different designs are combined to answer the research questions. Section 3 describes the general characteristics of the study areas. Section 4 elaborates on how the preliminary data collection was used to inform the survey. Section 5 and 6 describe the ways quantitative and qualitative approaches were undertaken in the study. Section 7 discusses limitations of data collection activities, and zooms into validity and reliability of methods.

2. RESEARCH DESIGN AND APPROACH

“The design of the study refers to the means by which the research question will be addressed, specifically in relation to the data that will be collected, the comparisons that will be made, the experimental conditions (if any) that will be manipulated, and so on” (Albery & Munafò, 2008, p. 20).

While the literature normally classifies research designs into four types, namely experimental, longitudinal (cohort), cross-sectional and case study (see for example Matthews & Ross, 2010; D. C. Miller, 1991), Albery and Munafò (2008) contend that research can fall into one of two categories, either an experimental or an observational study. In experimental studies, a researcher manipulates some of the units that are being studied to observe changes or to measure differences (Matthews & Ross, 2010). The units that are being manipulated are referred as experimental groups, and the remaining units are known as the control group. In observational studies, the researcher studies the units without an attempt to manipulate them. While the comparison of groups might seem to be essential in experimental studies, it may also be desirable in observational studies.

Albery and Munafò (2008) further subdivide research into groups of either longitudinal or cross-sectional studies. Longitudinal studies are adopted when the research questions attempt to investigate the behavioral changes over time (Bogue, 1952; Matthews & Ross, 2010). In cross-sectional design, “participants are observed only once, offering a ‘snapshot’ of the characteristics of interest at that particular moment” (Albery & Munafò, 2008, p. 21). While both experimental and observational studies can be longitudinal or cross-sectional, Albery and Munafò (2008) argue that most of the experimental studies use a longitudinal design (although the intervals may be too short).

A case study design involves the studying of “either a single case or small number of cases but each case is explored in detail and great depth” (Matthews & Ross, 2010, p. 128). A case study can be either experimental or observational, and it can apply either longitudinal or cross-sectional designs.

Our study applied an observational cross-sectional research design to answer the research questions. This design is chosen because the study at hand is intended to investigate the links between the choices of development strategies and degradation of RBR in Tanzania without introducing an intervention on selected groups of the research population. As we did not intend

to record changes over time nor changes (likely) to happen in the future, we used a cross-sectional survey.

After choosing the appropriate research design, the next task of the researcher is to choose the strategies to conduct the study, which include the types of data to be collected and methods of data collection and analysis (Kirshenblatt-Gimblett, 2006).¹⁸ Three approaches are normally applied in social science studies namely quantitative, qualitative and mixed methods approaches. Each approach is supported by three philosophical positions namely ontology, epistemology and methodology (Harwell, 2011; Riege, 1998). Ontology refers to the philosophical stance underlying the knowledge (i.e. the nature of reality that is investigated) while epistemology highlights the process in which the knowledge (reality) comes to be known. Finally, methodology describes the procedures and techniques that are used to investigate the reality. The choice of the approach reflects the holistic picture in which the knowledge is viewed and the ways of going about acquiring the knowledge.

The quantitative approach stems from positivism's ontological position, which asserts that reality exists in its natural forms external to social actors (Bryman, 2012). The social reality is regarded as static i.e. it is "stable over time and pre-existing regularities can be scientifically studied" (Shek & Wu, 2018, p. 978). Researchers have no influence on the existence of the reality and its meanings i.e. they can gain the knowledge on the reality through measuring it. Thus, it is imperative to use valid and reliable tools of measurement to arrive at accurate knowledge and objectivity is expected to be maintained when studying the reality, i.e. a person's own subjectivity on the studied phenomena is discouraged. The researcher is expected to uncover the existing reality without putting their own judgment or influence on the objects that are being studied (Shek & Wu, 2018). Quantitative methods of data collection and analysis are used in finding the truth about the knowledge. This involves the precise observations of phenomena and collection of data to test hypotheses and/ or theories. A large number of units are often studied with the intention of getting a general understanding of the problem (Creswell & Plano Clark, 2011). The approach is termed deductive because the inferences from the tested hypotheses lead to generalization of the characteristics of the studied objects in a studied area

¹⁸ Kirshenblatt-Gimblett (2006) claimed that: "Research design is not related to any particular method of collecting data or any particular type of data. Any research design can, in principle, use any type of data collection method and can use either quantitative or qualitative data. Research design refers to the structure of an enquiry: it is a logical matter rather than a logistical one" (p. 16).

(Harwell, 2011). Despite its usefulness for studying large numbers of units and generalising results to a large area, quantitative methods are often criticised for not providing a detailed understanding of the units being studied. Furthermore, the quantitative approach is also criticised for assuming that social realities are static over time, and for considering that their meanings are independent of human beings and their values (Shek & Wu, 2018).

The qualitative approach originates from the social constructivist's (interpretivism) ontological position. The interpretive approach stresses that there is no single social reality as its meaning may differ from one context to another. Unlike the positivist approach that claims that social reality is shaped by causal laws, the interpretive approach believes that social reality is formed by the meaning and interpretations that people give to it (Draper, 2004). In the qualitative approach there is no precise measurement of reality, instead the researcher's own judgment and understanding of the problem is thought to influence the observations of reality (Shek & Wu, 2018). Qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them (Harwell, 2011). Thus, the reality is multi-layered because different people can have different interpretations of the reality (Cohen, Lawrence, & Morrison, 2000). In addition, the reality is not static as its meaning is continuously shaped by social actors' perceptions and actions towards it. In a qualitative approach, researchers use qualitative methods of collecting and analysing data to study a small number of individuals. By concentrating on a few individuals, the problem is explored in detail, which results in a comprehensive understanding of the problem (Creswell & Plano Clark, 2011). Qualitative researches are termed as inductive because the detailed information that is collected at the field can result in the generation of new theories or hypotheses. However, despite its usefulness for gaining an in-depth understanding of a problem, the results from the qualitative approach cannot be generalized to a large population because of the small sample size, i.e. only few individuals being studied (Creswell & Plano Clark, 2011).

In the middle of the quantitative and qualitative research approaches lies a mixed methods research. The approach is also known as data triangulation method, which "blur the boundaries" between positivism and interpretivism (Teddlie & Tashakkori, 2009, p. 205) and instead focus on combinations of both quantitative and qualitative research "methods, techniques, approaches, concepts or language" to study a social reality (Harwell, 2011, p. 151). Creswell and Plano Clark (2011) emphasised that "mixed methods research provides multiple ways to address a research problem" (p. 2). Research questions are answered by using multiple approaches rather than using a single (qualitative/ quantitative) approach.

There is much debate on what constitute mixed methods, and the exact point at which the mixing should occur (Harwell, 2011). While some authors argue that it is just a matter of combining qualitative and quantitative data, others contend that the mixed research should contain mixed research questions, quantitative and qualitative methods of data analysis and integrated inferences (Tashakkori, 2009). In the literature, three stances with different views on mixed methods emerge, namely the purist stance, the pragmatic stance, and the dialectical stance.¹⁹ The purist stance researchers are against the use of mixed research. They argue that two approaches cannot be easily combined in a single study because of the incompatibility of the philosophies behind each approach and mismatch of their methods (Denzin & Lincoln, 2011; Smith & Hodkinson, 2005). Unlike the purist stance, the pragmatic stance researchers support the combination of two paradigms to address a research question (see for example, Johnson & Onwuegbuzie, 2004; Tashakkori & Teddlie, 2003). Combining an inductive and deductive approach results in a detailed understanding of the problem as it allows flexible approaches in addressing research questions. By focusing on solving practical problems, debates about the existence of objective “truth,” or the value of subjective perceptions, can be usefully sidestepped. As such, pragmatists have no difficulty with the idea that there is a single “real world” and that all individuals have their own unique interpretations of that world (Wheeldon, 2010, p. 88). Like the pragmatic approach, the dialectical researchers agree that the two research paradigms are compatible. However, they argue that the differences between the two paradigms and their implications for research should be made clear by the researcher (Greene & Caracelli, 1997). At present the debate on what constitutes the mixed research has not been resolved as there is no common agreement among researchers (Morse, 2010).

A mixed methods approach was used to collect data. The data collection activity was divided into three phases whereby the qualitative—quantitative—qualitative approaches were used in a sequential manner. The study started with exploratory qualitative research to gather prior information to clarify some of the variables that are used in the analytical framework and to aid the selection of the studied districts and villages. The second phase of the study used a quantitative research approach, whereby a survey questionnaire was used to collect data. The quantitative approach enabled us to test the relations highlighted in our analytical framework and to get initial answers to our research questions. However, the use of the quantitative approach did not provide in-depth information on the variables’ relationships to analyse and interpret the results correctly. The literature suggests that when one data source is insufficient

¹⁹ For a more detailed discussion, see a study by Harwell (2011).

to clarify the results, the adoption of a mixed approach allows the use of the results from one method (let us say qualitative) to clarify the results from the other method (let us say quantitative) (Creswell & Plano Clark, 2011; Greene & Caracelli, 1997). Creswell and Plano Clark (2011) argued, “sometimes the results of a study may provide an incomplete understanding of a research problem and there is a need for further explanation” (p. 9). The use of the mixed approach helped in examining the consistence of findings from different instruments to answer the research questions. Consequently, it became imperative for us to embark on another qualitative research round to supplement the findings from the quantitative approach. This third phase of data collection mainly relied upon focus group discussions (FGDs).

3. GENERAL CHARACTERISTICS OF THE STUDY AREAS

The study was conducted among households living along the Kilombero river basin and the Simiyu river basin in Tanzania. The two areas were chosen in order to assess locational and socio-cultural differences associated with the governance of river basins.

Figure 3: A Map showing River Basins in Tanzania



Notes: For the administrative purpose, Tanzania is divided into nine river basins namely (i) Pangani, (ii) Wami/Ruvu, (iii) Rufiji, (iv) Ruvuma and Southern Coast, all of which drain into the Indian Ocean, and (v) Lake Nyasa, (vi) Lake Rukwa, (vii) Lake Tanganyika, (viii) Lake Victoria, and (ix) the Internal drainage basins of Lake Eyasi, Manyara and Bubu depression (MoWLD, 2002, p. 9). Kilombero is one of the sub-basins of Rufiji basin. Simiyu is one of the sub-basins of Lake Victoria basin.

Source: Maps of the World, (Maps-of-World, 2014).

Figure 3 shows the river basins in Tanzania. Kilombero river basin is one of the four sub-basins that form the Rufiji Basin. The Rufiji basin covers an area of 183,791 square kilometres (equivalent to 20% of total area of Tanzania). Other rivers that form part of the Rufiji basin include the Great Ruaha River, Luwegu River and Rufiji River (lower part of Main River). The Kilombero River is the largest contributor of the water that flows into Rufiji River, the largest river in Tanzania (Danida/WorldBank, 1995; WRED, 2002).

Kilombero basin is located in the Kilombero valley flood plain²⁰ in Morogoro region (eastern part of Tanzania). The basin receives its water from the Udzungwa Mountains, Mahenge Mountains and mountain ranges in the Iringa and Mbeya Region. At Ifakara town, different streams merge into one main stream to form the Kilombero River. Other rivers such as Msolwa River join the Kilombero River downstream. The river continues to flow to the border of the Selous Game Reserve and leaves the flood plain area. Thereafter, Kilombero River flows for 65 km and joins Luwegu River to form Rufiji River (Ramsar, 2002).

There are two major reasons for including Kilombero basin in our study. Firstly, the basin is important for the livelihoods of local people and other people downstream. The basin stores water in the wet season and discharges it in the dry season, thus it contains permanent rivers and permanent swamps. Consequently, it provides opportunities for people to conduct irrigation activities during the dry seasons (Jogo & Hassan, 2010). Kilombero basin is also an important area for the reproduction of different kind of species of fish that are found in the downstream area of Rufiji basin (PMORALG, 2010). In addition, the basin supplies freshwater to both rural and urban areas for domestic purposes, and is an important source of hydroelectric power.

Secondly, Kilombero basin was chosen due to increasing levels of human activity, which create pressures on the basin's natural resource uses. The inflows of agro-pastoralist migrants seeking fertile land for agriculture and shelter for cattle, people looking for irrigated paddy rice farms and migrants looking for fisheries are among the reasons for the increasing pressure in the valley's resource uses (Monson, 2012). The agro-pastoralists tend to migrate with large numbers

²⁰ The valley is an extensive natural wetland that collects water during the rainy season and discharges it in the dry season, i.e. it is flooded in the wet season and the larger part of it dries up in the dry season, with the exception of some of the streams and permanent water bodies and swamps (Ramsar, 2002).

of cattle, and once they have reached their destination, they clear land for agriculture and for settlement. In addition, as there is no prior infrastructure to support large numbers of cattle, some agro-pastoralists feed and water their cattle along the rivers. Also, migrant fishers are blamed for practicing illegal fishing and bring with them technologies that destroy both fish and the spawns. The migrants are considered to bring development to the area because they come with resources and new techniques of farming and fishing. However, they are also blamed for the increasing degradation of the basin's resources because some of their techniques are not environmentally friendly (Monson, 2012). The presence of migrants from all over the country has transformed the Kilombero basin from a monocultural to a multicultural community; and indigenous technologies for the conservation of RBR are diminishing.

The Simiyu river basin is located at the lake zone in the northern part of Tanzania, and is one of the six rivers that feed Lake Victoria on the Tanzanian side.²¹ The basin starts in the Serengeti game reserve, passes through six districts (Meatu, Itilima, Bariadi, Maswa in Simiyu region, and Kwimba and Magu in Mwanza region) before it runs into Lake Victoria.

There are different reasons for including Simiyu basin in our study. Simiyu basin is important for people's livelihoods because it offers different resources useful for daily economic and social activities. These resources include land for farming (both seasonal and irrigated farming), rangeland for traditional pastoralism,²² sand for the construction of houses, water for domestic purpose, etc. The basin is also important to other people whose livelihoods depend on Lake Victoria and the rivers that drain the lake because its waters run into Lake Victoria.

In addition, Simiyu basin was chosen because of increasing degradation practices that threaten the conditions of the basin. The degradation practices in Simiyu basin are reported to contribute to the pollution of other water bodies that are directly or indirectly fed by it, particularly Lake Victoria (Rwatabula, De Smedt, & Rebhun, 2007). URT (2014) reported that: "The Simiyu catchment is considered to be one of the main contributors to the deterioration of Lake Victoria because it is relatively large (10,800 km²), with many agricultural activities using agrochemicals (p. 3), ... and generates high yields of sediments" (p. 3). The Simiyu basin is characterised by degradation practices such as overgrazing, farming along the riverbanks (Mulungu & Munishi, 2007; URT, 2014) and uses of agrochemicals in irrigation activities (Ningu, 2000). The disposal of

²¹ Lake Victoria is the largest lake in Africa and it is shared by three countries namely Tanzania, Kenya and Uganda, while it is also the source of the longest river in Africa, the Nile River.

²² Traditional pastoralism is the DST that involves free grazing of livestock.

agrochemicals and other sediments that are transported from agricultural fields (via Simiyu River) to Lake Victoria contribute to the pollution of the lake (Mulungu & Munishi, 2007; Ningu, 2000; URT, 2014). In summary, the human activities that do not consider conservation and protection of the basin have resulted in problems of water shortages, soil and gully erosion, deteriorating water quality, deforestation and forest degradation and erosion and expansion of Simiyu River banks (URT, 2014). Further, the lack of local institutions to manage water resources, communities' lack of awareness of sustainable conservation practices, poor appreciation of RBR coupled with inadequate community involvement in river basin management, also contribute to the degradation of Simiyu River (URT, 2014).

The two study areas are similar in some aspects in that they are both important bodies of water for people's livelihoods. In addition, the major development strategies (DSTs) in both basins is agriculture, where both seasonal and irrigated farming are practiced. Despite the similarities, the two study areas differ in several respects. Kilombero basin lies on a natural wetland flood plain consisting of several rivers that merge to form the Kilombero River. This means that the majority of villages/ wards have more than one stream. Most of the rivers in Kilombero basin are permanent i.e. they flow throughout the year. In contrast, Simiyu basin is seasonal, with increasing amount of water during the rainy season and becoming dry during the dry season.

In addition, native dwellers of the two study areas practice different types of secondary DSTs. Fishing and traditional pastoralism are considered the secondary DSTs in Kilombero and Simiyu basins, respectively. Traditional pastoralism is now practiced in Kilombero, mostly by people who have migrated from the northern part of Tanzania, including people from Simiyu basin. In addition, irrigated farming is practiced in both study areas. While vegetables, legumes and maize are irrigated in both study areas, Kilombero is famous for the irrigation of large farms of paddy rice. There are also differences in the ways the irrigation activities are conducted. The government or groups of irrigators organize irrigation activities in Kilombero through the establishment of irrigation schemes and irrigation associations (IOs), though there are places where irrigation activities are uncoordinated. In Simiyu, irrigation activities are uncoordinated i.e. there are neither irrigation schemes nor arrangement on the use of irrigated water.

In Simiyu basin there is a governmental project called The Lake Victoria Environmental Management Project (LVEMP II), which works on conservation of Simiyu River banks with the aim of reducing the environmental degradation facing Lake Victoria. This project has played a substantial role in providing education on RBR conservation and facilitating the conservation practices in Simiyu basin.

The nature of degradation practices and the factors behind the RBRs' degradation practices also differ between the two basins. In Kilombero basin, the degradation of RBR is largely associated with the flow of migrants into the basin. Unlike in rural areas of Kilombero, migration in Simiyu is characterised by the movement of people of a similar cultural background (people who predominantly belong to the Sukuma ethnic community), display similar life styles and behaviours in terms of RBR use, moving from one village/ district to another.

The following three sections (Section 4, 5 and 6) give detailed explanations of how the study was approached.

4. PRELIMINARY DATA COLLECTION

The study is based on a survey conducted among households residing along Kilombero River (KR) in Kilombero district and Simiyu River (SR) in Meatu district between March and June 2016. Before the survey, preliminary study visits were organised to get prior information to inform the survey. This exploratory phase of data collection was conducted between October and December 2015. The aim of the preliminary data collection activity was to get background information on the livelihood situations in relation to the RBR uses alongside the two different basins. The exploratory study phase also helped to clarify some of the variables that are used in the analytical framework, for example the concept of RBR and how it is defined in different areas, important RBR for livelihoods and DST that exist in study areas. In addition, the preliminary study visit helped the researcher to select districts and villages to be included in the survey as explained in the subsections that follow.

4.1. SELECTION OF THE SURVEYED DISTRICTS

A multi-stage sampling design was used to select surveyed areas, whereby the first stage involved the selection of the districts. The preliminary data collection began with visits to the Rufiji Basin Water Board office (the Kilombero sub basin's office) in Kilombero district and the Lake Victoria Basin Water Board (LVBWB) office in Mwanza city. From each office, basin water officers were interviewed to obtain background information on the livelihood situations in relation to the RBR uses and dependencies, governance of river basins, and RBR conditions in the study areas.

At Kilombero basin's office, we found that most of the economic activities that depend on RBR are located in Kilombero district. The largest part of the district area lies in the Kilombero basin (PMORALG, 2010). The other part of the district lies on the Selous Game Reserve and the Udzungwa Mountains National Park. The district has 37 permanent rivers and other seasonal rivers, all of which form part of the Kilombero River. Thus, Kilombero district was purposely selected because of its location.

The LVBWB in Mwanza is responsible for the management of Lake Victoria and the rivers that feed the lake, including Simiyu River. Thus, the basin's office was visited to gather basic information on RBR uses and identify the areas/ districts to be surveyed. The information we received from LVBWB office led us to visit the Lake Victoria Environmental Management Project

(LVEMP II), which is also located in Mwanza. LVEMP II is a government project (under the supervision of LVBWB), which deals with the conservation and protection of Simiyu River boundaries. Information from LVBWB and LVEMP II gave us detailed insight into the development strategies, RBR uses and the nature of environmental degradation in all six districts that Simiyu River passes.

People who reside in Simiyu basin are agro-pastoralist, who share the same cultural background. This leads to similarities on their nature of economic activities, dependency on RBR, conservation practices behaviour and the extent of RBR degradation. However, despite these similarities, further information from the LVBWB and LVEMP II offices led us to choose Meatu district as the study area. Compared to other districts, people in Meatu have been less willing to conserve the environment as advised and supported by the LVEMP II project. In the other five districts, there has been a considerable improvement in RBR conservation because people are more willing to change their behaviours on RBR use and conservation. Furthermore, Meatu is the first district the Simiyu River flows through from its sources in Ngorongoro Highlands. The district lies on an upstream area of the river: thus, the impact of pollution in the upstream area can be felt beyond the district boundaries i.e. its impact largely affects other districts in the downstream and people who live along Lake Victoria.

After consultation with the basins water boards' offices, Kilombero and Meatu districts councils were visited to receive more information on the livelihood situations in the basins. In both districts, discussions were conducted with government officials responsible for the governance of river basins and their resources at the district and ward levels. The officials at the district level included the District Environmental Management Officer, District Planning Officer, District Livestock Management Officer, District Agricultural Engineer and District Fisheries Officer. The discussions with these officials helped to provide us with more information on the DST and their dependencies on river basin resources.

At the wards, we conducted discussions with Ward Executive Officers (WEOs) together with the Village Executive Officers (VEOs).²³ We also held discussions with leaders of different groups of resource users such as farmers, pastoralists, irrigators and fishers from different villages. Leaders of the resource users' groups are considered to have either experience/ special

²³ In terms of local governance structure in Tanzania, several villages form ward. While VEO ensures the implementation of districts council's policies and decisions at the village level, WEO coordinates the activities of all villages that form the ward.

knowledge or special roles in the governance of RBR (Marshall, 1996). The discussions we conducted with these groups helped us to obtain information regarding:

- RBR that are important in livelihoods, and how those resources are used,
- the way different people access RBR, and
- the nature of development strategies and how they contribute to degradation/conservation of RBR

After the discussions, we visited different areas where different livelihood activities that depend on RBR are conducted. We also visited some areas (depending on their accessibility) where economic activities that use RBR are conducted, for example, irrigation schemes, beekeeping areas, etc. The pictures of some of these areas are shown in the appendices.

4.2. SELECTION OF THE SURVEYED WARDS AND VILLAGES

This paper has used empirical data to study gender and access to RBR among native and non-native dwellers living along the Kilombero River in Tanzania. The study found that, the practical rights on the use of RBR are highly gendered, which also results in a gendered distribution of labour, both among native and non-native dwellers of Kilombero. In addition to the negative impact of gender on the practical rights to use RBR, the findings also show the negative impact of gender on the ability to benefit from the use of resources. Thus, these findings confirm the first and second hypotheses. Findings on the people's rights to use pasture confirm the third hypothesis that the rights that men and women have on the use RBR translates unequivocally into their ability to benefit from the use of RBR.

After the selection of the districts, the second stage of sampling involved the selection of the wards.²⁴ According to the Kilombero District Profile, Kilombero district is divided into 5 divisions,

²⁴ The choice of a ward with multiple activities seems more feasible than the choices of the villages. In both study areas, there is no village that practice all identified economic activities. While the prior intention was to choose two villages at KVFP and two at SR, the decision was not practical as it is not common to find different RBRs users' groups living in the same village. For example, due to presence of land conflicts between native farmers and migrant agro-pastoralists in Kilombero district competing for farming land and pastures, one may find distinct farmer villages and pastoralist villages. People who practice fishing activities also tend to live in the community of fishers, close to the fisheries. In addition, it is not easy to find a village with all three types of irrigation i.e. modern, traditional and no scheme.

23 wards and 76 villages (PMORALG, 2010). Mofu and Signal wards were purposively included in the survey due to the range of activities that depend on RBR use; here, we look at the wards with the presence of different stakeholders (socio economic groups) who depend on RBR for their livelihoods. In addition to native dwellers who practice subsistence farming and fishing, Mofu and Signal wards host migrant farmers, fishers and livestock keepers from different parts of the country. Migrant agro-pastoralists tend to keep large numbers of cattle, which degrade both land and RBR. Agro-pastoralists practice large-scale farming compared to the native dwellers. Thus, when they migrate to a new land, they cut trees to clear land for agriculture, which contributes to deforestation of the area. Migrant fishers are blamed for bringing technologies that destroy fish. Furthermore, Mofu and Signal are the two wards in the district where Beach Management Units (BMUs)²⁵ were established. Another reason for the selection of the two wards was the presence of common pasture in both wards. The ward governments set aside the areas that were used as pastures for pastoralists. Irrigation activities are practiced in both areas although they differ in the nature of their conduct. Irrigation in Signal is conducted through modern irrigation schemes²⁶ and traditional irrigation schemes, and through the uses of water pumps and buckets. In Mofu ward, there are neither modern nor traditional irrigation schemes. The irrigation activities are commonly conducted without formal/ informal arrangements on water use among irrigators. Furthermore, the two wards differ in their locations. While Mofu ward is located in the remote areas of the district, Signal ward is located in the town areas, close to the headquarters of the district council.

Meatu district is divided into 25 wards and 100 villages. Of these 100 villages, Simiyu River passes eight villages (Mwabuma, Mwashata, Mwabulutago, Mwasengela, Ng'anga, Kisesa, Mwamhongo, and Ntobo), which are located in three wards namely Mwabuma, Kisesa and Mwasengela. There are no differences in the nature of economic activities practiced in the

In Meatu district, there are no land conflicts between different RBRs users' groups as the majority of people practice both seasonal agriculture and traditional pastoralism. However, the choice of a single village to represent other villages was not possible due to the presence of other development strategies that were brought by the LVEMP II project. Different villages host different projects, which implies differences in their secondary development strategies. While one village may host a farming project, another village may host modern livestock keeping's project, and the other may host a beekeeping's project. More than one project are rarely brought to a single village.

²⁵ Beach Management Unit' means a group of devoted stakeholders in a fishing community whose main function is management conservation and protection of fish in their locality in collaboration with the government (URT, 2003).

²⁶ In other wards where modern irrigation schemes were established, the use of irrigation outside of the schemes are strictly not permitted.

villages. Even the extent of environmental degradation does not differ across the villages. Thus, all villages in the three wards could have potentially been included in the survey. However only two wards, Mwabuma and Kisesa, were included in the survey. Both wards were easy to access during the rainy season (the period during which the survey was conducted) compared to Mwasengela ward.

The third stage of sampling involved the selection of the surveyed villages. All villages in the selected wards share the common characteristic that seasonal farming is their major DST, however they differ in the nature of secondary and tertiary DST. For example in Kilombero district, while migrants usually practice seasonal agriculture and traditional pastoralism, native dwellers practice seasonal agriculture and fishing. Both migrants and native dwellers practice irrigated farming. To capture differences that may exist between different socio-economic groups, the third stage of sampling distributes the villages according to their secondary DST.

In Mofu Ward, three villages, with different DST are included in the survey. These villages are Ihenga, Mofu and Ikwambi. Most people in Ikwambi village are native dwellers²⁷ of Kilombero (predominantly belonging to the Ndamba ethnic community) who depend on seasonal agriculture and fishing for their livelihood. Mofu village hosts the ward's head office, and other facilities such as ward's health centre and secondary school. Modern livestock keeping, domestic pig keeping and small-scale trading are practiced as the secondary DST in the village. Ihenga village started as a hamlet of Mofu before it became a separate village. Agro-pastoralist migrants, predominantly of Sukuma descent, established the village through buying/ applying for the land from village governments upon their arrival. The Sukuma have a habit of living in their own areas, separate from the native dwellers. However, Ihenga village has been receiving migrants from other communities due to its rapid development in terms of infrastructure such as access to electricity and irrigated farming.

In Signal ward, five RBR are identified, which are modern scheme irrigation, traditional scheme irrigation, no scheme irrigation, seasonal farming and traditional pastoralism. The survey covers two villages namely Sululu and Signal. In Sululu village, selection of respondents was based on two hamlets namely Sululu (the modern irrigator's community) and Ikwambe (the traditional

²⁷ These people are predominantly of Ndamba descent. Their livelihoods depend on seasonal agriculture, mostly cultivation of paddy rice, and on fishing.

irrigator's community).²⁸ Signal village hosts the ward's head office and has access to the ward's service delivery facilities such as the health centre and secondary school. In addition, the train station on the line linking Tanzania and Zambia renders the village into an attractive area for informal trading.

In Meatu district, four villages from two wards were included in the survey. These villages are Kisesa and Ntobo from Kisesa ward, and Mwabuma and Mwashata from Mwabuma ward. Kisesa and Mwabuma villages are headquarters of Kisesa ward and Mwabuma ward, respectively. Kisesa village is located along the main road from Meatu district's headquarters to Bariadi town (the Simiyu Region's headquarters); the other three villages are situated in the more remote areas of the district. In this sense, Kisesa village is a town village of sorts. Most people in the studied villages practice both seasonal farming and traditional pastoralism, but the nature of other livelihood activities differ between the villages. Modern livestock keeping is practiced in Ntobo and Mwashata village with the support of the LVEMPII project. In Mwabuma village, the LVEMPII established beekeeping projects on the forested area along the riverbanks. In all four villages, households with farms along the river practice irrigated farming.

²⁸ To capture differences that are associated with communities' development strategies, these two hamlets were treated as separate villages although they are located in one administrative unit.

5. QUANTITATIVE APPROACH

5.1. QUANTITATIVE DATA COLLECTION

The study is largely based on a survey conducted among the households residing along Kilombero basin in Kilombero district and Simiyu basin in Meatu district (Tanzania) between March and June 2016. The pre-tested interviewer-administered questionnaire was the major method of data collection. Before administering the survey, a pilot study was conducted among households living along the Wami river basin in Mvomero district to pre-test the data collection tools. The pre-testing of the questionnaire helped to improve the questionnaire by omitting unnecessary questions or repetitions. We also recast some of the questions that the respondents could not easily understand. After the pre-test of the questionnaire, four research assistants (tutorial assistants from Mzumbe University) were trained to join the researcher in the data collection activity. The survey questionnaire consisted of closed and open-ended questions. The closed questions were designed to collect numerical data on respondents' demographic characteristics, access to RBR and other livelihood resources and development strategies. The open-ended questions were designed to collect data on the degradation of RBR, whereby respondents were free to give their opinions on the changes of RBR conditions over time and reasons for the changes. As the concept of degradation of natural resources might be perceived differently by different resource users (Leach, Scoones, & Stirling, 2010), the open-ended questions allowed the researcher to explore the subjects from different angles (Longhurst, 2009).

The survey covered 313 households: 148 in Kilombero district and 165 in Meatu district. For each ward, the following formula was used to arrive at the number of households to be included in survey (see also Kothari, 2004).

$$n_{ward} = \frac{Z^2 pq Nward}{e^2(Nward - 1) + Z^2 pq}$$

Where, n_{ward} = ward's sample size; $Nward$ = the number of households in the ward; p = the probability that each household in the ward has equal chance of being selected; $q = 1-p$; Z = the abscissa for confidence level; and e = the random error. Column 3 of Table 1 shows the number of households in the villages and the wards. The study uses 95% confidence level, P value of

0.5²⁹ and e equals to 10% to arrive at the ward' sample size. In Kilombero district, the sample size were 91 and 84 for Mofu and Signal wards, respectively. In Meatu, the sample size is 88 and 89 for Kisesa and Mwabuma wards, respectively.

Table 1. The Distribution of Population size and Sample size

Ward	Village	Population size (N)	Sample size (n)	Surveyed households
Kilombero District				
Mofu	Ihenga	555	30	32
	Ikwambi	385	21	19
	Mofu	740	40	32
Total Mofu ward		1680	91	83
Signal	Sululu	403	47	37
	Signal	318	37	28
Total Signal ward		721	84	65
Meatu district				
Kisesa	Kisesa	629	49	44
	Ntobo	492	39	36
Total Kisesa ward		1,121	88	80
Mwabuma	Mwabuma	790	54	43
	Mwashata	506	35	42
Total Mwabuma ward		1,296	89	85

Source: Author's Survey Data, 2016

For each ward, we used the following formula to calculate the sample size of the villages (Kothari, 2004).

$$n(\text{village}) = \frac{N(\text{village}) * N}{N}$$

The formula gives the distribution of sample sizes as shown in column 4 of Table 1. In Kilombero district, the village sample size is 30 households in Ihenga, 21 in Ikwambi and 40 in Mofu. The formula also gives the sample size of 47 and 37 households in Sululu and Signal villages, respectively. In Meatu district, the formula gives the sample size of 49 and 39 for Kisesa and

²⁹ Ekise, Nahayo, Mirukiro, and Nsengiyumva (2013) argued that a p of 0.5 is normally used for all developing countries population (p. 34).

Ntobo villages, respectively, and 54 and 35 for Mwabuma and Mwashata villages, respectively. The number of surveyed households are shown in column 5 of Table 1.

In each village, a simple random sampling method was used to select households to be included in the survey. At the household level, data were collected from different members of households who are 18 years and above. Collecting data from each household member, separately, enabled us to capture intra-household dimensions on issues of rights to use resources, the ways in which different members benefit from the use of the resources and the choices of DST. Table 2 presents the descriptive results on the distribution of respondents in our study areas. The total number of respondents is 783, where 359 (46%) are from Kilombero district and 424 (54%) are from Meatu district.

Table 3 shows that the mean age of respondents is 38 years in Kilombero and 39 in Simiyu. The respondents' ages range from the minimum of 18 years to the maximum of 90³⁰ years.

Table 2. Distribution of respondents according to river basin

District	Frequency	Percent
Kilombero	359	46%
Meatu	424	54%
Total	783	100%

Source: Author's Survey Data, 2016

Table 3. Age of Respondents

District	Obs	Mean	Std. Dev.	Min	Max
	Age of respondent				
Kilombero	359	38	14	18	90
Meatu	424	39	17	18	90
Total	783	39	15	18	90

Source: Author's Survey Data, 2016

³⁰ Some respondents are too old to participate in production. However, these respondents were included in the sample due to their status of heads of households and or spouses of the heads.

Table 4 presents the data on the distribution of respondents according to gender. 412 (53%) out of all 783 respondents are women, and 371 (47%) are men. The data from the river basin's level shows that majority of respondents in Kilombero (56%) are men, and majority in Meatu (60%) are women.

Table 4: Gender of Respondents

District	Men		Women		Total	
	Frequency	%	Frequency	%	Frequency	%
Kilombero	201	56%	158	44%	359	100%
Meatu	170	40%	254	60%	424	100%
Total	371	47%	412	53%	783	100%

Source: Author's Survey Data, 2016.

5.2. QUANTITATIVE DATA ANALYSIS

The quantitative data analysis focuses on the interrelationship between variables displayed in the analytical framework in Chapter 2. The variables (as presented in the Figure 1) have a series of dependency relationships which are simultaneous, i.e. one dependent variable becomes an independent variable in a subsequent dependency relationship. The study could have applied a structural equation modelling technique to estimate the model as a system of equations. However, since each relation (shown by labelled arrows) is the central focus of a chapter, each equation is estimated separately from the other equations rather than estimating them as a system of equations. The detailed explanations of the estimated models are presented in the corresponding chapters as shown on the figure.

6. QUALITATIVE APPROACH

6.1. QUALITATIVE DATA COLLECTION

This paper has used empirical data to study gender and access to RBR among native and non-native dwellers living along the Kilombero River in Tanzania. The study found that, the practical rights on the use of RBR are highly gendered, which also results in a gendered distribution of labour, both among native and non-native dwellers of Kilombero. In addition to the negative impact of gender on the practical rights to use RBR, the findings also show the negative impact of gender on the ability to benefit from the use of resources. Thus, these findings confirm the first and second hypotheses. Findings on the people's rights to use pasture confirm the third hypothesis that the rights that men and women have on the use RBR translates unequivocally into their ability to benefit from the use of RBR.

The Focus Group Discussion (FGD) method, linked to participatory resource mapping and the benefit analysis (see below), was the major method of collecting qualitative data. The study conducted FGDs to get in-depth insights into why there are differences in access to RBR among different groups of people within households and the broader Tanzanian society. In addition, we tailored the discussions towards obtaining insights regarding differences in choices of DST among members and their contributions to conservation of RBR. Through the FGD, we also explored in more depth the link between resource users' environmental awareness and its impact on pro-environmental behaviour.

Wilkinson (2004, p. 177) (as cited in Onwuegbuzie, Dickinson, Leech, & Zoran, 2009, p. 2) defined FGD as "a way of collecting qualitative data, which—essentially—involves engaging a small number of people in an informal group discussion (or discussions), 'focused' around a particular topic or set of issues." Participants of FGDs are purposively selected based on the knowledge/experiences they possess on the topic. Interactions between participants during the discussion often result in richer information than what could have been obtained from a one to one interview (Rabiee, 2007). FGD is considered an efficient and economical way of collecting data because multiple data are collected from a group of people within a short period of time (Krueger & Casey, 2000; Rabiee, 2007).

Onwuegbuzie et al. (2009) argue that the research questions guide the design of the FGD. Since the aim of our FGDs was to obtain information to clarify the findings from the quantitative data analysis, some of the households who were involved in the survey also participated in the FGD.

Different group sizes are included in FGD. Krueger and Casey (2000) suggest a number of six to eight is more manageable for a researcher. Some other studies advise a group of 6 to 12 participants to generate the necessary diversity of information on the topic discussed (Onwuegbuzie et al., 2009; Onwuegbuzie, Jiao, & Bostick, 2004). In this study, FGD comprised a group of 10 to 15 people. This number was considered enough to capture diversities in demographic compositions especially in terms of choices of secondary DST, and relationships with the head of households. In each surveyed village, four groups that differ in composition were formed from 15 surveyed households. The composition of the groups differed based on gender and the relationship with the heads of households. Since our study also considered intra-household differences, the heads of households/ couples were put into different groups from the other members of households. These groups were further separated into two subgroups, according to sex of participants i.e. each group was formed by people of the same sex. The homogeneity of the groups in some characteristics such as gender helps to have full participation of all people in the discussion (Krueger, 1994) and to capture gender differences in responses. Variations in ages, education levels of respondents and differences in DST were taken into consideration when forming the groups to improve the external validity of the findings. In the end, 40 FGDs were conducted: 24 in Kilombero district and 16 in Meatu.

As suggested in the literature (Krueger, 1994; Onwuegbuzie et al., 2009), it is crucial to have a facilitating team (a moderator and an assistant moderator) to lead the FGDs. In our study, the facilitating team consisted of four members, a female leader (researcher) and a female assistant who moderated the sessions of the female groups, and a male leader and a male assistant for the men's sessions. While the leaders headed the sessions by ensuring active participations of members and recording some issues when deemed important, the assistants recorded the discussions by using audio devices and taking notes. Both the leaders and assistants helped each other by ensuring a conducive environment for everyone to participate for example by arranging seats and dealing with the late comers and people who were not chosen to participate but insisted on joining the discussions. A single session of FGD lasted between 2 to 3 hours.

Before embarking on the activity, the research project and its aims were introduced to the governmental and social leaders to build a rapport to ensure active participation of members. Although the activity involved only the households that participated in the survey, governmental leaders helped identify households to be included in the activity. Given that the methodology was new to the researcher, the pre-test of the instruments was conducted at Idete village in Kilombero district (a village which was not one of the surveyed villages) in order to identify

challenges that were likely to occur during the activity. Corrections and improvements of data collection tools were carried out before start of the FGDs at the surveyed villages.

While it is commonly known that the moderator conducts FGD by asking a series of questions to participants, moderators can also request participants to engage in a certain activity that subsequently forms the basis of discussions (Onwuegbuzie et al., 2009). The nature of the activity depends on the kind of information a researcher wants to collect. Examples of these activities include team-building exercises, watching video etc. In our study, the resource map activities preceded the FGDs. Resource mapping is one of the types of space related participatory rural approaches, which focuses on the identification of natural resources in the locality by depicting for example land, hills, rivers, fields, vegetation, etc. (Kumar, 2002, p. 71).³¹ In our study resource mapping was conducted with some modifications. Since RBR and other variables were already identified during the preliminary data collection and were used for data collection during the survey, the facilitators retained the list of all RBR and DST that were earlier identified in each village. The facilitators then guided the respondents to indicate the listed resources on their maps rather than identifying new ones.

The reasons for using resource mapping in this study are twofold. Firstly, to prepare participants to fully participate in discussions. Since access to resources and informal social relations are important concepts in this study, the resource mapping was used to acquaint participants with the idea that the discussion is based on the RBR that are found in their localities, i.e. the ways different groups of people access RBR and its impact on RBR degradation.³² Before engaging in discussion, resource users were requested to draw maps of their respected areas and indicate the rivers (streams) that are found in their localities. Participants were asked to point out on the

³¹ Participatory rural appraisal (PRA) involves the use of various approaches and methods that allow local people to share their knowledge and analyse their livelihoods for the purpose of planning or acting (Absalom et al., 1995). PRA has been called “an approach and method for learning about rural life and conditions from, with and by rural people.” ... “The phenomenon described is, though, more than just learning. It is a process which extends into analysis, planning and action” (Robert Chambers, 1994, p. 953). Kumar (2002) explained three approaches for the collection of qualitative information by the use of PRA. These approaches include space related PRA whereby the spatial dimension of people’s realities is explored mostly by using mapping methods (p. 53), time trend PRA whereby temporary dimensions of people’s realities are explored (p. 118), and PRA relations methods whereby different diagrams are used to shows relationships between certain events (p. 188).

³² In our study, RBR and other variables were already identified during the preliminary data collection and were used for data collection during the survey. Thus, facilitators kept the list of RBR and DST that are found in each village.

maps the location of the listed RBR in their respective villages and DST that use those resources. Secondly, resource mapping was used in this study to facilitate linking informal social relation factors with the concepts of access to RBR, development strategies and the extent of degradation of those resources. After indicating the RBR on the maps, respondents were asked further to specify (by using symbols, colours, and arrows) the RBR that are used by different groups of people such as young women vs young men, old women vs old men, and other groups of people. By using maps, the researcher could easily grasp which groups use a specific RBR and which do not. The mapping activity was followed by a discussion on the link between access to RBR and different informal social relations factors in particular, the discussion on who owns the resource, who has access to resource (within society and within household), how resources are used etc. Resource mapping smoothed the conduct of FGDs because the discussion was partly based on the relationships that they (themselves) had already indicated on the maps. Thus, questions such as why only men practice a certain activity did not seem inappropriate to the respondents.

Furthermore, participants were asked to give their views on the concept of RBR degradation and to link the concept with the DST that are pursued in the villages and with pro-environmental behaviour. This was done by first requesting participants to give their perception on the status of RBR and then to compare it with the past (more than 20 years back) status. By using maps, participants were requested to show the situation of RBR in the past. This included mapping out RBR that they think were present in the past, but had disappeared. The past status on the map was used as baseline for comparison of the two periods. Furthermore, respondents were asked to link the changes in RBR status with development strategies and behaviours of different social groups. This was followed by the discussion on the comparison of the changes in the status of RBR and the changes in development strategies, and the reasons for the changes.

Finally, and importantly, a benefit analysis was conducted to gather participants' views on the ways different household members benefit from the use of household resources. The benefit analysis, as referred to by Buenavista and Cornalia (1994), was used to gather information on the person that has access to the products of households as well as the person that controls decision-making for each product. This activity was conducted by the aid of the charts. On the chart, products and by-products of several DST were listed on the left-hand side. At the top of the chart, there were two columns, one indicating the person(s) who make(s) decisions on the use of household goods, and the other one showing the person(s) that control(s) the money in case products are sold. The resource mapping was followed by a discussion of the way different household members benefit from the use of a household's resources. The discussion of the

concept of benefits from the use of resources was also linked with the informal social relation factors and access to RBR and other livelihood resources.

6.2. QUALITATIVE DATA ANALYSIS

Two types of qualitative data are collected in this study: the data from the open-ended questions of the questionnaire and data from the FGD and the related resource mapping and benefit analysis. As large amounts of data were generated in our qualitative data gathering, the process of analysis of qualitative data analysis involved data reduction. Berkowitz (1997) defined data reduction as: "The process of selecting, focusing, simplifying, abstracting, and transforming the data that appear in written up field notes or transcriptions. Not only do the data need to be condensed for the sake of manageability, they also have to be transformed so they can be made intelligible in terms of the issues being addressed " (Data reduction section, para. 1). Data reduction may include the process of data interpretation to find out their meanings and coding them into sets of similar ideas which are important for the research questions and data analysis (see also LeCompte, 2000; Teddlie & Tashakkori, 2009). Content analysis was used to analyse the qualitative data collected through the survey questionnaire. "In content analysis, the researcher evaluates the frequency and saliency of particular words or phrases in a body of original text data in order to identify keywords or repeated ideas" (Namey, Guest, Thairu, & Johnson, 2008, p. 138). In this study, the technique was used to transcribe, classify and present written texts for frequency and consistency of themes, ideas and/or opinions. These data were further transformed into numerical terms and used to measure some of the variables of the analytical framework, particularly the variables in chapter 8.

Krueger and Casey (2000) (as cited in Rabiee, 2007) suggested that the research purpose drives the qualitative data analysis. Thus, since the aim of the FGD is to collect information to supplement the findings from the quantitative data analysis, the themes that were identified during the quantitative analysis largely influenced the reduction of FGD data. Analysis of data from FGDs started with the process of transcribing the spoken texts and translating the written texts. Different contents were classified from the texts and similar ideas were grouped together. As mentioned before, the grouping of the ideas was largely based on the issues raised drawing on the findings of the quantitative data. This facilitated data management, and in particular helped avoid the processing of irrelevant information. The audio tapes were used to capture some quotations of interests to further validate the findings. Findings from the FGDs are presented parallel with the results from quantitative analysis to give more meaning to the

findings. They supplement the survey findings by bringing meaning to the evidence rather than providing new information (Rabiee, 2007).

6.3. OBSERVATION

Teddlie and Tashakkori (2009) defined the observational data collection method as the recordings of the units of interaction occurring in a defined social situation based on visual examination or inspection of that situation” (p. 218). In our study, observation was combined with other methods of data collection in all three phases of field research. The information from observation supplemented information from other methods to enrich the quality of the data.

During the preliminary data collection, we visited different areas where different DST that use RBR took place. Thus, in addition to information we received from the discussions with the key informants, we observed the availability of RBR, the ways they are used and the nature of degradation of resources. For example, we observed several less environmentally friendly RBR uses such as irrigation practices that block the rivers, grazing of huge numbers of cattle, farming along the riverbanks and deforestation. These observations helped the researcher in the formulation and rephrasing of some questions in the questionnaire. While the questionnaire was the major tool of data collection during the survey, researchers could still combine the observational data collection method with the information from the questionnaire. For example, the presence of facilities such as fishing equipment, cattle sheds and ploughs could easily reveal the nature of DST that households pursue.

The literature reports that the conduct of FGD includes using the observation method, particularly when interactions between participants are observed (Mahoney, 1997; Teddlie & Tashakkori, 2009). Thus, in addition to discussions, the observation method was also applied during FGDs. Sometimes, facilitators withdrew themselves from the exercise and observed the ongoing/ unfolding events particularly when participants were drawing maps and/ or arguing with each other about some important issues on the topic of discussion such as access to important resources for production, DST and degradation of RBR.

6.4. DOCUMENT REVIEW

In addition to the quantitative and qualitative approaches, the study also employs document review to gather data and statistics regarding the governance of river basins. This strategy was also used to identify and assess rules and regulations (at the national/ sectoral, district, village and community levels) that define activities that are used in river basin management at local levels. The information is gathered from published and unpublished materials such as books, reports, papers, statistical abstracts from government ministries/ agencies and districts/villages authorities. This information supplements the primary data collected through the questionnaires. The information presented in chapter 4 relies mostly on the data collected through document review.

7. POSITION OF THE RESEARCHER

“The quality of your data is highly dependent on how participants and others in your research context view you and the legitimacy of your project. Research contexts are often complex social systems with their own norms, expectations, interpersonal dynamics, and insider-outsider boundaries. As a researcher, you might be fortunate to have some role in the site under study (i.e. you might be an insider). More often, researchers are outsiders who need permission (officially and informally) to conduct a research project at a particular site” (Teddlie & Tashakkori, 2009, p. 202).

A researcher needs to consider some ethical issues before the commencement of and during the data collection activities. Before data collection, formal permits were obtained from local government authorities (district council’s offices of Kilombero and Meatu) to conduct research in their administrative areas. The district council offices issued the letters to introduce us to the ward offices. At the ward offices, each WEOs called a meeting with the village government officials and village political leaders where we had the opportunity to explain the aim of the research project, and request consent for collecting data in the respective villages. Similar procedures of obtaining permits from the district council offices were performed in all three phases of data collection.

During the preliminary data collection, the village leaders conveyed the message to the groups of resource users to convene at the government offices where we conducted the discussions. During the survey, the leaders informed their people that the researchers would visit their households to collect some information, and thus requested them to support to us. Village leaders handed us over to the sub-village leaders who escorted and introduced us to each of the surveyed households. Admittedly, the selection of the surveyed households might have been to some extent influenced by preferences of the sub-village leaders. However, we handled the situation by interfering in the selection process, for example by requesting to visit households with different characteristics particularly in terms of DST.

At the household level, researchers briefly introduced themselves as well as the purpose of the survey. Thereafter, the permission was requested to collect information from different members of households. Some heads of households were not comfortable letting other household members respond to the questions, separately without their presence. Researchers convinced them that women or youths themselves could best provide some of the answers because their preferences and perceptions differ from other members. Two heads of

households in Meatu refused to allow their members to be interviewed separately. We respected their wish and left the households. In one household, where we met a female head of household, the data could not be collected as the lady refused to be interviewed without the consent of her husband.

During the FGDs, the selection of households who participated in the FGD was again to a large extent guided by the village leaders. However, researchers had the list of households that participated in surveys, which helped to intervene in the choices of village leaders by making sure that diversities were taken into consideration when choosing participants.

Respondents from both districts demanded to be compensated for the information they provided to us. They complained that it has been a tendency for researchers to collect information from rural areas for their own benefits without any consideration of the welfare of information providers. Thus, the respondents demanded a certain amount of money as recompense for the time given to us. We discussed this issue with the village leaders and agreed to compensate each respondent with Tanzania Shillings 2500, which was equivalent to one Euro. Actually, the situation was even worse in Kilombero because many organisations collected data in the area and sometimes, in addition to money, they provide material things such as sugar. While the payment of money could have affected the nature of responses, it helped us to get consent to interview several household members because of the assurance of raising household's income.

The researcher has an ethnic background (community) of Sukuma. The author's father belongs to the Sukuma ethnic community while her mother is from a different ethnic background. While I might have been perceived as an outsider during the data collection process because of my lack of command of Sukuma language, at the same time, it cannot be ignored that I was somehow also an insider due to my knowledge of Sukuma norms. When I was growing up, I had lived and interacted with relatives from a Sukuma ethnic background, which made me conversant with the norms. In fact, some of norms were even practiced at my parents' household. Thus, my knowledge on some of the Sukuma norms somehow also smoothed interactions between researchers and the respondents.

8. LIMITATIONS OF THE DATA COLLECTION ACTIVITIES

The data collection activities faced several limitations, which also have implications for the study's validity and reliability. Pelto and Pelto (1978) define validity as "the degree to which scientific observations measure what they purport to measure" (p. 33). The accuracy of the techniques and tools used in research assures the validity of the study. In this study, the non-response rate and/ or provision of false information on some questions, especially those concerned with land and cattle ownership, are some of the limitations that could affect the validity of the study. In Kilombero district, due to already existing problems such as land conflicts and government intentions to reduce the amount of cattle, it is not unlikely that some respondents did not disclose exact information regarding their assets. More specifically, some of respondents were not willing to reveal the fact that they kept cattle because of the fear of this being reported to government authorities. In addition, due to increasing land conflicts, some respondents were not comfortable responding to questions on the land ownership, particularly as regards farming land and pasture. Some of them also responded by asking the interviewers if they planned to grab their land. While we clearly explained the aim of our research and gained confidence from the interviewees throughout the interview process, we could not completely allay such suspicions.

In Meatu, before conducting our survey, Tanzania Social security Funds (TASAF) conducted a study to identify poor households/ members of households who needed a certain kind of government support to improve their livelihoods. During the time of data collection, the identified households had already started to receive support from TASAF. In addition, the LVEMP had requested that people shift their activities away from the Simiyu River to protect the riverbanks. The project organized people into groups and provided some assistance to support their activities. Because of the supports that the LVEMP II and TASAF provided to their targeted groups, some of the households thought that our survey had the same objectives of providing supports to people. Consequently, some households who were not in our sample requested to be interviewed. The government initiatives that preceded our survey might well have affected responses, particularly on assets ownerships. To minimize this problem of truth in responses, in both study areas, different family members were asked the same questions i.e. range of data were collected from different household members to measure assets ownerships. We then compared the responses of different household members to verify the results. Furthermore, the same question was asked to respondents in different ways, for example in addition to the household's possession of cattle, the respondents were asked if

they use a plough during farming and how they access the plough. Additionally, we also used the observation method together with interviews, particularly as regards cattle ownership. By looking at the surroundings and observing things such as the presence of a cattle shed, the interviewer could easily ascertain whether or not the household kept cattle.

While the above limitations are similar in both study areas, there are limitations that are specific to each study area. In Kilombero, the survey could not be conducted with people residing at Kipingu hamlet in Signal ward. The majority of dwellers in the hamlet are agro-pastoralist migrants. When they received the information that we were going to conduct a survey there, all male villagers (mostly heads of households) gathered in a meeting. During the meeting, they complained that the government had converted part of their land (pasture area) to other uses. They insisted that unless the ministers responsible for land, agriculture and livestock visited their village and resolved the land conflict, they were not ready to talk to any other visitor.

The communication barrier was a major challenge during the data collection in Meatu district. Some of the respondents, especially the women, could not communicate in Swahili language. They only spoke Sukuma, which is their ethnic language. We counteracted this problem by hiring translators to facilitate the communication between researchers and respondents.

Furthermore, most male respondents in Meatu were not comfortable with their wives being interviewed separately, without their presence. They insisted that they were the ones to provide answers to all questions concerning the household and its members. In each household we visited, we had to seek permission from the male head to interview the women and other members. We did this by convincing them that women or youths themselves best provide some of the answers.

Reliability refers to the extent that the study can be repeated and the same results can be obtained (Rogers & Schlossman, 1990). The context in which the data were collected might have affected the reliability of the answers. The survey was conducted during a post-election period in which the new government insisted on environmental conservation for example by requiring people to move their activities away from the riverbanks. Thus, the existing political situation might have influenced some of the responses, particularly on activities that degrade RBR.

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ANNEXES



Left hand side - the modern irrigation scheme at Mkula Village in Kilombero. Right hand side - the traditional irrigation scheme at Kiberege Village in Kilombero.



Figure 2: Fishing through blocking of the rivers at Mofu in Kilombero Valley.



Right hand side- The PhD researcher, Christina, visiting a household, which is the beneficiary of the LVEMP II projects at Mwabuma village in Meatu. Left hand side- Christina talking to farmers at Kisesa village in Meatu.



Christina and Kubwela, administering survey interviews at Sululu village in Kilombero.



The PhD researcher, Christina Shitima, taking a picture with respondents who participated in the Focus Group Discussion in Kilombero.



Tumaini conducting a Focus Group Discussion.



Focus group discussion moderators. From the left: Zamaradi, Christina, Tumaini and Lington (the first at the right) taking a picture with village leaders in Mofu.



Christina visiting the household at their paddy rice's farm during a survey in Ihenga Village, Kilombero.



Left-hand side - A fisherman showing the local fish trap, which is used for catching fishes at Mofu village in Kilombero. Right-hand side, the PhD researcher, Christina Shitima looking at the fish that dried, ready to be exported to other areas of the country in Ikwambi village, in Morogoro.

CHAPTER 4

TANZANIA POLICIES ON GOVERNANCE OF RIVER BASINS RESOURCES: IMPLICATIONS ON PEOPLE'S LIVELIHOODS AND RESOURCE CONSERVATION

1. INTRODUCTION

Before independence in 1961, Tanzania's policies on the governance of natural resources were designed to suit the needs of the colonial government. In 1967, the country adopted the socialist mode of production, which put the governance of natural resources under the control of the central government. In the mid-1990s, the government embarked on a mixed type of economy by allowing the private sector into the production system. In addition, Tanzania signed several international treaties that require stakeholders' participation in the planning and management of natural resources. Consequently, from the 1990s, the country has been adjusting some of its environmental policies to incorporate the change in political system and some of the agendas that were agreed on at international forums (MoWLD, 2002; van Koppen, Tarimo, Van Eeden, Manzungu, & Sumuni, 2016).

This chapter presents an overview of Tanzanian government policies on river basins and their resources. The focus is on linking the policies with the people's use of river basin resources (RBR) for the improvement of their livelihoods and resource sustainability. The chapter addresses the first research question that aims to understand the forms of governance structures that exist in the management of RBR and how they affect people's access to RBR (see chapter 1). The information presented in this chapter relies mostly on the data collected from a desk review of different published and unpublished works.

Section 2 provides an overview of earlier policies³³ that governed RBR uses in Tanzania. Section 3 presents the current policy that governs the use of RBR together with the institutional frameworks through which policies are implemented. This section also briefly highlights how different sectors that make uses of RBR fit into the current policy on RBR governance. Section 4 focuses on the implementation of policy at the community (resource users) level, with particular attention paid to the literature that addresses how policy implementation affects people's livelihoods (in terms of access to RBR) and RBR conservation. Section 5 presents the concluding remarks.

³³ The impact of policy on the status of RBR in Tanzania cannot be explained by using a single policy document because there are different sectoral policies that affect the uses of RBR.

2. PREVIOUS POLICIES ON GOVERNANCE OF RIVER BASINS IN TANZANIA

For a long period, Tanzanian RBR policies/ programmes were geared towards water supply rather than the management and protection of water and other RBR. The government policy before independence concentrated on the supply of water to urban areas and settlers who own plantations in rural areas.³⁴ After independence, the new government continued to implement the then existing policy until 1971 when it adopted a 20-year rural water supply programme (1971-1991). The programme tried to address the weakness of the colonial programme by including rural society in the government's water supply programmes. The aim of the programme was to provide free access to adequate and safe water to rural populations. As in the water sector, other sectoral policies that use RBR, for example the agriculture sector, concentrated on increasing outputs in terms of production rather than focusing on RBR management.

The idea of IWRM was first introduced in regulations in 1974, although it was not until the early 2000s that its implementation started to be effective. In 1974, the Water Utilisation (Control and Regulation) Act No. 42 placed all water resources under the control of the United Republic of Tanzania (URT, 1974). The act gives the power to the minister who is responsible for water to divide the country's water resources into drainage basins. In 1981, an amendment was made to include a component of water governance according to river basins, and consequently the country's fresh water was subdivided into nine river basins (URT, 1981). The amendment specified that each basin would be managed by its respective water office under the advisory board. The basin boards replaced the then existing regional boundaries of river management.

Tanzania adopted its first national water policy in 1991.³⁵ Like the rural water supply programme, the goal of the policy remained to provide clean and safe water to the entire population. Again, the policy focussed on the development of water resources rather than management and protection of river basins. Although the existing act divided the country drainage system into river basins, the implementation strategy of the policy mentioned the

³⁴ For a detailed discussion on the topic, see (MoWI, 2008).

³⁵ For a detailed discussion on the topic, see the 2002 national water policy (MoWLD, 2002).

central government as the “sole investor, implementer and manager” of the water related projects all over the country (MoWLD, 2002, p. 5).

In 1992, only a year after the launch of the first water policy, Tanzania participated in the Earth Summit and signed the Agenda 21 (MoWLD, 2002). Consequently, it became necessary for the country to reform some of its sectors, including water resources. In 1997, Tanzania adopted its first national environmental policy with four objectives related to the water resources sector. One of its objectives was the application of the integrated approach in the planning and implementation of water resources, including the protection of water catchment areas and their vegetation cover (VPO, 1997). The policy also emphasized the valuation of ecosystem services including water resources by putting institutions for the user charges.³⁶ The other two objectives are related to the protection of wetland areas and the improvement of technology for safe water supply.

³⁶ The 1974 Water Utilisation (Control and Regulation) Act No. 42 requires Tanzanians to apply for the water rights to legalize their uses of water. However, this rule was practically not enforced to smallholder’s water users until the 2000s (URT, 1974).

3. CURRENT POLICIES ON GOVERNANCE OF RIVER BASINS IN TANZANIA

3.1. POLICY DOCUMENTS

In 2002, the government adopted the new National Water Policy (NAWAPO) that explicitly includes the component of IWRM. The objective of the policy is to develop a framework for the management of the country's water resources (MoWLD, 2002). This is done through putting effective legal and institutional frameworks that ensure that water resources are managed according to the river basins. The policy highlights that "Basin water resources are part of a management continuum starting with the upstream freshwater sources in the watershed, moving down into the freshwater-seawater interface in the deltas and estuaries" (MoWLD, 2002, pp. 9-10). The policy also aims at bringing all stakeholders who operate different activities along and within the basin into the planning and management of the basin's resources. The government's role has changed from 'service provider' to the 'coordinator of the sector', including formulation of policy, guidelines and regulations.

The government adopted a Water Sector Development Programme (WSDP) in 2006, which sets the framework for the implementation of water policy.³⁷ The major goal of the WSDP is to strengthen the institutions of water resources management (WRM) and to improve access to water supply and sanitation.³⁸ The framework is in line with other broader (national) frameworks such as Tanzania's Development Vision (Vision 2025)³⁹ and the National Strategy for Growth and Reduction of Poverty (NSGRP/MKUKUTA).⁴⁰ The implementation of the WSDP is expected to contribute to the achievement of the targets that were set by Vision (Vision

³⁷ For a detailed discussion see (MoWI, 2008) and (MoW, 2014).

³⁸ Due to the nature of our research, only the component of water resource management will be discussed in this chapter.

³⁹ One of the targets of Vision 2025 is to have a strong and competitive economy. Among other things, this target will be achieved through reversing current adverse trends in the loss and degradation of environmental resources (such as forests, fisheries, fresh water, climate, soils, and biodiversity) (PO, 2000).

⁴⁰ NGSRP was one of the midterm plans covering a period of five years. NGSRP papers were expected to contribute to the achievement of Vision 2025. The papers show that water resources management is important to achieve desirable outcomes in terms of growth and reduction of income poverty, improved quality of life and social well-being and good governance and accountability (MoWI, 2008).

2025) and the NSGRP. The programme covers a period from 2006–2025. However, due to the time-length, the programme is implemented in three phases.

Phase one of the WSDP (cf. WSDP1), commonly known as the National Water Sector Development Strategy, was implemented from 2007 to 2014. The strategic goal of the WSDP1 on the management of water resource was to give directions on restructuring the institutional framework⁴¹. In 2009, the Parliament of Tanzania enacted the Water Resources Management Act, 2009 (URT, 2009b). The act provides the legal framework for the implementation of the policy, including the restructuring of the institutional framework for WRM.

The implementation of phase two of the WSDP (cf. WSDP2) runs from financial year 2014/2015 to 2018/2019. While the major development goal of WSDP remains to strengthen the institutions of WRM, WSDP2's major objective on WRM is to “ensure availability of water for socio-economic development and environmental sustainability” (MoW, 2014, p. 34). The objective is expected to be achieved through (among other things) strengthening institutional capacities for water resource management, improving multi-sectoral coordination of IWRM activities given the basins priorities and development of priority water resources facilities such as dams and boreholes as identified in development plans at the basins' levels.

3.2. INSTITUTIONAL FRAMEWORK

Institutions for WRM have undergone restructuring following the adoption of NAWAPO and its implementation frameworks. The NAWAPO divides the institutional framework for WRM into five levels. As a result, different boards/ committees for the management of water resources were formed after the enactment of the 2009 Water Resources Management Act. These include the National Water Board (NWB), Basin Water Boards (BWBs), Catchment Water Committees (CWCs), and Water User Associations (WUAs). The district council is also included as a part of the WRM institutional framework. Its role on WRM is to participate in BWBs and CWCs, develop district WRM plans in accordance with the basin's plan, protect and conserve natural resources in the wards and villages, establish bye-laws on WRM and use bye-laws to resolve conflicts in

⁴¹ Other strategic goals on WRM relate to water resources assessment, planning and development, environmental protection and conservation, water quality and pollution control, water conservation and demand management, water utilisation and allocation, trans-boundary waters, disaster management and water resources management legislation.

water uses (MoWLD, 2002, p. 28). By the end of WSDP1, all nine BWBs were operational and ninety WUAs were formed. In addition, thirty-eight CWCs were identified and the procedures for their formation had already been initiated (MoW, 2014).

The subject of valuing water resources (as recommended in the 1997 national environmental policy) is addressed in the NAWAPO and its institutional frameworks. The policy and the 2009 Water Resources Management Act indicate that the issuing of water rights and the collection of the various fees and charges as being among the roles of BWBs. Fees and charges on water uses would transform water into an economic good. Payment for water resources use was expected to raise people's awareness of the importance of conserving water resources through reducing the uses of water (Sokile & Koppen, 2004).

Since the provision of the Water Resources Management Act of 2009, people at the community level have started to participate in WRM through water resources users groups (RUGs) such as irrigators, fishers and pastoralist groups. Water rights can be held by either an individual person/organization or a group of people (collectively). Thus, to reduce the cost of obtaining rights for the smallholder's users of RBR, the government promoted the formation of RUGs (van Koppen et al., 2007). Through RUG, a group of resource users can apply for a single right to use water resource and share the associated cost. This lowers the cost of using water compared to when the permit is issued to an individual person. In addition, it is also more convenient for a government to collect fees from a group of users compared to collection from individual users (van Koppen et al., 2007).

3.3. MULTI-SECTORAL IMPLEMENTATION

The multi-sectoral linkages in the planning and management of water resources are explicitly considered in the 2002 national water policy. The policy recognizes the important role that water resources have on the functioning and development of other sectors in the economy. These sectors include agriculture, livestock, industry, mining, environment, domestic water supply, energy, fisheries, wildlife and tourism, forest and beekeeping, navigation and trans-boundary water resources.⁴²

⁴² For the sake of keeping the discussion narrow, the paper will concentrate on the link between resources that are frequently used in our analysis, which are irrigated land, livestock areas and fisheries.

The policies from the sectors that use RBR have also incorporated the idea of RUGs in their documents. For instance in the agriculture sector, the government adopted the national irrigation policy in 2009. The policy was followed by the national comprehensive irrigation guideline of 2010, which requires that irrigation activities be conducted by the use of irrigation schemes in the groups of irrigators called Irrigator's Organisations (IOs). The registered IOs receive permits on using water from their respective BWBs office. While the BWBs issue permits that specify the amount of water that an IO can use and charges the associated fee of using water, the district councils' office educates people on the importance of forming RUGs and the procedures for registrations and applications for the permits. During our field study, we found that modern and traditional irrigation schemes are used in Kilombero district. Out of 16 modern irrigation schemes, five schemes were operational during the time of data collection. The remaining 11 schemes were in different stages of implementation i.e. some aspects of infrastructure were still under construction. In Meatu district, there are no irrigation schemes: irrigation activities are conducted without irrigation schemes which might be related to the seasonality of the river. The river is dry when the rain season is over. Thus, it may be not economically desirable to establish irrigation infrastructure in the area with insufficient water.

More or less similar procedures apply to all other RUGs who share common RBR. Pastoralists' access to water resources is commonly through the presence of rangeland.⁴³ Water and grazing areas that sustain the animals' needs during the wet and dry seasons are important features of rangeland. The national livestock policy of 2006 indicates that the movement of pastoralists with their animals to search for pasture and water is one of the causes of the degradation of water sources and land within and outside rangeland areas. The weakness of water users associations among the pastoralist groups also increases the problem of degradation. The policy emphasises the importance of strengthening the WUAs in pastoralist groups to manage water sources and formation of pastoral and agro-pastoral associations to manage pastoral land. However, the Grazing-land and Animal Feed Resources Act, 2010 does not explicitly show the roles of RUGs in the RBR management among pastoralist communities (URT, 2010a). During our own data collection, with the exception of the Signal ward of Kilombero district, we found no communal rangeland to be reserved for agro-pastoralists in the surveyed villages. Although the majority of the people in Meatu district are agro-pastoralists, there was no communal rangeland (pasture)

⁴³ Rangeland is defined as "an extensive area that is not cultivated, and contains forages, which can sustain animals" (MoLD, 2006, p. vi).

area. While private lands are used to feed cattle, rivers and their streams are used for cattle watering.

The integrated approach in the fishing sector at the basin level is implemented through the establishment of Beach Management Units (BMUs). In 1997, the government adopted the fisheries policy, which transferred the power of managing fisheries resources to the community. The policy was followed by the 2003 Fisheries Act (URT, 2003) and its regulations of 2009 (URT, 2009a). The policy emphasises the establishment of BMU for the management of fisheries resources. The act defines BMU as “a group of devoted stakeholders in a fishing community whose main function is management conservation and protection of fish in their locality in collaboration with the government” (URT, 2003, p. 6). With the help of villages and district governments, communities are stimulated to form BMUs to promote collaborative efforts in the management, protection and conservation of fishery resources, biodiversity and environment (URT, 2009a). Currently, the country has a new fisheries policy adopted in 2015 (MoLFD, 2015). In Kilombero district, BMUs are established in the form of fishing camps to gather all fishers in the recognized fishing areas. During the period of data collection, three BMUs in Mofu, Ikwambi and Signal villages had already been established. The district council was still in the process of organizing fishers in other areas to form BMUs.

4. POLICY IMPLEMENTATION AT THE LOCAL LEVEL: SUCCESS AND CHALLENGES

4.1. SUCCESS STORIES

The literature that supports the integrated approach claims that the local communities' ability to protect environmental resources is supposed to increase if they are given more powers and authority in the planning and management of those resources. In Tanzania, communities participate in the governance of RBR through RUGs. Within the context of NAWAPO, different groups such as WUAs, BMUs and IOs have been formed as parts of an institutional framework for RBR (Kabogo, Anderson, Hyera, & Kajanja, 2017). Further to that, the RUGs participate in the RBR planning and management at the basin level through having their representative at the BWB.

A number of success stories of RUGs in managing RBR have been reported in several studies (Kabogo et al., 2017; Kanyange, Kimani, Onyango, Sweenarian, & Yvergniaux, 2014; Luomba, 2013; Ogwang, nyeko, & mbilinyi, 2009). More specifically, some RUGs have been successful in the enforcement of rules and the resolution of conflicts on RBR uses. The study by Kabogo et al. (2017) highlights how the WUAs in Mara River (a trans boundary river) are successful in the conservation of RBR. For example, Tobora WUA was awarded the best WUA in both Tanzania and Kenya river sides because of its efforts to conserve the RBR, particularly trees, at their sub-catchment areas. The WUA has been helpful in combatting the deforestation, which is carried out to expand tobacco farms, and use the felled trees to burn charcoal. The success of the Tobora WUA is largely attributed to its leader who ensures enforcement of the rules and regulations, and fairness in decision-making. In the similar basin, the Tigite WUA has also been struggling to manage water pollution that is caused by mining activities. Furthermore, the study Kabogo et al. (2017) report that some WUAs have developed income-generating activities in the areas they operate, for instance the establishment of bee keeping activities and tree nurseries. While such activities are not part of river basin management, they contribute to environmental conservation. The study by Masifia and Sena (2017) in Kilosa district shows that there is a high level of awareness of RBR conservation in the villages where leaders call for public meetings to discuss RBR related issues and stimulate people to adhere to the village and district bye-laws. The study also reports that due to poor leadership, several WUAs have not been able to achieve their objectives of RBR conservation.

In the fishing sector, BMUs have formulated bye-laws, which have been useful in the management of fisheries in their areas (Kanyange et al., 2014; Luomba, 2013; Ogwang et al., 2009). Enforcement of the bye-laws have been useful for controlling illegal fishing, the improvement of hygiene conditions in the basins and the collection of revenue by the local government authorities. In addition, through BMUs, communities have been empowered to make decisions regarding the planning and management of fisheries. This is in line with literature that documents the resolution of conflicts as one of the successes of BMUs (see for example Kanyange et al., 2014; Luomba, 2013).

4.2. CHALLENGES

Despite the usefulness of the new institutional framework for the WRM in Tanzania, several challenges affecting its implementation have been reported. These challenges likely hinder the achievement of one of the WRM policy objectives of having sustainable water use and conservation.

One of the reported challenges is the under-representation of smallholder's RBR users at the higher levels of planning and management.⁴⁴ MoWI (2010) reported that 89% of the water drawn in Tanzania is used for irrigation activities. While an average of 500,000 acres of land is used for irrigation, smallholders irrigate 80% of the land in traditional ways (van Koppen et al., 2016) while they are simultaneously under-represented at the higher levels of RBR planning and management. In fact, only one member represents people from the grassroots level through local government representation. Representation at the BWB attract corporate private sector and large-scale users rather than the small-scale users. van Koppen et al. (2016) challenged the current framework by arguing that "Basin management by basin offices opened new doors for winners in the form of large-scale users at the top. Smallholders, by all accounts, are losers as they have no practical way of being meaningfully involved, in the near future, in the new parallel governance layers" (p. 601).

The institutions require people to participate in RBR governance through RUGs. This leaves the smallholder's RBR users who are not organized in the RUGs or who do not have financial capital to pay for water fees without water rights and access to strong formal institutions to forward

⁴⁴ For more detail, see a study by van Koppen et al. (2016) on winners and losers of IWRM in Tanzania.

their claims. The study by van Eeden, Mehta, and van Koppen (2016) reported that the smallholder's users in Wami-Ruvu basin have been complaining of the tendency of large-scale users to diversify and over-extract water, leaving them with insufficient access to water. For example, one of the companies demarcated its area by closing some of the tracks to the areas where communities used to get access to water (van Eeden, 2014). This results in conflicts over water use between the villages that surround the company and other villages downstream. While the company possesses the user right, people in the surrounding villages and other people downstream do not. The study by Masifia and Sena (2017) at Mkondoa sub-catchment in Wami-Ruvu basin reported that the majority of water users (83%) are unregistered and thus do not have rights to consume water. This leads to conflicts over water uses between groups of upstream and downstream users and large-scale water users and small-scale users. For instance, the large-scale users blame the small-scale users for not respecting the fact that they (large-scale users) have water rights from the government. Similarly, the smallholder users do not understand the kind of law that allows the large investors to block the rivers and to have their farms located in the areas adjoining the riverbanks. In addition, the same study also reports that the majority of livestock keepers at Ilonga and Kisangata areas of the Kilosa district are individual users who take their cattle to the rivers without possession of formal rights to draw water.

While the provision of water rights is considered to solve the problems of water allocation and conflicts between users, it has not benefited all resource users equally. The literature shows that the changes of property rights regimes on water and land can result in the exclusion of poor people from the possession of rights (Islar, 2012). This was the case at the upstream of the Upper Ruaha River where the implementation of water rights attracted the irrigators (who technically were more organized and wealthier than the downstream users) to register their groups to legalize their claims for water (Sokile & van Koppen, 2004). As a result, the irrigation activities were expanded in the upstream areas, which caused water shortages for the downstream users, who were mainly unorganized livestock keepers and small-scale irrigators. The study by Masifia and Sena (2017) in Kilosa reported that some users with access to financial capital construct local canals and supply water to smallholder's irrigators requesting a fee. They thus sell water rights to other people without having the permits from the respective BWBs. As discussed in Masifia and Sena (2017), people who construct canals do not necessarily consider supplying water to large parts of the population because their motive is to obtain profit rather than providing services. Because of this, large parts of the population in the nearby communities are left without access to water for irrigation. Another study by van Eeden et al. (2016) revealed the marginalization of small-scale users in Wami-Ruvu basin due to the implementation of the new

policy. To implement the Kilimo Kwanza (Swahili translation of Agriculture first) policy, which aims at modernizing agriculture methods, the government has been giving priority to large investors in the allocation of land and water for farming. The smallholder users, previously, were using the land that is now allocated to large investors. Because irrigation in Tanzania is accessed through access to irrigated land, loss of irrigated land implies the loss of access to irrigated water.

Resource user groups are also reported to have failed to achieve the objectives of protecting RBR, due to their members' lack of awareness of the responsibilities of their groups. This is also mentioned in WSDP2 as one of the challenges affecting the water policy's implementation (MoW, 2014). The study by Masifia and Sena (2017) in Kilosa showed that even in circumstances where some smallholder users are members of WUAs, the majority of them are not aware that, through their groups, they are part of the water policy implementation strategies. Other studies reported that people perceive resource user groups as the system that is put in place by the government with the purpose of collecting revenues from the use of RBR (Sumuni, 2015; van Koppen et al., 2016). The roles of WUAs in the management of RBR are not clear to the members, even in those cases where people comply with the payment system. For instance, at Mvomero district in the Wami-Ruvu basin, farmers comply with fee payment to avoid being disconnected from water supply (Sumuni, 2015). Similar studies (Sokile & Koppen, 2004; Sumuni, 2015) have pointed out that local water users think that WUAs do not help conserving RBR but rather impede local systems of water management.

Another challenge for effective RBR management is the lack of funds and other facilities such as computers, boats and motor vehicles. For instance, in 2000s, the performance of BMUs in Lake Victoria was largely associated with the presence of the Fisheries Management Plan project⁴⁵ that was supporting and enabling the activities of BMUs (Luomba, 2013). Once the project ended, there was little support from the government in term of capacity building. Thus, the newly formed BMU lacked the necessary skills to lead the groups (Ogwang et al., 2009). In addition, some BMUs lack the working tools that are important for the sustainable implementation of their activities for instance, computers facilities to store data, boats to patrol fishing grounds etc.

⁴⁵ The project was implemented 2004-2010 in Tanzania, Kenya and Uganda, the states that surround Lake Victoria. The Lake Victoria Fisheries Organization coordinated the project.

5. CONCLUSION

In Tanzania, the governance of RBR moved from a focus on a centralized system of water resources management to a more participatory approach that includes different stakeholders in the planning and management of RBR. The institutional framework for the implementation of the policy was also put in place. The current national water policy puts hydrological basins at the centre of the governance of inland water in Tanzania. The basin offices coordinate the activities of different stakeholders who have different interests in river basin natural resources. The conservation of the basin and its related resources, and the welfare and livelihoods of people who depend on the basins are given priority during planning and management of river basins. All these are crucial for the long-term sustainability of river basins and their resources.

The policy has the good intention of involving communities in the planning and management of RBR, however the way people are involved have implications for their livelihood situations and the conditions of RBR. While this is not the policy's aim, the new policy has somehow resulted in the exclusion of poor people from the possession of water rights. The chapter has shown that people with power have been able to take advantage of the new framework and to disproportionately benefit more from RBR. The institutional framework has not been able to ensure the inclusion of the majority (i.e. mainly smallholders RBR users) in the policy implementation. In addition, while the national water policy requires participation of different people in its implementation, other government policies give priority to large investors who produce in large-scale, and use substantial areas of land and quantities of water. For instance in Kilombero, some people feel that the new policy has taken their important livelihood resources and re-allocated them to big investors. The issue of power relations and access to RBR is addressed in chapters four and five. In particular, chapter 5 assesses the impact of informal social relations on the practical rights to use RBR and the ability to benefit from the use RBR among different groups of people (both within a single community as well as between communities). In chapter 6, the focus is further narrowed by investigating how informal social relations affect the ability to benefit from RBR among different household members.

There are differences in livelihood outcomes that are caused by differences in access to resources even among the smallholder users. For instance, the rule that requires people to have water permits is more favourable to those endowed with the resources (money and time) and who are conversant with the bureaucratic procedures to file the applications. The majority of RBR users are poor individual smallholder irrigators/ fishers/ livestock keepers who

may not be conversant with procedures and cannot afford the cost of applying for RBR user permits as individual users. As discussed in chapter 7, even in the modern irrigation schemes that were built by the government, the majority of local rural people cannot afford the cost of inputs that are associated with irrigation farming. For example in Kilombero, we found out that people rent out their irrigated land to outsiders who can afford the expensive cost of inputs such as fertilizers and pesticides. Thus the owners of the farms continue to depend on seasonal (rain fed) farming. This means that the presence of new infrastructures bring more benefits to people with access to different livelihood resources such as cash and credit and further exacerbates inequalities between differently positioned people. Chapter 7 assesses the extent to which differences in resource access affect livelihood outcomes in terms of occupational choice and RBR conditions. The chapter addresses the role of access to livelihood resources (social and financial resources) on people's choices of development strategies, and their implication for the development of conservation strategies.

The findings have also shown that there is lack of awareness on the importance of protecting RBR among the resources users. The problem of implementing rules is severe in the areas where there is poor leadership. In areas where the level awareness is low, some resource users believe that God gives the RBR to their communities for free, thus there should be no rules to govern their uses. Other resources users still perceive the new rules as a means of tax collection set up by the government. The importance of environmental awareness for the protection of RBR is captured in chapter 8. The chapter addresses the impact of awareness of RBR degradation on the attitudes towards conservation of RBR.

Empirical studies report the existence of conflicts over water and land ownership among RBR users. This implies that the new institutional framework has not yet achieved the objective of solving the conflicts among resources users. While the basins' officers have to rely on formal (regulatory) rules to carry out their duties even at the grassroots levels, people in rural areas often rely on their norms and customary systems when accessing RBR and solving RBR's disputes (Lankford & Hepworth, 2010). This means that there is a need for government officials to consider people's norms and traditions of accessing RBR and of solving disputes. For instance, people prefer engaging in informal ways to solve conflicts before engaging in formal ones. Apart from their acceptance by the majority, informal paths are also less costly in terms of time and resources for both government and resources users. This study pays particular attention to the impact of informal practices in terms of RBR access, while the role of informal practices in solving conflicts related to RBR is not a focus of the study.

Gender as an important cross-cutting issue in RBR governance is mentioned in the policy document as among the main policy principles in water resources management. With regard to the institutional framework for WRM, the policy says that “gender implications shall be examined and taken into account at all stages of management of water resources” (MoWLD, 2002: 16). However, the implementation strategy documents (WSDP 1 and 2) do not clearly show how the component of gender is integrated in the implementation plan, which implies that the phenomenon of policy evaporation (whereby gender concerns gradually disappear throughout the different phases of the policy cycle) is likely to occur⁴⁶. “Policy evaporation was/ is always a real possibility, because of factors such as inadequate appropriation and translation of gender issues into different sector languages” (Holvoet and Inberg, 2014: 323). Although gender was incorporated in the WSDP1 document, it was only taken into consideration in the component of water supply, but not water resources management.

⁴⁶ For a discussion of policy evaporation see Bangura (1997) and Holvoet and Inberg (2014).

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CHAPTER 5

INTERSECTIONS OF GENDER AND AGE IN ACCESSING RIVER BASIN RESOURCES: A COMPARATIVE ANALYSIS OF FISHING AND AGRO- PASTORALIST COMMUNITIES IN RURAL AREAS OF TANZANIA

A slightly adapted version of chapter 5 has been published in Afrika Focus (August 2018).

1. INTRODUCTION

The chapter applies intersectionality theories in its examination of access to RBR in rural areas of Tanzania. The paper argues that livelihoods of some people who live in the villages along river basins in Tanzania might be affected by differences in access to river basins resources (RBR).⁴⁷ These differences in access to RBR are the result of cultural norms and beliefs that create diverse social relations in society. These include differences in wealth, knowledge, age, and gender, all of which create differences in power relations among actors. Agarwal (1997) argued that, in some rural areas of developing countries, livelihood resources are not equally accessible for men and women. This is due to power differences created by socially constructed practices in terms of gender. For instance, in Tanzania, while there are strong legal provisions that give rights to and protect women's ownership of land, most customary norms give rights to women to use land through their spouses or male family members and deny them rights to own or to transfer land (Leavens & Anderson, 2011, p. 2). Even at a household level, females do not inherit resources from their fathers, as most cultures favour men's inheritance (Leavens & Anderson, 2011).⁴⁸ Traditionally, the eldest son might seem to be in an advantageous situation because he gains a larger share of the inheritance compared to other members. However, the gains go parallel with the extra responsibility of taking care of his siblings, for example by paying for his brothers' bride prices when they want to marry. Thus, on the one hand, the elder son's inheritance can also be termed by all household members as a good investment and collectively, all household members may be satisfied given the extra responsibilities that are assumed by the eldest son. On the other hand, however, cattle is one of the assets that can be easily converted into the cash. Thus, in case of emergency/ or need of money, the one who inherits the most might be in an advantageous situation because he owns the assets that are not only termed as a symbol of wealth in society, but they can also easily be sold in the market. The livelihoods of the other household members may as well be affected if the person who inherited most to assume collective

⁴⁷ River basins in Tanzania provide important natural resources which are used for different livelihood activities. These resources include water for irrigation, fisheries, areas for livestock, trees for the construction of houses and sources of energy, recreational areas etc.

⁴⁸ In Tanzania, the formal laws that govern inheritance give equal rights to all children regardless of their gender, unless it is stated otherwise in the will of a parent. However, most of the inheritance trials are conducted at the household level by using the traditional rules and customs, i.e. the trials are not taken to the formal system of laws.

responsibilities decides to pursue individualistic decisions of selling the assets for his own benefits.

While diversity in social relations is considered to create differences in power relations among actors, the literature also shows that differences in power relations may also cause diversity in social relations between members of society. Some actors may use their power to benefit more from resources than others (Cleaver, 2001; Cleaver & Toner, 2006; Mehta et al., 2001). For instance, people who possess certain skills and/ or other forms of resources may have substantial capacities to negotiate and/ or manoeuvre and shape the use of shared RBR to their advantage and thus accrue more benefits. Furthermore, some groups of actors with power may deny other groups the rights to access important resources. L. de Haan and Zoomers (2005) have referred to such denial as social exclusion, i.e. "A process in which groups try to monopolize specific opportunities to their own advantages" (p. 33).

In line with Leach et al. (1999) and Ribot and Peluso (2003), this paper defines individual access to RBR in terms of practical rights to use household owned RBR to pursue different livelihood activities and the ability to benefit from the goods that were produced from the use of RBR. In most societies, formal and informal rules operate together to determine the rights to use natural resources. While the state provides formal (legal) rights on the use of RBR through rules and regulations, other customary (informal) norms operate alongside formal rules to govern the uses of resources. This situation is referred to in the literature as legal pluralism (Meinzen-Dick, 2014; Meinzen Dick & Pradhan, 2002), whereby different types of arrangements/ rules are used in allowing access to natural resources. For example, Cleaver (2001) showed that at the Usangu River in Tanzania, conflicts over use of irrigated water are referred to traditional elders instead of being reported to formal systems of laws, which people found to be unnecessary. Thus, even with the existence of formal rules, people not only use the rules that are familiar but also those that seem to be more advantageous. Showing the role of both formal and informal rules in shaping outcomes of access to resources, Leach et al. (1999) have referred to these rules as "not as the rules themselves, but as regularized patterns of behaviour that emerge from underlying structures or sets of 'rules in use'... 'rules' are constantly made and remade through people's practices (p. 237). In this paper, we argue that a household's legal possession of rights to the use of RBR or physical ownership is not a sufficient condition for an individual household member to have practical

rights to use that resource.⁴⁹ Customary norms interact with modern ways of livings (see also Hall et al., 2014) to determine the ways resources are used by different household members. Thus, the term rights to use RBR is used in this paper to mean the practical rights that an individual has on the use of household owned RBR.

The benefits that a person has from the use of livelihood resources is regarded in this study as the freedom that a person has to make decisions about the uses of goods she/he has produced (Leach et al., 1999; Sen, 1999). While the right to use resources is an important condition for a person to be able to produce goods, studies show that the right to use resources does not guarantee the accrual of benefits that result from the use of RBR (Ribot & Peluso, 2003). Thus, even if a person is able to use RBR to produce goods, the ability to use the yields to meet personal needs is also an important condition for him/ her to benefit from the use of RBR. Other literature has shown that the freedom to decide whether to use produced goods and how to use them also defines the ability to benefit as people have different life-goals (Leach et al., 1999; Sen, 1999). Leach et al. (1999) showed that informal relation factors such as differences in gender, age and other forms of socially constructed practices moderate the whole process of gaining benefits. For instance, some resources may not be utilized for the improvement of livelihoods due to religious beliefs, norms and/ or traditions that prohibit certain groups of people from using those resources. In a polygamous marriage, wives may not be able to benefit from the goods produced by the household, if only the husband makes the selling/ consumption decisions.

From the above arguments, this paper raises the following important questions regarding access to RBR in Tanzania: How do men and women access RBR that are owned by households for the enhancement of their livelihoods? The following three hypotheses are then tested: (i) gender differences derived from cultural norms affect individual rights to use RBR, (ii) gender differences derived from cultural norms affect the ability to benefit from the use of resources, and (iii) there is a link between the rights to use RBR and the ability to benefit from the use of

⁴⁹ Studies of the unitary approaches and common preference models (see for example Becker, 1965; Haddad et al., 1997; Singh et al., 1986) stipulate that production and consumption decisions in rural areas are made at the household level rather than by an individual person. In these models, the household is seen as well-being maximizing unit, whereby all household members are assumed to have the same preference for production and consumption of goods. Drawing upon the studies of unitary approaches, this study assumes that in rural areas of Tanzania, RBR that are used for production are owned at household level and the production decision is made at household level. All household's members use the same RBR to produce goods that are consumed by all household's members.

resources (both for men and women). In addition, by using intersectionality approaches (see for example Crenshaw, 1989), the paper argues that some people's access to RBR may be more affected than others, as they belong to different social categories of marginalization. In this study, we more specifically use intersectionality theories to study how informal social relations in terms of age and gender intersect to affect people's livelihoods in terms of the access they have to important RBR. Furthermore, the study also tries to determine whether the impact of the intersection of these variables differs between people of different cultural norms.

The findings of this study are important in terms of understanding whether the livelihoods of men and women are enhanced or hindered by norms that discriminate not only some people's rights to use RBR but also their ability to benefit from the use of those resources. Importantly, following Jones et al. (2010) we insist that these socially constructed practices "are not inherently good or bad". However, when they create "inequality, discrimination and exclusion, they become detrimental to development" (p. 7). Institutions of cultural norms and practices can be detrimental to development, for example, when they deny a certain group of people rights to access certain productive activities that are found within a particular society, and/ or if they limit some people's abilities to benefit from the available societal resources to improve their livelihood outcomes. Thus, the study is also important with respect to recommending policies that promote development initiatives that take into account the different opportunities and challenges faced by (different groups of) men and women in terms of the improvement of their livelihoods. In addition, the study extends the literature on the intersectionality approaches by applying the theory to study rural people's behaviour in relation to access to resources. Traditionally, intersectionality studies have been focussed on the interactions of social categories that are related to race, gender, class, in the main comparing people of different cultural backgrounds. In this paper, first people with similar cultural norm are studied. Subsequently, the scope is broadened to a comparison between different cultural backgrounds.

The paper is organized as follows: the following section presents the literature on intersectionality theories, followed by Section 3, which gives a brief description of the study area. Methodology is presented in Section 4, followed by results and discussion of findings in Sections 5 and 6, respectively. Section 7 gives the conclusion and policy implications of the study's findings.

2. INTERSECTIONALITY THEORIES

Intersectionality is an approach in research that is used to study how different social categories intersect to affect people's lives in different ways, compared to the impact of a single social category. Having its roots in legal studies, intersectionality theory was first introduced by Crenshaw (1989) who studied the marginalization experienced by African-American women in America. She showed that African-American women face double marginalization compared to other groups of people (white women, black men etc.), because they belong to more than one group of social marginalization. Extending the intersectionality theory, Hill Collins (1990) explained three dimensions that put a black woman in America in an oppressive situation. She pointed out that black women were economically oppressed because of the history of being slaves for white men; politically oppressed, as they were not allowed to vote and to hold public office; and ideologically oppressed because of the stereotypes that perceived them as prostitutes and people of low class in society. While different people fall into different categories of discrimination, intersectionality theorists challenged the anti-discrimination laws for assuming discrimination affects all people equally. For example, they contest the laws that assume sex discrimination affects all women equally or that race discrimination affects all people of colour equally (Best, Edelman, Krieger, & Eliason, 2011). Intersectionality theorists argue further that people are not homogeneous in terms of oppression they experience i.e. different people experience different magnitudes of oppression. There are other social arrangements that intersect with constructs such as gender and/ or race to bring more oppression to some groups of people. For example, if employers practice sexual discrimination against women when recruiting new employees for positions that are traditionally perceived to be male jobs, that kind of discrimination is one dimensional as it affects all women. However, if an employer refuses to hire disabled women in certain positions, these women are discriminated against not only because of their gender, but also because of their disability. Thus, disabled women may experience a double impact of social marginalization associated with socially constructed practices, because they are caught in an intersect of different social identities. The intersectionality theorists argue for the need to study how different social categories intersect to affect people's lives in different ways instead of treating them as one-dimensional categories (Best et al., 2011).

In rural areas of developing countries, informal social relations embedded in norms and culture strongly determine the behaviour that is expected from women and men, and from old and young people, etc. For example, women are socialized to be the care givers of the families and

men are expected to engage in activities that generate income and accumulate wealth (Ridgeway, 2011). These gendered expectations on the roles of different groups of people become norms, which also affect the access that different groups of people have to resources. Showing the inequalities in livelihood opportunities between people with similar cultural backgrounds, Valdez (2016) argued, “different family members within an ethnic household may experience unequal opportunities because multiple power relations and dimensions of identity, such as those rooted in social class and gender, shape family member’s access to family resources differently” (p. 1619). While it is the case that people’s agencies on the access to RBR are affected by socially constructed practices embedded in cultures and norms, intersectional theory is applied in this study to explore whether informal social relation factors lead to more disadvantage/ privilege in access to RBR to some people compared to others.

3. DESCRIPTION OF THE STUDY AREA

The study is based on data gathered in three villages of the Mofu ward, situated along the estuaries of the Kilombero River in the Kilombero district, which is located in the eastern part of Tanzania. While the villages of Ihenga, Mofu and Ikwambi have some similarities—for example, they are all located in remote areas of the district and seasonal agriculture is their major livelihood strategy—they simultaneously differ in their cultural backgrounds. People in Ikwambi village are native dwellers⁵⁰ of Kilombero, who depend on seasonal agriculture and fishing for their livelihood, i.e. it is a kind of a homogeneous community. People in Ikwambi practice seasonal farming and fishing as the major livelihood activity. Mofu village hosts the ward's head office, which makes it attractive to people from different cultural groups. In addition, some of the ward's service delivery facilities such as the health centre and secondary school are located in Mofu village. Finally, Ihenga was initially a hamlet of Mofu, but it later became a separate village. It was established by agro-pastoralist migrants, predominantly of Sukuma descent, who bought/ applied for the land from village governments upon their arrival. These migrants tend to live in their own areas, separate from native dwellers. Despite its nature of homogeneous, agro-pastoralist community, Ihenga village now receives migrants from other communities due to the rapid development of its infrastructure. It is the only village in the ward with access to electricity. Furthermore, Ihenga is the only village in the Mofu ward where irrigation activities are conducted.

⁵⁰ These people are predominantly of Ndamba descent. Their livelihoods depend on seasonal agriculture, mostly cultivation of paddy rice, and on fishing.

4. METHODOLOGY

4.1. DATA AND DATA SOURCES

The major method of data collection is the pre-tested survey questionnaire. The survey was conducted among households living in the selected villages. Before the survey, preliminary study visits were organised to get prior information on RBR and activities that make use of RBR. Interviews were conducted with government officials responsible for the governance of river basins and their resources. At village level, informal discussions took place with leaders of the different groups of resource users. The data from the exploratory field visits were also used to confirm some of the explanatory variables that were used during the survey. Our survey, which took place in March 2016, covers 203 respondents aged 18 and above who carry out different socio-economic activities along KR. These 203 respondents were surveyed from a total number of 83 households.⁵¹

After the survey, focus group discussions (FGD) were conducted to supplement survey findings. In each surveyed village, four groups of 10-15 people were formed from 15 surveyed households. The heads of households/ couples were put into different groups from the other members of households. Furthermore, each group was formed by people of the same sex to capture gender differences in responses. Variations in ages, education levels of respondents and differences in livelihood activities were considered when forming the groups to improve the external validity of the findings. Both concepts of rights to use resources and decision-making regarding the use of goods that were produced from those resources were discussed.⁵²

⁵¹ For a detailed discussion on the data collection process during the survey, including sampling procedures and selection of respondents, see section 5.1 in chapter 3.

⁵² For a detailed discussion on the data collection process during FGD, see section 6.1 in chapter 3.

4.2. MODELS AND THE VARIABLES

4.2.1. RIGHTS TO USE RBR

Probit regression mode is used to estimate rights to use RBR.⁵³ Respondents were asked to choose (from the list of RBR) the types of RBR that their households possess/ have rights to use, and thereafter to choose the kind of RBR that an individual respondent normally uses (depends on) to pursue livelihood activities. RBR that are used by people in the Kilombero district include water for irrigation, irrigable land, pasture and fishery. As in other places in Tanzania, access to irrigated water in Kilombero is linked with the household's possession/ renting of irrigated land along the river (Kramm & Wirkus, 2010). Access to pasture is also linked with access to traditional pastoralism i.e. access to pasture reflects people who have rights to keep cattle and thus make use of the household's pasture. Access to fishery is linked with the right that household members have to conduct fishing activities. Thus, three variables, i.e. an individual's right to use irrigated land, an individual's right to use a pasture and an individual's right to fishing are used to capture the concept of right to use RBR. All three variables are dummies, taking values 1 if the right is possessed and 0 if otherwise. Since our model has a series of binary dependent variables, probit regression models were used to estimate the equations. Each equation was estimated separately from the other equation. The equation was modelled as (Long & Freese, 2003):

$$y_i^* = x_i\beta + \varepsilon_i \quad \varepsilon \sim Normal(0,1)$$

Where, y_i^* is an unobserved (latent) variable that shows the individual's right to use a certain RBR. X_i and β show the vector of explanatory variables and a vector of parameters to be estimated, respectively. ε_i is a random error term.

Since our observed dependent variable, rights to use RBR takes the values of 1 if the right is possessed and 0 if otherwise, the relationship between the observed variable, y_i , and unobserved variable, y_i^* , is given as:

⁵³ Structural Equation Modelling (SEM) technique could have been used to estimate this model as a system of equations because some of the variables have a series of simultaneous dependency relationships i.e. one dependent variable becomes an independent variable in a subsequent dependency relationship. However, since each relation corresponds to a certain hypothesis, each equation is estimated separately from the other equations rather than estimating them as a system of equations.

$$y_i = \begin{cases} 1 & \text{if } y_i^* > 1 \\ 0 & \text{if } y_i^* \leq 0 \end{cases}, \quad i = 1 \dots n.$$

The interpretations of the results is based on the average marginal effects of the regressors.

An independent variable female is used to capture the impact of gender on access to RBR. Female is a dummy variable, which takes the value of 1 if a person is female and 0 if male. A negative relationship is expected between female and an individual's right to use irrigated land, right to use a pasture and right to fishing. A variable that shows age differences is added to capture if there are differences in access to RBR that are associated with age. As old people are assumed to have accumulated more resources than young ones, increase in age by one year is expected to be positively related with an individual's right to use irrigated land, right to use a pasture and right to fishing. However, the study assumes that the impact of age on dependent variables to be non-linear. Thus, a variable age square is added to capture the point at which the impact of age is reversed. Since the positive relationship is expected between age and dependent variables, the negative relationship is expected between age square and the dependent variables because its coefficients will be given by the first derivative of the variable age. Furthermore, another variable, native dweller, is added to capture the differences in impact between the native dwellers and non-native dwellers. Native dweller is a dummy variable, which takes the value of 1 if a person is native dwellers of Kilombero district, and 0 if otherwise. Those people who are native dwellers are expected to be more likely to have rights to fishing because fishing is a traditional activity of native dwellers of Kilombero. A negative relationship is expected between native dwellers and an individual's right to use irrigated land and/ or right to use a pasture. To assess the impact of location, the variable that captures village differences is added to the model. Because data were collected from three villages, Mofu village is used as a reference variable.

For all three dependent variables, a second model specification that includes the interactions of independent variables is run. The variables that show informal social relations are interacted with the variables that show villages/ native dwellers differences to assess whether there are differences in rights to use resources between different groups of people and across cultural groups.

4.2.1. ABILITY TO BENEFIT FROM RESOURCES

To study the ability to benefit from the use of resources, a variable freedom is used. Freedom captures a respondent's answer on a statement as to whether he/she is able (free) to use what he/she has produced to achieve personal goals in life. Freedom is a dummy variable taking values 1 if the answer is yes, and 0 if otherwise. Since the dependent variable has binary outcomes, the logit regression model is used to estimate the equation. The equation is modelled as follows:

$$W_i^* = Z_i^* \delta^* + v_i^*$$

W_i^* is a latent dependent variable that shows the choice an individual i makes among two alternatives. The observed choices are based on one's feelings of freedom. Z_i^* is a vector of explanatory variables related to informal social relations and individual access to RBR, v_i^* is an error term. The observed choice W_i is defined as:

$$W_i = \begin{cases} 1 & \text{if } w_i^* > 1 \\ 0 & \text{if } w_i^* \leq 0 \end{cases}$$

The model predicts the negative relationship between female and ability to benefit from the use of resources. Increase in age by one year is expected to be positively related with ability to benefit from the use of resources. The impacts of being a native dweller, right to use irrigated land, right to use a pasture and right to fishing on the ability to benefit from the use of resources cannot be predicted with certainty, as there is no theory or prior empirical evidence to support the arguments. Thus, we expect either positive or negative relationships between the mentioned variables and ability to benefit from the use of resources.

To explore whether gender differences are manifested across locations and cultural groups, interaction variables between informal social relations' variables and the variables that show locational (villages)/ native dwellers differences and rights to use RBR are added in the second model specifications.

5. RESULTS

5.1. DESCRIPTIVE STATISTICS

Tables 5 and 6 show descriptive statistics of the variables that are used in our models. Table 5 reveals that the total number of respondents in Mofu ward is 203 whereby 82 (40%) respondents are from Mofu village, 73 (36%) from Ihenga and 48 (24%) from Ikwambi. The mean age of respondents in all surveyed villages is 37 years. While the mean in Mofu is 38 years, the means in Ihenga and Ikwambi villages are 35 and 36 years, respectively. The mean average of the variable age square is 1,523.7 when the data from all three villages are pooled. The means age square for each village are: Mofu 1624; Ihenga 1444; and Ikwambi 1470.

Table 5: Summary of the descriptive statistics for the continuous variables

Age of respondent					
Village	Obs	Mean	Std. Dev.	Min	Max
Mofu	82	38	13	18	82
Ihenga	73	35	14	18	90
Ikwambi	48	36	13	18	79
Total	203	37	13	18	90
Age square					
Mofu	82	1.624	1.166	324	6724
Ihenga	73	1.444	1.250	324	8100
Ikwambi	48	1.470	1.114	324	6241
Total	203	1.523	1.183	324	8100

Source: Author's Survey Data, 2016

Table 6 shows the results of distribution of respondents in each village according to gender, native dwellers and access to resources in terms of rights to use RBR and ability to benefit from the use of resources. Results show that 127 (63%) out of 203 respondents in all three villages are males and only 37% are females. While 45% of respondents are females in Mofu village, 32% and 33% are females in Ihenga and Ikwambi villages, respectively. The insignificant Pearson chi-square result shows that there is no association between gender and villages.

Results on native dweller reveal that only 44% of respondents are native dwellers of Kilombero district: the rest (56%) have migrated from different parts of the country. The majority of respondents in Mofu village are native dwellers compared to respondents in Ihenga (11%) and

Ikwambi (44%). The Pearson's chi-square results are significant at less than 0.1%. This shows a strong association between being a native dweller and the village that a respondent resides in.

Table 6: Crosstabulation between villages and informal Social Relation Factors, Rights to use RBR and Ability to benefit from Resources

Variable	village	No		Yes		Total		χ^2
		Freq.	%	Freq.	%	Freq.	%	
Gender (if female)	Mofu	45	55%	37	45%	82	100%	35.1
	Ihenga	50	68%	23	32%	73	100%	
	Ikwambi	32	67%	16	33%	48	100%	
	Total	127	63%	76	37%	203	100%	
Native dweller	Mofu	22	27%	60	73%	82	100%	607.1**
	Ihenga	65	89%	8	11%	73	100%	
	Ikwambi	27	56%	21	44%	48	100%	
	Total	114	56%	89	44%	203	100%	
Right to use irrigate land	Mofu	60	73%	22	27%	82	100%	215.1**
	Ihenga	42	58%	31	42%	73	100%	
	Ikwambi	46	96%	2	4%	48	100%	
	Total	148	73%	55	27%	203	100%	
Right to Fish	Mofu	59	72%	23	28%	82	100%	209.3**
	Ihenga	63	86%	10	14%	73	100%	
	Ikwambi	23	48%	25	52%	48	100%	
	Total	145	71%	58	29%	203	100%	
Right to Pasture	Mofu	80	98%	2	2%	82	100%	589.7**
	Ihenga	40	55%	33	45%	73	100%	
	Ikwambi	47	98%	1	2%	48	100%	
	Total	167	82%	36	18%	203	100%	
Ability to benefit from the use of resources	Mofu	17	21%	65	79%	82	100%	12,523**
	Ihenga	34	47%	39	53%	73	100%	
	Ikwambi	13	27%	35	73%	48	100%	
	Total	64	32%	139	68%	203	100%	

Notes: Freq. = frequency; χ^2 = Pearson's chi-square; ** Significant at 1% level.

Source: Author's Survey Data, 2016

Results as regards rights to use RBR show that only 27% of respondents in all three villages have rights to use irrigated land, 29% rights to fish and 18% rights to use pasture. While 42% and 27% of all respondents in Ihenga and Mofu villages, respectively have rights to use irrigated land, only 4% of all respondents in Ikwambi possess the rights. 52% of all respondents in Ikwambi have rights to fish, followed by 28% and 14% in Mofu and Ihenga villages, respectively. The

results regarding the rights to use pasture show that the majority of respondents in Ihenga possess the rights (45%) compared to only 2% in both Mofu and Ikwambi villages. The Pearson's chi-square results on the access to RBR and villages are significant at less than 0.1% level. Thus, there are strong associations between the villages that the respondent resides in and rights to use RBR.

Results regarding ability to benefit from the use of resources show that 135 (67%) respondents in all villages possess the freedom to make decisions on the use of household's produced goods. The remaining 33% do not have the ability to benefit. Further results show that while 77% and 67% of respondents in Mofu village and Ikwambi village, respectively have ability to benefit, only 55% of respondents in Ihenga have the ability. The significant Pearson's chi-square result reveals a strong association between the village that a respondent is located in and the ability to benefit from the use of resources.

5.2. RIGHTS TO USE RIVER BASIN RESOURCES

Table 7 presents the results from the probit models. The goodness-of-fit test results (LR χ^2) show the significant results for both models. These results imply that the independent variables explain the results in dependent variable better than the models with only constant terms.

Results of model 1 specifications show how the informal social relation factors affect rights to use RBR. For each additional year of age, individuals are 2.4% more likely to have rights to fish. The results are significant at less than 1% level. The negative sign of the variable age square reveals that while age is a positive determinant of the right to fish, each marginal increase in age by a year is associated with the increment which is likely to be lower by 0.01% compared to the previous change.⁵⁴ These results are statistically significant at 1% level. Age does not significantly affect rights to use irrigated farming and rights to use pasture. In addition, as predicted by the model, women are less likely to have rights to use RBR compared to men. Results show that women are 44.6% less likely to have rights to fish compared to men. Results are statistically significant at less than 1% level.

⁵⁴ By taking the first derivative of the estimated equation, the exact point at which the impact of age on the rights to fish starts to diminish is 46 years of age. Thus, with respect to the variable right to fish, a person is considered to be old when he/ she is at the age of 46 years and above.

It was revealed during FGD that in Ndamba's norms, fishing is a male activity. Cultural norms prohibit women from practicing fishing as a livelihood activity. Because of norms, women are not even allowed to visit fishing areas/ camps (mtoni) and thus most of them have never been to the fishing areas. They can only catch fish for food in the streams/ ponds close to their houses during the rainy seasons. An old Ndamba's woman in Mofu village said:

“Us women from Ndamba's cultural group do not know anything about the rivers. We do not even know the places that the fishing camps are located as we have never been there. We only know the road that takes people to the camps but our traditions do not allow us to go there. For example we heard that in the Kibasila dam, there are frogs that breastfeed, however we have never been there to experience that incidence, ourselves.”

Women are considered too weak to fight crocodiles that are found in the big rivers. A male respondent in Signal village added: *“It is too risky for women to do fishing because most of the fishing activities take place during night time.”* While there are women from town areas who visit the fishing camps to conduct business such as selling fruit (ripe bananas) and warm cooked meals, married local women complained about this behaviour. Expressing her dissatisfaction, a woman in Ikwambi village said: *“Town's women go to fishing camps not only for business purposes but also to seduce our men. Once our spouses (husbands) meet these women, they never come back to the villages with money for the households”.* Some men mentioned that it is a curse for women to visit fishing camps. There is a belief in Ndamba's community that the presence of women in fishing areas results in misfortunes like the disappearance of fish. They believe that, nowadays, there is not enough fish in the rivers because of the presence of women at the fishing camps.

Findings from the regression analysis highlight that women are 21.5% less likely to have rights to use pasture in comparison with men. These results were also confirmed during the FGD. In pastoralist communities, all cattle belong to men, mostly to the heads of households. Sukuma's traditions do not allow women to hold assets such as cattle and land, and for that reason Sukuma women do not use their earnings to buy cattle, as they automatically become property of the men. As to married women, they do not use their money to buy cattle, as they fear that men will either sell them or use them to pay the bride price to acquire more wives. Young unmarried women mentioned that even if they buy a goat or a cow, they could never be allowed to take them to their husbands once they get married. A young woman said: *“If I use my money to buy a goat, the goat will automatically belong to my father. I will never be allowed to take cattle with*

me to my husband on the day that I get married. Everybody expects a girl to own cows or goats through her husband."

Results on native dweller show that the native dwellers of the Kilombero district are 19.8% more likely to have access to fishing than the non-native dwellers. In addition, regarding rights to use pasture, as expected by the model, non-native dwellers are 20% less likely to have rights compared to native dwellers. These findings probably reflect the fact that non-native dwellers, who are agro-pastoralists, do not practice fishing as a livelihood activity.

Results on the locational differences show that residents from Ihenga are 26.3% more likely to have rights to use pasture as compared to people in Mofu. Furthermore, residents from Ikwambi are 23.4% less likely to have rights to use irrigated land and 24% more likely to have rights to fishing as compared to people in Mofu village. The descriptive statistics also displayed similar results, i.e. that the majority of people in Ihenga are agro-pastoralist, and majority in Ikwambi are engaged in fishing.

The study also ought to explore if some groups of people are stuck into the middle of different forms of social identities which may create more oppressions in the rights to use resources. The results on the interaction of variables are not significant which implies that this is not the case in our study setting.

Table 7: Rights to use RBR: overview of findings

	Right to use irrigated land				Right to fish				Right to use pasture			
	model 1		model 2		model 1		model 2		model 1		model 2	
	Coeff.	dy/dx	Coeff.	dy/dx	Coeff.	dy/dx	Coeff.	dy/dx	Coeff.	dy/dx	Coeff.	dy/dx
Informal Social Relations												
Age	0.011	0.003	-0.005	-0.001	0.113	0.024**	0.146	0.030**	0.000	0.000	0.053	0.008
Age Square	-0.000	-0.000	-0.000	-0.000	-0.001	-0.000**	-0.002	-0.000**	0.000	0.000	-0.000	-0.000
Gender (If Female = 1)	-0.375	-0.109	-1.416	-0.397	-2.110	-0.446**	-3.888	-0.812	-1.630	-0.215**	-6.245	-10.175
Native (If Native Dweller = 1)	-0.025	-0.007	-1.293	-0.362	0.938	0.198**	1.242	0.259	-1.518	-0.201**	-0.994	-0.162
Village (Reference category = Mofu village)												
Ihenga	0.370	0.1333	-1.038	-0.291	-0.201	-0.042	0.802	0.168	1.612	0.263**	1.809	0.295
Ikwambi	-1.164	-0.238**	-0.836	-0.234	0.999	0.241	1.087	0.227	-0.492	-0.029	1.917	0.312
Interactions between variables												
Female* Age			0.010	0.003			-0.058	-0.012			0.044	0.007
Native* Age			0.025	0.007			-0.009	-0.002			-0.015	-0.002
Native*Female			0.918	0.257			3.918	0.818			Omitted	
Age*Ihenga			0.034	0.010			-0.030	-0.006			-0.006	-0.001
Age*Ikwambi			-0.027	-0.007			0.004	0.001			-0.069	-0.011
Female*Ihenga			0.286	0.080			1.218	0.254			2.791	0.455
Female*ikwambi			0.950	0.266			Omitted				Omitted	
Probit regression												
Number of observations	203		203		203		187		203		158	
LR χ^2	28.98**		35.72**		92.10**		92.44**		93.08**		76.57**	

Notes: There are three dependent variables namely right to use irrigated land, right to fish and right to use pasture. All dependent variables are dummies, taking values of 1 if the specific right is possessed and 0 if otherwise. For each dependent variable, the second model specification (model 2) adds to model 1 the interactions of independent variables. All models are estimated using probit regression. Coefficients (Coeff.) contains the maximum likelihood estimates of the independent variable. The columns with dy/ dx contains the average marginal effect of the independent variable, whose computation is based on the average of the individuals' marginal effects. LR χ^2 is the value of a likelihood-ratio chi-square for the test of the null hypothesis that all of the coefficients associated with independent variables are simultaneously equal to zero (Long & Freese, 2003, p. 76). ** Significant at 1% level; * Significant at 5% level.

Source: Stata output/Own estimation.

5.3. ABILITY TO BENEFIT FROM THE RIVER BASIN RESOURCES

Table 8 presents the results regarding the ability to benefit from the use of resources measured as the freedom to make decisions on the use of the goods that an individual has produced. The goodness-of-fit tests show statistically significant results (see LR χ^2 results in the last row of table 6). The independent variables in our models explain the dependent variables better than the models with only the constant terms.

As predicted by the model, results show that the likelihood to benefit from the use of resources increases with the increase in age. Odds ratio in model 1 shows that for each additional year, individuals are more likely to have ability to benefit from resources by a factor of 1.375. Furthermore, the variable age square indicates that with each increase in a year of age, the increment of the likelihood of ability to benefit from resources is lower than the previous one by a factor of 0.997.⁵⁵ Results on gender show that the odds for women to benefit from the use of resources is lower by a factor of 0.043 compared to men. All results are statistically significant at less than 0.1% level. The analysis with respect to the cultural differences (in model 1) shows that people who are native dwellers of Kilombero district (versus non-native dwellers) are 23 times more likely to benefit.

Interestingly, model 2, which includes interaction variables, reveals that the impact gender on ability to benefit is not homogeneous across all women's groups. While results from model 1 show that women are less likely to benefit from the use of resources, results on the interaction between native and female show that women who are also native dwellers are 30 times more likely to benefit compared to the women who are non-native dwellers. These results were also confirmed in FGDs. Apart from women in the native Ndamba community, a majority of women admit either involving the husbands or making decisions jointly with their husband. Women in the Sukuma community must involve their husbands whenever they want to sell their crops, even crops that were produced by the women themselves. In some households, failure to involve the husband might even result in a divorce. After selling the crops, some men tend to control their wives' expenditures. Young unmarried Sukuma women cannot use the household's produced goods, even if they were involved in producing the crops, and they depend on their mothers to provide them with basic needs. As regards the young boys, both married and

⁵⁵ By taking the first derivative of the estimated equation, the exact point at which the impact of age on the ability to benefit from resources starts to diminish is 63 years of age. Thus, with respect to the variable the ability to benefit from resources, a person is considered to be old when he/ she is at age of 63 years and above.

unmarried, they depend on their parents' decisions if they live in their parents' houses. In Sukuma traditions, young men do not leave their parents' houses immediately after getting married but only when they have their own areas to cultivate. Thus at pastoralist households, people cultivate together and the male head of household is the one who make decisions on behalf of everybody.

On the other hand, women who are native dwellers of Kilombero have more decision-making power compared to other cultural groups. The group of female spouses who are native dwellers boasted that men could not control the uses of the goods that they themselves produced. In some households of Ndamba's communities, women cultivate household plots, but at the same time they cultivate their own personal fields. These women are free to use the crops of their private farms without interference from men. For the goods that were produced collectively with their spouse, they make decisions together. In some households, the couples distribute the goods evenly between husband and wife: thereafter, everyone decides how to use his/ her share of goods. However, the story is different for the young married women in the Ndamba community. In the early stages of the marriage, young women must ask the husband for permission to cultivate their own fields. A young Ndamba married woman said: *"Even though we do farming activities together, after harvesting, the husband (head of household) becomes the owner of the crops. He is the one who decides whether to sell or not."* A husband may allow his wife to have a separate field to grow vegetables, but not paddy rice. Nevertheless, as these marriages grow older, the women generally become more independent and start to cultivate and sell their own paddy rice. For the young unmarried women and men, the norms of native dwellers of Kilombero do not deny young women and men the rights to cultivate their own farms or to sell the goods they have produced. However, they are supposed to leave some of the crops for the household's consumption.

Further analysis reveals that the impact of gender on ability to benefit differ according to villages. These differences can be associated to differences in cultural norms because the villages comprise of people who share similar ethnic backgrounds. The interaction variable between village and female show that women in Ihenga are 30 times more likely to benefit compared to women in Mofu village. Results for the interactions between Ikwambi village and social identities variables are not significant.

Table 8: Ability to benefit from the use of RBR: Overview of findings

Variables	Model 1		Model 2	
	Odds Ratio	z	Odds Ratio	z
Informal Social Relations				
Age	1,375**	3.69	1,437**	3.18
Age square	0,997**	-2.74	0,997*	-2.25
Gender (if female = 1)	0,043**	-5.05	0,003*	-2.07
Rights to use RBR				
If right to use Irrigated land = 1	0,895	-0.22	18,638	1.55
If right to Fish = 1	0,822	-0.29	90,658	1.67
If right to use Pasture = 1	2,945	1.59	18,674*	2.03
If a native dweller				
If native dweller = 1	23,023**	4.90	0,048	-1.14
Village (Reference category = Mofu village)				
Ihenga	0,608	-0.78	0,004	-1.76
Ikwambi	0,703	-0.56	0,194	-0.59
Interactions (Native)				
Female* Age			0,983	-0.23
Native* Age			1,145	1.67
Native* Female			30,974*	2.21
Interactions (Village)				
Age* Ihenga			1,097	1.10
Age* Ikwambi			0,973	-0.36
Female* Ihenga			30,529*	1.92
Female* Ikwambi			13,134	1.46
Interactions (Rights to use RBR)				
Irrigated land* Age			0,895	-1.78
Fishery* Age			0,880	-1.61
Pasture* Age			0,935	-1.45
Irrigated land* Female			1,119	0.09
Fishery* Female			0,106	-1.14
Pasture* Female			0,325	-0.49
Logistic regression	Model 1		Model 2	
Number of observations	203		203	
LR χ^2	118.84**		139.63**	

Notes: The second model specification (model 2) adds to model 1 the interactions of independent variables. Dependent Variable is Ability to benefit from the use of resources (cf. ability to benefit). Ability to benefit is a dummy variable taking values 1 if a person is free to use what he/she has produced to achieve personal goals in life, and 0 if otherwise. Odds ratio shows the factor change in odds of a person's ability to benefit for a unit increase in an independent variable. Z score are reported to show the directions of changes of the independent variables. A 'z' coefficient is the z-score for test of $\beta = 0$. LR χ^2 is the value of a likelihood-ratio chi-square for the test of the null hypothesis that all of the coefficients associated with independent variables are simultaneously equal to zero (Long & Freese, 2003, p. 76). ** Significant at 1% level; * Significant at 5% level.

Source: Stata output/Own estimation

FGD results concur with the findings by showing that cultural norms are important determinant for the way people live in their societies. Ihenga is rather a homogeneous village, where most of people who reside there are non-native dwellers of Kilombero. During FGD, women, who are native dwellers, appear to have more decision-making power compared to women from other cultural groups. As regards Ihenga, FGD and survey findings differ. During FGD, some participants in Ihenga village insisted that the decisions are taken jointly, while other participants challenged them by saying that in Sukuma traditions only the husband (the head of household) takes decisions on whether to consume or to sell. However, it was also observed during FGD that not all women seem to comply with the norms, as some women reported that they silently resist these norms. One of the participants said, “When I want to buy my own things such as new dresses, I need to seek advice and sometimes permission from my husband”. She continued by saying that:

“As a woman, sometimes you have to use your brain to be able to buy new things. For example, I may buy a new dress and give it to a friend to wear it for the first time. Then the friend return the dress to me after washing it so it does not look new to the husband. By doing that, my husband may not complain that I have squandered the money by buying unnecessary stuffs”.

Such statements somehow imply that women find their own ways to benefit, silently, without being accused of violating the norms. Young unmarried Sukuma women cannot use the household’s produced goods, even if they were involved in producing the crops, and they depend on their mother to provide them with basic needs. As to the young boys, both married and unmarried, they depend on their parent’s decisions if they live in their parents’ houses. In Sukuma traditions, young men do not leave their parent’s houses immediately after getting married but only when they have their own areas to cultivate. Thus in pastoralist households, people cultivate together and the male head of the household is the one who makes decisions on behalf of everybody. Finally, Mofu village hosts people from different cultural backgrounds who have migrated to look for farming land. Thus, due to the multicultural nature of the villages, there might be different results regarding ability to benefit.

Results on all variables that measure the rights to use RBR, i.e. rights to use irrigated land, rights to fish and rights to use pasture are not statistically significant in model 1. When the interaction variables are added in model 2, the variable that measure individual possession of right to use pasture becomes significant. Results reveal that people who possess such kind of right are 18 times more likely to have the ability to benefit compared to those without the rights. Results

from FGD show that pastoralism is traditionally men's jobs. In pastoralist communities, men are the ones who own cattle and land and thus the ones with the decision-making power on the uses of cattle. Apart from their other traditional uses such as payment of bride price, cattle can be easily converted to cash. Women's involvement in the income generating activities that are considered men's jobs tend to increase their decision-making power in the households.

Results on the right to fish and rights to use irrigated land are not statistically significant. Results from FGD show that like pastoralism, irrigation and fishing are traditionally men's jobs. While irrigation provides food security in the households, it is an activity that is mostly used for income generation. Most women are involved in irrigation activities through helping their partners/ households in planting, weeding and harvesting. Men provide the capital to invest in irrigation such as buying/ renting of water pumps and other inputs, and they also control the harvests.

While fishing is a traditional men's activity according to Ndamba's norms, it was admitted during the FGD that men in fishing communities do make decisions together with their spouses. Men spend most of their time in fishing camps; sometimes they stay there for months. Thus, they automatically leave all household issues to be dealt with by the women. Men in the fishing communities said themselves that although men are considered household heads, women are empowered to make decisions. One respondent added that: *"Our women are stubborn: we cannot do a thing without involving them"*. Furthermore, in fishing communities, some married men do not practice agriculture activities at all. In such a situation, a wife (mother) becomes the main custodian of food, while the husband (father) is expected to bring home income from fishing. The wife is the one who keeps all the stock of food: she is considered as the family's treasurer and a storekeeper. Thus, the woman is free to use/ sell agricultural products without interference from the husband. The wife is the one who makes sure that there is enough food for the family, i.e. not all food is sold. One of the men said, *"Since we were born, men were socialized to fish and women were socialized to take care of the families and to conduct agriculture activities. We men spend many days at the fishing areas, thus so many decisions regarding the households are left in the hands of wives (women)"*. While these women seem to benefit from the use of resources (even without having access to the fishing activity itself, see findings right hand side Table 1), some of them say that their control over the income from fishing is limited because they are not sure of the amounts men earn from the activity. Women complain that men's income from fishing is mostly spent at the fishing camps with businesswomen from town areas who visit the fishing camps. Thus, only a small amount is left for household consumption. One of the woman said that:

“Today, you are lucky to find our men in the village because it is raining, otherwise you wouldn’t find them here. They spend many days at fishing camps but they bring very little income home for household uses. Sometimes they even do not bring money home, they just send some few fishes for food purpose. Since we are not allowed to go to fishing camps, we cannot control the money they earn and their expenditures. Sometimes we think a lot of money is spent with the women from town areas who visit the fishing camps. We always see the town women, who are carried on the motorcycles, passing our village to the fishing camps”.

6. DISCUSSION

This paper has used empirical data to study gender and access to RBR among native and non-native dwellers living along the Kilombero River in Tanzania. The study found that, the practical rights on the use of RBR are highly gendered, which also results in a gendered distribution of labour, both among native and non-native dwellers of Kilombero. In addition to the negative impact of gender on the practical rights to use RBR, the findings also show the negative impact of gender on the ability to benefit from the use of resources. Thus, these findings confirm the first and second hypotheses. Findings on the people's rights to use pasture confirm the third hypothesis that the rights that men and women have on the use RBR translates unequivocally into their ability to benefit from the use of RBR.

The commonality in findings between the native and non-native dwellers of Kilombero is that the norms from both cultural groups deny women access to RBR, especially when access to RBR leads to income-generating activities such as fishing and traditional pastoralism.⁵⁶ These activities are traditionally termed as men's jobs. This implies that women's livelihoods in Ndamba and Sukuma communities might be affected, not necessarily because resources are unavailable, but due to cultural norms that restrict women from using certain RBR (see also Leach et al., 1999). These findings are in line with the studies by Kavishe (1991), Omari (1989) and Skoog (1993), which have also shown the gender distribution in activities conducted by people in rural areas of Tanzania. In our study, women seem to have access to RBR that are used in the production of crops. This means that while men are engaged in multiple activities that use RBR, women are responsible for the production of goods that do not reach the markets i.e. goods that are, directly, consumed by the households.

While women are found to be less likely to benefit from the use of resources, the gender impact on the ability to benefit differs between different groups of women i.e. between native and non-native dwellers and between women of different villages. Among the native dwellers, old women (married and non-married) have the ability to benefit from the use of RBR, while young married women do not have that ability. In line with intersectionality theories, the findings imply that women cannot be considered a homogeneous group not even in a single community.

⁵⁶ The importance of cattle to Sukuma was also explained in the study by Drangert (1993) who said that purchasing of cattle is the most preferable investment in Sukuma community because cattle reproduce themselves and they can easily be converted to cash.

Furthermore, norms that allow native women of Kilombero to own and cultivate their own land separately from the household plots give them some sort of power to make decisions on the use of the goods they produce, compared to women in pastoralist communities. These findings are in line with the study by Lyimo-Macha and Mdoe (2002), which show that in areas of the Morogoro Rural district where women inherit land, women have more decision-making power as regards the use of land compared to women in other cultural groups. Because of norms that deny ownership of land, women in pastoralist communities depend on men for production and for consumption decisions. From these findings, the conclusion can be drawn that women cannot be conceived of as a homogeneous group; they differ between and within cultural groups.

In addition, while it was predicted by our hypothesis that women would be less likely to benefit from the use of RBR due to norms that deny them access to important resources, this hypothesis was not confirmed amongst the women who are native dwellers of Kilombero. In the fishing communities of Kilombero, qualitative results show that women in a fishing community are more likely to benefit from the use of RBR. Although the norms deny them the right to fish, women in fishing communities seem to accrue benefits from fishing activities by being the major custodian of their households' food reserves and income. From these findings, another conclusion can be drawn that both men and women are heterogeneous groups in the communities examined. The fact that women are denied the right to use important livelihood resources does not necessarily mean they are not able to benefit from the use of those resources. Furthermore, in Pastoralist communities, our qualitative data also suggest that women have been able to find ways to benefit, sometimes by silently resisting the norms. This evidence is not unique to the Tanzanian context. Abdullah and Sondra (1982), (as cited in Agarwal, 1997), earlier reported similar evidence for South Asia where women, silently, resist the norms that restrict their access to important resources by for example letting their neighbours raise cattle for them so that husbands do not know that they possess those kinds of goods.

7. CONCLUSION AND POLICY IMPLICATIONS

Rights based on physical ownership and rights to use resources and structural-based mechanisms in terms of access to labour and other means of production have received more attention in empirical studies of access to resources than studies on the ability to benefit from the use of resources. This study contributes to the literature of access to resources by showing that it is important to distinguish between rights to use resources and the ability to benefit from resources.

Our study shows that gender differences embedded in norms affect rights to use RBR and the ability to benefit from the use of resources. In general, women are found to have no advantages in terms of the rights to use RBR and the benefits from the use of resources, though the latter does not apply to all women. The study recommends the policies which are targeted to improve women's livelihoods in rural areas should take into account not only the types of activities that women (and men) engage in, but also whether or not they are able to use the goods they produce to improve their livelihood situations. While people with rights to use RBR may seem to be in an advantageous position because they are able to engage in economic activities, their livelihoods may be disadvantaged as much as those without the rights, if they are not allowed to use the goods they produce to achieve their goals in life.

The study shows that access in terms of the ability to benefit from the use of resources differs between communities, and within the single community. These findings show the importance of further distinguishing between groups of respondents; women and men are heterogeneous groups that differ according to age and cultural background. Thus, we emphasize that future studies apply intersectionality approaches when studying access to resources. Subsequently, we recommend the policies that aim to improve women's (and men's) livelihoods should consider not only differences between the communities but also within the communities.

Findings reveal that old women in the fishing community under study are able to benefit from the use of RBR despite their lack of fishing rights. As a result, one may argue that the village women have more power to access resources because they live in their own local clan. Agro-pastoralist women and other women who are not native to Kilombero district might have lost their power after migrating to new areas with different practices of cultural norms. These findings deserve comparative study of livelihoods of agro-pastoralists who stay in their own local clan and those who have migrated to other areas. Furthermore, since the study has not established the reasons for some of the pastoralist women's actions of, silently, resisting the

norms, future researchers can conduct in-depth studies of these covert behaviours to come up with more solid recommendations on inequalities in access to resources.

Power relations between men and women are the result of practices that have been inherited from previous generations, though they change as society and its priorities change. The changes in these practices may be brought about by factors such as changes in climate, socio-economic conditions, population, technology and migration, (Leach et al., 1999). Because of these changes, individuals have found themselves changing their strategies and adopting new ways of livings which also result in changes in their norms and rules. Thus, the study recommends future research to pay attention to the process or social trajectory through which power relations between women and men change over time.

This paper has studied quantitatively the intersections of informal social relations variables. Other studies may consider studying qualitatively the manner in which these inequalities in access to RBR occur. This can be done by, for example, attending to the voices of people who are locked into the intersections of those social categories. The behaviour that may be perceived by outsiders as a discriminative norm may not necessarily be perceived as such by the community, even by those who seemed to be affected by those conducts.

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CHAPTER 6

INTERSECTIONALITY AND AN INTRA-HOUSEHOLD ANALYSIS OF THE FREEDOM TO MAKE DECISIONS ON THE USE OF HOUSEHOLD PRODUCTS: EVIDENCE FROM MEATU DISTRICT

Note: A slightly adapted version of chapter 6 was published in the International Journal of Women Studies (August issue).

1. INTRODUCTION

1.1. ABILITY TO BENEFIT FROM GOODS PRODUCED BY A HOUSEHOLD

This chapter uses intra-household and intersectionality theories to analyse the relative benefit that household members gain from the use of goods produced by households living along the Simiyu River in Tanzania's Meatu District. The analysis from this chapter addresses the second relation of the analytical framework presented in Chapter 2.

In non-monetized rural economies, productive resources such as land for farming are owned at the household level, with different household members using these resources in the production of goods (Sadoulet & De Janvry, 1995; Singh et al., 1986). Some of the goods produced are consumed within the household and some are sold at the market to provide capital to meet other household needs. While household members engage in production to meet household consumption needs, they are also expected to use goods produced in the household to meet their personal needs and improve their livelihood. Literature on access to resources shows that being able to produce does not guarantee an improvement in livelihood if people do not have the ability to accrue benefits from the goods produced (Agard et al., 2007; Leach et al., 1999; Sen, 1999). Leach et al. (1999) have related this to "capabilities," that is, "what people can do or be" with the goods they have produced (p. 233). This means that people engage in economic activities to achieve personal goals in their lives, and by doing so, they are able to achieve personal wellbeing. From this vantage point, what is important to individuals is not only what they have produced, but also whether they are able (they have some freedom) to use the goods to achieve the kind of life they value. In line with Agard et al. (2007) and Sen (1999), this study defines *the ability to benefit from goods produced by a household* as the "freedom to act." This includes freedom to make individual or collective decisions on the use of the goods produced by a household for the improvement of livelihoods.

The literature has shown that socially constructed practices determine the freedom that different members have in the use of goods produced by a household (Leach et al., 1999). Differences in identity based on social constructs such as gender, age and marital status create diverse power relations, which further affect the use of the goods produced. Some people may take advantage of their power to gain more benefits from the goods than others (L. de Haan & Zoomers, 2005). Similarly, the livelihood outcomes of those people without power might be affected due to socially constructed practices that deny them the right to make decisions on the use of goods produced by a household. Furthermore, some people may experience greater

disadvantages than others with respect to the right to make decisions because they fall into more than one socially marginalized group. Studies on intersectionality have shown that some people experience the impact of social marginalization associated with socially constructed practices differently to others, as they are positioned at the intersection of different social identities (Crenshaw, 1989).

On the basis of the above, this study argues that in rural areas of Tanzania, the livelihoods of some household members are negatively affected because they do not benefit equally from the goods that are produced within the household. Thus, the aim of this paper is to undertake an intra-household analysis of the ability to benefit from the goods produced by a household in rural Tanzania. In particular, the study applies intra-household and intersectionality theories to understand how different social identity categories interact to affect different household members' ability to benefit from the use of resources.

The paper adds to the literature which uses intra-household analysis of livelihood outcomes by collecting data from different male and female household members, including husband and wives, heads of households and adult children. The paper also moves beyond the analysis that considers social identities as separate categories, each with different outcomes for people's livelihoods, and attempts to grasp the impact of intersectionality on these social identity categories. The findings from this paper will be of use in providing recommendations for policy that targets groups of people who experience various and combined forms of marginalization in society.

The paper is structured as follows. The following two sections, Sections 1.2 and 1.3, present the literature on intra-household differences and intersectionality respectively. Section 2 provides a brief summary of our study area and is followed by our data collection methods and analysis in Section 3. The study findings are presented and discussed in Sections 4 and 5 respectively, while Section 6 presents our conclusions and policy recommendations.

1.2. INTRA-HOUSEHOLD DIFFERENCES IN ACCESS TO RESOURCES

In unitary approaches or common preferences models (Haddad et al., 1997), the household is considered a single unit of analysis. These models show that in rural economies most of the household members are related (Ellis, 1998), either through immediate family or kinship. Productive resources such as land are owned at the household level and all household members employ their labour power in the production of goods that are collectively used by all household members. Furthermore, all household members are assumed to share the same level of welfare maximization, and have the same preferences regarding the production and consumption of goods (Becker, 1965; Sadoulet & De Janvry, 1995; Singh et al., 1986). One household member, often the head of the household, retains the right to decide how the resources are allocated to different livelihood activities and how the goods produced are used. Thus, the head of the household's preferences are assumed to be those that maximize the welfare of all household members (Anderson, Reynolds, & Gugerty, 2017).

While the common preferences models are useful in explaining how responsibilities and goods are distributed within households, they have been criticized for assuming that household members share preferences in relation to the production and consumption of goods and thus the same level of welfare maximization (Alderman et al., 1995; C. R. Doss, 1996). Some studies have revealed that husbands and wives differ in their expenditure patterns. For example, Appleton (1991) and Hoddinott and Haddad (1995) found that an increase in the income of wives was associated with an increase in household expenditure on food and a reduction in the expenditure on alcohol and cigarettes. In addition, a recent study by Kazianga and Wahhaj (2017) found that in extended families in rural Burkina Faso, household members did not share the same preferences with regard to the production and consumption decisions.

Studies and models that explicitly focus on intra-household differences were developed as an alternative to unitary/common preference models. In studies of intra-household differences, the existence of different preferences among different household members is explicitly taken into account. Consequently, intra-household resource allocation refers to the processes in which different productive resources are allocated to household members, as well as the resulting outcomes of those processes (see e.g., Haddad et al., 1997). These allocation processes may result in inequities in access to resources between household members and in the way the benefits of resources are used. Unequal power relations and conflicts of interest often characterize the decision-making process regarding the use of household resources and

products (Evans, Mariwah, & Antwi, 2015). These processes are affected by “socially constructed” factors, in terms of norms and practices, rather than “biological” reasons (Agarwal, 1997, p. 2). Socially constructed practices create intra-household differences in aspects such as access to and control over resources, time and task allocation, and decision-making processes within households.

In rural areas of developing countries, the freedom to make decisions on the use of the goods produced tend to follow cultural norms and certain historical paths. Cultural norms result in differences in social identities and social status in terms of age, gender, wealth and ethnicity, and because of these norms “women and men are located at different levels of social and class hierarchies” (Khalid, Nyborg, & Khattak, 2015, p. 48). Customary systems tend to favour some groups in society, while placing other groups in disadvantageous situations. For example, empirical evidence supports the notion that the norms which deny women ownership of important resources result in women’s lack of decision-making power on the production and consumption of goods. A study by Lyimo-Macha and Mdoe (2002) showed that lack of female ownership is among the reasons for women’s limited decision-making power in relation to the allocation of land to different economic activities in Tanzania. In Ghana, women’s participation in cash-crop production is significantly influenced by the control they have over household productive resources and household income (Zakaria, 2017). A recent study in Malawi revealed that women’s control over land is an important determinant of an equitable division of income within the household (Djurfeldt, Hillbom, Mulwafu, Mvula, & Djurfeldt, 2018).

This study assumes cultural norms affect an individual’s ability to benefit from the use of household resources in rural Tanzania. The ability to benefit may differ between household members due to differences in social status, in terms of age, gender and marital status, which are embedded in norms. Such social status may be used as a source of power in a society: those who hold such power may use it to gain more benefits from resources than others (Cleaver et al., 2013). As Dawsey and Bookwalter (2016) pointed out: “If the power to allocate resources lies with household members that maximize their own utility, improving the economic situation of the household may not benefit all of its members” (p. 940).

Based on the arguments above, the following questions about the ability to benefit from the use of resources will be considered: (i) Are there intra-household differences in the ability to benefit from the use of goods produced by a household among households in rural areas of Tanzania? and (ii) Are there differences in the ability to benefit from the use of goods produced by a

household that are associated with differences in the social identity factors of age, gender and marital status?

1.3. INTERSECTIONALITY THEORIES

Studies on intersectionality have their roots in legal studies, in which the impact of law is analysed based on gender, race and class. Crenshaw (1989) showed that in the US legal system, cases of gender and race are treated as separate social categories, while in real situations the two categories interact to produce greater oppression for an Afro-American woman compared to people in other groups. According to Crenshaw (1989), Afro-American women may be subjected to a double act of marginalization by being black (in ethnicity) and female (gender) compared to either an Afro-American man, who is marginalized only because of his ethnicity, or a white woman, who is marginalized only because of her gender. Hill Collins (1990) supported this theory by further arguing that it is vital to empower minority women by showing them how the interlocking of gender and race affects their livelihoods differently to other social groups. According to (Hill Collins, 1990), Afro-American women do not fit into either category because, historically, gender inequality usually concerns oppression faced by majority women and racism is reserved for the oppression faced by minority men. In summary, intersectionality theory postulates that people in marginalized social groups are not homogeneous, as some simultaneously belong to various marginalized social groups. Social category factors are interconnected with each other, resulting in either disadvantage or privilege to specific groups of people (Crenshaw, 1989).

Since its inception, intersectionality theory has been applied to different issues in different fields of study, such as labour market inequality, migration and health outcomes (Ogawa, 2017). Furthermore, while the theory was originally used to study how interactions between gender, ethnicity (race) and class affect Afro-American women, it was further extended to include other social identity variables, such as disability, religion and sexuality (Turner, 2011). For example, a recent study by Tariq and Syed (2017) showed that in the UK, Muslim women who were South Asian were more likely to experience challenges and discrimination in employment than Muslim women from other ethnic groups and Muslim men in general. The study also showed that because the norms of Muslim societies in South Asia expect women to take care of children, Muslim women are not only discriminated against by the ethnic majority in the UK, but also by ethnic minority men from a similar background.

Most work on intersectionality theories have studied the combination of social categories across different ethnicity/race groups. In our study, we argue that it is also important to study other differences in groups of people with similar ethnic backgrounds. Valdez (2016), for example, pointed out that: “Different family members within an ethnic household may experience unequal opportunities” (p. 1619). Differences in power relations rooted in socially constructed practices determine access to resources among members of households. Valdez (2016) also argued that, in some cases, these intra-ethnic group differences might exceed the differences that are found between ethnic groups. Based on the arguments above, we will also consider the following question: (iii) Do age, gender and marital status intersect to affect the ability of people from different groups to benefit from the use of resources?

2. STUDY AREA

The study is based on a cross-sectional survey among households residing along the Simiyu River in Meatu District in Tanzania's Simiyu Region. The Simiyu River is located in the lake zone in the northern part of Tanzania, and is one of six rivers that drain into Lake Victoria on Tanzania's side.⁵⁷ People who reside along the river are predominantly Sukuma in ethnicity and are known as Wasukuma. The Sukuma ethnic group are mainly agro-pastoralists who practice farming and traditional pastoralism.

Four villages from two wards were included in the survey. These villages are Kisesa and Ntobo from Kisesa ward, and Mwabuma and Mwashata from Mwabuma ward. Kisesa village is located along the main road from the Meatu District capital to the town of Bariadi (the Simiyu Region capital), while the other three villages are situated in more remote areas of the district. This means Kisesa village is more like a small town compared to the other villages.

⁵⁷ Lake Victoria is the largest lake in Africa, shared by three countries, Tanzania, Kenya and Uganda, and is the source of the longest river in Africa, the Nile.

3. METHODOLOGY

3.1. DATA AND DATA SOURCES

Data and findings were triangulated by combining survey data with qualitative information collected through focus group discussions (FGDs). Prior to our survey, a pilot study was conducted to obtain information on the livelihoods of people in the study areas. This included information on the nature of the economic activities pursued. During the pilot study, interviews were conducted with government officials at the district council, ward and village levels. Information from the pilot study contributed to the confirmation of some of the explanatory variables, while some other information was useful for the elaboration of the survey.

Our survey, which was our main data collection tool, included 165 households and 424 respondents. The distribution of households according to villages are 44 and 36 for Kisesa and Ntobo villages, respectively, and 43 and 42 for Mwabuma and Mwashata villages, respectively.⁵⁸ At the household level, we collected intra-household data, that is, data from husbands (household head or spouse), wives (household head or spouse) and children (biological children who were 18 years or older).

After the survey, focus group discussions were conducted with the aim of obtaining information to supplement the quantitative data analysis. Some members of the surveyed households were brought together in groups and involved in discussions on the main topic of our study: decision-making on the use of goods that were produced by the household. In each village surveyed, four groups of heads, spouses, and male and female members of households were formed from the households surveyed. Each of the four groups consisted of 10–15 members from 10–15 households.⁵⁹

The data collection process encountered several limitations. Some of the household members were not at home during the daytime as the survey was conducted during farming season. We solved this problem by revisiting those respondents at other times. Communication was also a challenge during the data collection, as some of the respondents, especially the women, only

⁵⁸ For a detailed discussion on the data collection process during the survey, including sampling procedures and selection of respondents, see section 5.1 in chapter 3.

⁵⁹ For a detailed discussion on the data collection process during FGD, see section 6.1 in chapter 3.

spoke Sukuma, which is their ethnic language. We addressed this problem by hiring translators to facilitate communication between researchers and respondents.

3.2. DATA ANALYSIS

To measure the ability to benefit from the goods produced by a household, respondents were asked the following question: *“Could you indicate whether you agree with the following statement: “I am free (have the freedom) to use what I have produced to achieve my personal goals in life.”* This means that we consider ability to benefit to be achieved if people perceive themselves to be free to make decisions on the use of the goods they have produced. Ability to benefit is dummy variable taking values of 1 if the answer is yes, and 0 if otherwise. Since the dependent variable has binary outcomes, the logit regression model is used to estimate the equation. The equation is modelled as follows:

$$W_i^* = Z_i^* \delta^* + v_i^*$$

W_i^* is a latent dependent variable that shows the choice an individual i makes between two alternatives. The observed choices are based on one’s feelings of freedom. Z_i^* is a vector of explanatory variables related to social identity factors and individual relationship with the household’s head, v_i^* is an error term. The observed choice W_i is defined as:

$$W_i = \begin{cases} 1 & \text{if } w_i^* > 1 \\ 0 & \text{if } w_i^* \leq 0 \end{cases}$$

Three variables, age, gender and marital status, were used to measure social identity factors. Drawing on our pilot study, these factors were considered the main drivers of differences in social status and thus as providing some form of power to some members in our specific study setting. First, an assumption was made that older people may have accumulated more resources than those who were younger and thus the former would be more likely to have authority with respect to decision-making about the goods that were produced by the household. Thus, an increase in age by one year was expected to be positively related to ability to benefit from the goods produced by a household. However, the study also assumed that the impact of age on

the dependent variable might not be similar for all ages.⁶⁰ Thus, another variable, age square, was added to capture the change in slope as the number of years (age) increases. Since the impact of age on the dependent variable was assumed to be positive, age square was expected to have a negative sign, as its coefficient (given by the first derivative) would be less than one.

Second, gender was a dummy variable, taking the value of 1 if a person was female and 0 if male. Since the majority of women in rural societies of Africa are denied access to important productive resources (see e.g., Ellis, 2000; Agarwal, 1997), the model assumed a negative relationship between female and ability to benefit from the goods produced by a household.

Third, the variable for marital status took the value of 1 if a person was not married and 0 if a person was married. While there are several studies examining the impact of marital status on access to productive resources,⁶¹ we could not find any relevant literature on the relationship between marital status and decision-making power concerning the use of goods produced by a household. Thus, due to a lack of existing empirical evidence, the study assumed that both a positive and a negative relationship might be found between the variables that measure marital status and ability to benefit from the goods produced by a household.

To assess the importance of a specific relationship to the household head, the variable relationship with the head of household was used. Relationship with the head of household took values from 1 to 4, where 1 was a reference variable referring to the head of the household, 2 = spouse, 3 = child and other members of households (relative). Since socially constructed factors, in terms of norms and practices, largely determine how decisions are made within households in a particular society (Agarwal, 1997:2), we cannot determine with certainty the nature of the relationships between the variables that measure a specific relationship to the household head and ability to benefit from the goods produced by a household in our study area. Thus, the study expected that both a negative and positive relationship might be found between the variables.

⁶⁰ The impact of *AGEE* on the dependent variable may not be linear across all ages: a linear model would mean that each additional year of age would lead to a constant change in the ability to benefit from household products, irrespective of the respondent being young or old.

⁶¹ The literature has found that, in rural areas, the access that women have to important productive resources such as land is limited and often mediated through their male partners (Agarwal, 1997; Ellis, 2000). In the case of divorce or the death of a husband, most women are denied the access that they previously had (Agarwal, 1997). Other studies have shown that women who are not married can easily purchase their own productive resources (Englert, 2008) and thus they can easily gain decision-making power on the use of goods that are produced from those resources.

4. RESULTS

4.1. DESCRIPTIVE RESULTS

Table 9, 10 and 11 present descriptive statistics of the variables that are used in our models. Table 9 presents results on respondent's relationship with the head of household. Results show the total number of respondents in the study area is 424. (165) 39% out of 424 respondents are heads of households, 120 (28%) are spouses, 79 (19%) are children and 60 (14%) are relatives (other members) to the households' heads.

Table 9: Distribution of respondents according to the specific relationship with the head of household

Relationship with the head of household	Frequency	%
Head of household	165	39%
spouse	120	28%
child	79	19%
others	60	14%
Total	424	100%

Source: Author's Survey Data, 2016

Table 10: Distribution of Respondents According to Gender, Marital Status and Ability to benefit from the goods produced by a household

Variable	HHREL	No		Yes		Total	
		Frequency	%	Frequency	%	Frequency	%
Gender (if female)	head	113	68%	52	32%	165	100%
	spouse	4	3%	116	97%	120	100%
	child	38	48%	41	52%	79	100%
	others	15	25%	45	75%	60	100%
	Total	170	40%	254	60%	424	100%
Marital Status (if married)	head	27	16%	138	84%	165	100%
	spouse	5	4%	115	96%	120	100%
	child	18	23%	61	77%	79	100%
	others	19	32%	41	68%	60	100%
	Total	69	16%	355	84%	424	100%
Ability to benefit	head	11	7%	154	93%	165	100%
	spouse	86	72%	34	28%	120	100%
	child	52	66%	27	34%	79	100%
	others	36	60%	24	40%	60	100%
	Total	185	44%	239	56%	424	100%

Source: Author's Survey Data, 2016

Table 10 presents results on the cross tabulation between individuals' relationships with the heads of households and gender, marital Status and the ability to benefit from the goods produced by a household. Cross tabulations between gender and member's relationship with the head of household reveal that apart from the heads of households, majority of other groups of respondents are women. Results show that 68% of all heads of households are men and 97% of all spouses are women. In addition, while 52% of all children are women, 75% of all respondents with other relationships with heads of household are also women.

The data on marital status show that 355 (84%) respondents are married and 69 (16%) are not. Further results reveal that while 84% of all heads of households are married, 77% and 68% of all children and other members of households, respectively, are also married. 4% of spouses identified themselves as non-married due to loss of their partners.

The results as regards the ability to benefit from the goods produced by a household show that 239 (56%) out of 424 respondents possess the freedom to make decisions on the use of goods they have produced and 185 (44%) respondents do not. Distribution of respondents according to their relationships with the head of household reveal that while majority, 93%, of the heads of households have the ability to benefit from the goods produced by a household, only 28% of the spouses possess the ability. Further results show that 34% and 40% of children and other members, respectively, have the ability to benefit from the goods produced by a household.

Table 11: Ability to benefit from the goods produced by a household According to Gender and Marital Status

		Ability to Benefit from the use of Resources						χ^2
		No		Yes		Total		
		Freq.	%	Freq.	%	Freq.	%	
Gender	Male	32	19%	138	81%	170	100%	71.01**
	Female	153	60%	101	40%	254	100%	
	Total	185	44%	239	56%	424	100%	
Marital status	Married	150	42%	205	58%	355	100%	1.69
	Not Married	35	51%	34	49%	69	100%	
	Total	185	44%	239	56%	424	100%	

Note: Freq. = frequency; χ^2 = Pearson's chi-square; ** Significant at 1% level.

Source: Author's Survey Data, 2016

The study also ought to know the distribution of the ability to benefit from the goods produced by a household according to gender and marital status. Table 11 shows that the ability to benefit differs between women and men. While 81% of all men said to have ability to benefit, only 40% of all female respondents admitted to benefit. The Pearson chi-square results are significant at less than 0.01% level which points at a strong association between the two variables.

Results on Marital status show that 205 (58%) out of 355 married individuals have the ability to benefit from the goods produced by a household. Of the 69 unmarried persons, 49% (34) said to have the ability to benefit from the goods produced by a household. The insignificant chi-square results indicate that there is a no association between marital status and the ability to benefit.

4.2. RESULTS FROM THE MODEL

4.2.1. INTRA-HOUSEHOLD DIFFERENCES

Table 10 presents the results based on our models. The likelihood ratio (LR χ^2) chi-square tests for both models are significant at less than 1%. This shows that the independent variables, if taken together, have effect on the dependent variable.

The findings related to different positions in the household, which correspond to our first research question, show that spouses, children and other members of households (relatives) are less likely to benefit from the goods produced by a household compared to the heads of households. The odds ratios in model 1 show that while spouses are less likely to benefit by a factor of 0.059, children and relatives are less likely to benefit compared to heads of households by the factors of 0.87 and 0.146, respectively. All results are statistically significant at less than 0.1%.

These results were confirmed during the FGD, when respondents revealed that the decision on the production and use of household goods is reserved for the male head of the household (husband). Sometimes the household head does not even engage in a process of negotiation with the spouse or other household members. The spouse's responsibility is to take care of the family (children and husband). Some participants stated that there are some households where both husband and wife make the decisions, while in others the decisions were made collectively, including the spouse and adult children. A mother or children might make a decision to sell crops

or livestock, depending on the household's needs at the time. However, some other participants insisted that there are very few families where all household members sit together and make decisions as it is against Sukuma norms. One man in Ntobo village said: *"Allowing a wife to make the decisions on the use of crops is perceived as a man being submissive to a woman."* The men were proud of their role, and argued that the culture of allowing only one person to be a decision-maker in the household is one of the reasons that Sukuma people do not have food shortages in their households.

In households where the husband was deceased or lived far away, the wife played the household head function to some extent. In some households, after selling crops, the father would ask other household members about their needs. He would then give them money to satisfy those needs and keep the rest of the money for himself. If the money appeared to be squandered by the father, the children could not argue with him. As one young man in Mwashata village said: *"asking your father how he used the money is regarded as disrespecting your parent. Some parents may threaten the children that they will curse them because of disrespect. Children keep quiet, as they fear being cursed by the parent."*

The results from the FGD also showed that in Sukuma traditions, it is common to find all children (married and unmarried) living at their parents' house. Both males and females marry at young ages (soon after completing their basic education). While a married daughter is expected to move into her husband's household, a married son is expected to stay at home with his wife until they have at least two children, and/or when they find their own land to cultivate. Thus, children cultivate the household land and all household members normally rely on the harvested goods. As the head of the household is considered the owner of the resources that are used in production, he is also the decision-maker regarding the goods that are produced from those resources. Male children mentioned that they always take their orders from the household head, who is the main initiator of all household production activities. Children only offer an opinion to the household heads on the use of crops or money from their sale, and do not make decisions. Even when a male child has produced the goods himself with his wife, he must still seek advice from the household head. As one male child in Mwabuma village said:

"I cannot make decisions on the use of the goods I produce without involving my old man. Even if a cow is mine, if I live at my parent's household I cannot make a decision to sell it without involving the old man. If I convince my father about the reason for selling it, then I will be able to sell it."

4.2.2. SOCIAL IDENTITY FACTORS

With regard to our second research question, the findings show that social status, in terms of gender and marital status of the respondents were significant determinants of the ability to benefit from the goods produced by a household. In model 1, the results for the *FEMALE* variable revealed that women appear to be less likely to benefit by the odds of 0.298 compared to men. In addition, people who are not married are less likely to benefit compared to married people by the odds of 0.464.

Findings from the FGD confirmed these results by revealing that among the Sukuma ethnic community the right to make production and consumption decisions is reserved for the men. Only men have the right to own productive resources such as land and cattle, and thus they make decisions on how to use those resources and how to use goods that are produced from those resources. Women are expected to engage in production by using the resources that are owned by their spouses, or by using family household resources if they are not married. Men involve the women either by asking them for their advice or by informing them; however, women do not make decisions. As one married woman (spouse) in Kisesa village said:

“Even if we cultivate together, all of the crops produced are owned by the head of the household. Sometimes I pray to God that my husband will spare some of the crops for household consumption because he may decide to sell everything. Even when I decide to sell some of the crops myself so that I can buy my own stuff, he takes the money away from me.”

During the discussions, it became apparent that women earn income from the production of crops that are considered female crops; for example, nuts, beans and sweet potatoes. However, most women are not free to use the money from these crops without a man’s involvement. As one woman in Kisesa village said: *“When a husband sees you have money, he takes it away from you. Sometimes he sells the female crop and keeps the money for himself. If you need some money to buy something for yourself, such as a new dress, you have to ask your husband for money.”* One thing that women in all of the villages had in common is related to the nature of the benefits they chose to receive from the sale of their crops. They all reported that when they sell female crops they never use the money to invest in assets such as land or cattle because those assets traditionally belong to men. As one woman in Mwabuma village said: *“Even when a woman pays to buy a piece of land, the husband would be the one to do all the negotiations*

and the documents would be in his name.” Women from all of the villages also said that they would never use their money to buy cattle because men can use cattle as the bride price to marry more wives. Thus, for women, they would rather use their money to buy things such as chairs, tables, beds and mattresses and not invest in assets used in production. While women thus use female crops as the major source of income to support their personal needs, it was observed during the FGD that men have started to produce female crops because of an increase in the market price of some of them. This has left women with few crops under their control. The variables that measure age were not statistically significant.

4.2.3. INTERSECTIONALITY

The final research question seeks to assess whether social identity factors intersect to affect the ability of people from different groups to benefit from the goods produced by a household. While the results on impacts of social identities factors show that women and unmarried people are less likely to benefit from the goods produced by a household (see model 1), the coefficients in model 2 change directions from negative to positive signs i.e. both women and people who are not married appear to be more likely to benefit. However, further analysis in model 2 reveals that the results differ according to ages. For each additional increase in age by a year, unmarried respondents are less likely to benefit from resources in comparison with married ones by a factor of 0.73. Results on gender shows that, an increase in age by a year is more likely to decrease women’s ability to benefit by a factor of 0.782 compared to men’s respondents. Furthermore, women who are not married are less likely to benefit compared to married women by a factor of 0.002.

While the decision-making power on the use of household’s goods is largely reserved for men, during FGD, we also found different results for widows and divorced women. In this respect, one man in Ntobo village mentioned: *“Traditionally, a woman does not possess land and cattle: she owns home utensils like cooking pots and her clothes. If she gets divorced or becomes a widow and returns home, she cannot make decisions about the use of food that is grown at home.”* Widows who do not leave the household after the death of their spouse were reported to have decision-making power over the use of goods. However, widows who were too old to make decisions depended on their children to make them.

As regards to the age of respondents, in most households, the heads (parents) are the oldest members of the households and are expected to make decisions on households' goods. In addition, divorces are not common practices in Sukuma cultural norms because polygamy is also a normal practice. In the case of parents being too old to make decisions, the eldest son usually assumes the responsibility of household head. However, the eldest son will still seek advice from his parents on the use of goods. Giving an example from his household, one man in Ntobo village emphasized: *"My father is too old to participate in production. However, he still makes all the plans about how to use products, for example, either to use cattle as the bride price for a son who wants to get married or sell them to get money to extend production."*

Among the Sukuma ethnic community, older people are important members of the extended family. They are considered wise and thus their decisions always seem to prevail. It is a norm to respect elders (parents and/or grandparents) within the household and within the community in general. It is expected that younger generations will respect the advice of their elders, even when the latter are no longer involved in the production of goods. As one man in Mwabuma village said in this respect: *"although I have my own household, I always inform my parents regarding production and investment decisions. Even if they are old, they still have authority over whatever I do, and I always consider their advice to be the best."*

An analysis of the interaction between gender and spouse was not carried out because the majority of spouses (97%) were females. However, the results of the analysis of the interaction between spouse and age are not statistically significant. Findings from the FGD showed that decisions concerning the use of goods produced by a household were largely made by men, regardless of the age of the spouse. However, the situations may differ when husbands have more than one wife. A man who possesses a large piece of land, for example, may decide to allocate a piece of land to each of his wives. Thus, every woman then cultivates her own field with her children, although the husband remains the custodian of the crops. The women complained that dividing the piece of land equally among all wives usually leaves the wife with many children (usually the eldest wife) in a difficult situation. As one woman from Kisesa explained:

"The eldest wife usually has a large number of children to take care of. If this woman is given the same sized parcel of land as those who married recently, she will not be able to produce enough food for herself and the children. In such a situation, the eldest wife's livelihood is seriously affected compared to the other wives."

In a situation of polygamy, where all wives cultivate the same household farm, the husband may be the one who makes decisions on behalf of everybody in the household, or he may delegate that right to one of his wives. One woman in Ntobo village complained about this: *"I am mistreated by my husband and his other wife. My husband decides everything with his youngest wife and leaves me with no decisions on the use of the goods we produce."*

This study also attempted to determine whether there were differences between old and young children and between married and unmarried children in the ability to benefit from goods produced by a household. The results for interactions between child and age, and relatives and age are not statistically significant. Furthermore, unmarried children were less likely to benefit compared to married children by a factor of 0.024. Relatives (other members of household) who are not married are also less likely to benefit compare to relatives who are married by a factor of 0.007. As mentioned in the previous section, in Sukuma tradition, all children (married and unmarried) live at their parents' house with their wives and children. The parents make all of the decisions on the use of goods produced in the household. However, when the household has a large amount of land, a married son of older age may be given a piece of land to cultivate with his wife.

For the female children and relatives, the survey findings are not statistically significant. However, during the FGD, we found that young unmarried women who cultivate their own crops are not free to sell their crops without seeking permission from their parents, and they particularly talk to their mothers about this. In most cases, these young women cultivate female crops with their mothers, and their mothers become custodians of the crops. The mothers may thus control the crops and ensure that the money is used to buy clothes and other things their daughters require. In Kisesa village, while some unmarried female children said that they had the freedom to make decisions on the use of the "female" crops they produced, the married females (daughters-in-law to the heads of the household) said that their husbands controlled the "female" goods they produced. As one woman in Kisesa village woman said: *"When the husband sees I have the money, he takes it away from me. He even sells the crops that I harvest. If I want to buy something, I have to ask for the money from him. Sometimes he gives me less than I asked for."* Thus, the situation is much worse if a woman lives with her parents-in-law, as she does not even have a say over the women's crops. Mothers-in-law are expected to be custodians of all the women's crops. In fact, young married women seem to have more difficult lives (in terms of access to money) than those who are not married. As one young married woman who lived with her parents-in-law said: *"I cannot make decisions on the use of the goods*

that I produce with other members of the household because my mother-in-law and my husband decide everything on my behalf.”

Table 12: Ability to benefit from the use of RBR: Overview of findings

	Model 1		Model 2	
	Odds Ratio	z	Odds Ratio	z
Informal Social Relations				
Age	1.09	1.60	1.210	1.62
Age square	1.00	-0.79	1.001	0.96
Gender (if female = 1)	0.298**	-3.57	207.35*	1.99
Marital status (if not Married = 1)	0.464**	-2.07	70645.6**	3.48
Relationship with the head of household				
Spouse	0.059**	-6.74	0.018*	-2.38
Child	0.087**	-5.24	0.047	-1.45
Relative	0.146**	-4.12	0.051	-1.39
Interactions:				
Age* Not Married			0.730**	-2.98
Age* Female			0.782**	-2.68
Female* Not Married			0.002*	-2.16
Age* Spouse			1.037	1.00
Age* Child			0.996	-0.05
Age* Relative			1.080	1.48
Female* Child			2.496	0.75
Female* Relative			0.341	-0.59
Child* Not Married			0.024*	-2.28
Relative* Not Married			0.007**	-2.68
Logistic regression	Model 1		Model 2	
Number of observations	424		424	
LR χ^2	216.95**		249.09**	

Note: Model 1 presents results that do not include the interaction variables. Model 2 includes the effects of the interaction variables. Dependent Variable is ability to benefit from the goods produced by a household (cf. ability to benefit). Ability to benefit is a dummy variable taking values 1 if a person is free to use what he/she has produced to achieve personal goals in life, and 0 if otherwise. Odds ratio shows the factor change in odds of a person's ability to benefit for a unit increase in an independent variable. Z score are reported to show the directions of changes of the independent variables. A 'z' coefficient is the z-score for test of $\beta = 0$. LR χ^2 is the value of a likelihood-ratio chi-square for the test of the null hypothesis that all of the coefficients associated with independent variables are simultaneously equal to zero (Long & Freese, 2003, p. 76). ** Significant at 1% level; * Significant at 5% level.

Source: Stata output/Own estimation

5. DISCUSSION

This study analysed intra-household differences in the ability to benefit from the use of goods produced by households living along the Simiyu River in Meatu District in Tanzania. Although men and women have different needs and goals in their lives, our findings showed that the decision-making power concerning the use of the goods produced is largely reserved for men. Furthermore, while different household members were involved in the production of goods, the findings show that the right to make decisions on the use of the goods that are produced within a household are reserved for the household head. Other household members (spouses, children and relatives) depended on the household head for decisions on the use of goods. These findings are in line with two studies conducted by (Holmboe-Ottesen & Wandel, 1991a, 1991b), both in Tanzania, who reported conflict between household members in relation to the question of what to produce and how to use income that is earned from selling the goods produced. While men preferred the cultivation of cash crops to food crops for the purpose of income generation, women were more interested in the cultivation of food crops to provide the household with sufficient food. Income that is earned from cash crops is largely accrued by the men. Another reason why women did not favour the production of cash crops was that they had to expend more of their own labour on the crops, while being less likely to benefit from the income earned from them. Cultivation of cash crops also leaves women with little time for the production of food crops.

These findings imply that the livelihoods of women (and other members of households) are likely to be affected when men (or heads of households) make more individualistic decisions, or decisions that do not improve the livelihoods of women (and other members of the household). Other studies have shown that, unlike women who tend to focus on the needs of entire households, men's expenditure, including in Tanzania, tends to be more individualistic, with a focus on satisfying their own needs (Feldman, 1989). This may negatively influence the livelihoods of women and other members of households, since household members might have differing preferences on the consumption of goods they produce.

Our findings confirm intersectionality theories that claim that some people face discrimination on multiple levels because they belong to multiple marginal social identity groups. Our findings revealed that older unmarried people and older women were less likely to have the freedom to make decisions on the use of goods produced by a household. The findings imply that being old and unmarried and/ or old and female is a disadvantage in the Sukuma community. These

people were denied rights to make decisions on the use of the goods they produced. These are some of the consequences of the socially constructed practices that divide people into different classes in a social hierarchy.

In addition, our finding that unmarried women are less likely to benefit from the goods that are produced by a household implies that being female and unmarried (as compared to female and married) is even more disadvantageous in Sukuma community. The norms in Sukuma society that deny women the right to own land and other important resources such as cattle put unmarried women in a more disadvantageous situation compared to married women. Women can only access land through marriage, mainly by cultivating their husband's land. Women who live in their parents or another sibling's household may face more discrimination in relation to the use of household goods, as the goods they produce are considered culturally not to belong to them. In line with previous research (see also Van Aelst & Holvoet, 2016), being married is more important to women compared to men in rural areas of Tanzania. If women had the right to own important productive resources, they would not have to depend on marriage to engage in activities that improve their livelihoods.

6. CONCLUSION AND POLICY IMPLICATIONS

This study analysed intra-household differences in the ability to benefit from the use of goods produced by households living along the Simiyu River in Meatu District in Tanzania. In general, the study found that both women and men play major but different roles in the production of crops, whether cash or food crops. While both women and men are involved in the production of cash crops, women also assume substantial responsibilities for providing their households with food by engaging in subsistence farming of vegetables and legumes that are directly consumed by the household. Despite their important roles, women often have subordinate positions in decisions regarding the use of goods that have high market value. Men are held responsible and have control of cash crops and other goods that are sold in the markets, while women only have control over crops that are not sold in the markets.

The findings confirm intra-household theories by showing that members of households do not have equal decision-making powers on the use of goods that are produced by the household. Heads of households appear to have more decision-making power than other household members. This is not necessarily a bad practice, especially if the needs of other household members are well considered in the head of household's decisions. However, this is difficult to achieve in reality, as people have different goals in their lives. It is practically impossible for women to have any decision-making power because of the social norms that restrict their role. Social norms also affect the decision-making power of male household members who do not own productive resources. In the Sukuma community, most household members do not own resources to produce their own goods: the majority of household members only have recourse to their own labour power. Furthermore, in line with intersectionality theories, this study found that some people face discrimination at multiple levels as they are assigned multiple marginal social identities. Because of their gender, marital status and age, older unmarried women were found to be positioned at the intersection of multiple social identities and their related effects: their multiple social identities put them in a more disadvantageous position in relation to the use of goods that were produced by the household.

The study findings revealed that it is important to study people's agency in terms of their abilities to gain benefits from the activities they engage in. This is particularly important in rural areas, where production and consumption decisions occur at the household level. It is therefore recommended that governmental organizations, such as the Tanzania Social Security Action Funds (TASAF), as well as other non-governmental organizations which are working on the

improvement of rural people's livelihoods, consider reaching out to different groups by focusing on different levels of marginalization faced by people due to their social identity.

This study adds to the intra-household literature by quantitatively analysing the impact of social differences on the ability of different household members to benefit from the use of goods produced by a household. In addition, the study included data that categorized household members into different groups according to their relationships with the household head. We caution that the validity of the findings may be limited to the study areas and to other communities with similar cultural backgrounds (Sukuma communities) in other districts of Tanzania. The generalization of these findings to other areas with different cultures might be impossible. However, we recommend that further research uses a larger sample that includes different ethnic groups to explore the importance of cultural and other regional differences in more depth, especially in regard to the ability to benefit from goods produced by a household.

The study also adds to the intersectionality literature by showing how different social identities related to age, gender and marital status interact to bring about different outcomes for different people in relation to their ability to benefit from goods produced by the household. The findings revealed that people being older and female and/ or female and unmarried face a disadvantage in terms of the freedom to make decisions on the use of household goods. It is highly likely that there are further differences related to different types of marriage (monogamy/polygamy) or different categories of unmarried women (widow/divorcee/never married). Sukuma is one of a number of ethnic groups in Tanzania that practice polygamy, which may bring even more social differences into play compared to monogamous marriages. Further study should explore whether the position of women in a marriage, being the first, older or younger wife, for example, leads to differences in the freedom to make decisions on the use of household goods. This may not only be due to cultural factors but also to a husband's preferences.

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CHAPTER 7

ACCESS TO SOCIAL AND FINANCIAL RESOURCES AND CHOICES OF DEVELOPMENT STRATEGIES: IMPLICATIONS FOR THE DEVELOPMENT OF CONSERVATION STRATEGIES

1. INTRODUCTION

This chapter engages with the debate in the literature on access to livelihood resources and livelihood diversification to show how differences in people's access to resources result in differences in the choices of development strategies⁶² (DST) that people pursue for the enhancement of their livelihoods in river basin areas of Tanzania. It also links the findings with policy initiatives related to the conservation of natural resources.

Agriculture provides an important means of living for many people residing in Sub-Saharan Africa (SSA). In particular, agriculture employs more than 50% of the labour force in the region, with 80% of that figure engaged in subsistence farming (OECD, 2016). Despite the importance of agriculture to the livelihoods of people in SSA, agricultural productivity remains low compared to developing countries of Asia and South America (OECD, 2016) (OECD, 2016). This is also the case in Tanzania, where more than 80% of the population live in rural areas, most of them depending on subsistence agriculture (UNDP, 2015). Like many other countries in SSA, farming alone does not offer sufficient means of survival in Tanzania since agricultural productivity is lower than in other sectors in the economy (UNDP, 2015; URT, 2010b). Farming is labour intensive, depending largely on rain and family labour: even the use of technological inputs is low compared to many countries in SSA (UNDP, 2015).

Low agricultural productivity together with absence of non-farm employment create little incentive for those in the rural sector to remain in agriculture. The literature shows that people in rural areas react to the challenge of low agricultural productivity by engaging in more than one DST i.e. by being multi-occupational (see for example Ellis, 2000; Jamal & Weeks, 1988). Thus, they depend on a diverse portfolio of activities and income sources, e.g. farm and off-farm, as sources of income (A. de Haan, Brock, & Coulibaly, 2002; Ellis, 2000). In the literature, this is what is referred to as livelihood diversification,⁶³ whereby households as a whole or some household member(s) opt to engage in multiple DST to improve their livelihood situations. By reviewing empirical literatures on diversification to non-farm livelihood strategies, Y. Gautam

⁶² In this paper, livelihood strategies (activities) that are pursued with the aim of improving wellbeing are referred to as development strategies. Development strategies that are pursued in rural areas include both farming and off-farm employments (Ellis, 2000).

⁶³ In this study, rural people are considered to invest their resources in multiple activities as a strategy to improve their livelihood conditions (see also Barrett, Reardon, & Webb, 2001).

and Andersen (2016) showed that in developing countries, diversification from farming to non-farm activities has several advantages including the increase of household's income, enhancement of food security, the increase of agricultural production etc. (p. 240). Even in developed countries, where agricultural activities are subject to minimal risks, rural farmers diversify for the purpose of improving their financial returns (Barbieri & Mahoney, 2009). In river basin areas, diversification from seasonal farming entails the use of different natural resources, including River Basin resources (RBR).⁶⁴ As a result, many people living around these areas depend on RBR-based and non-RBR based DST. These DST can be either environmentally friendly or non-environmentally friendly depending on the impact they have on the conditions of RBR (see also DFID, 1999). Environmentally friendly DST are those that make less/ sustainable use of RBR and thus they are assumed to lead to RBR conservation.

Despite the importance of diversification to rural livelihoods, empirical evidence shows that livelihood diversification is not an option that is easily available to all groups of people in a society because some people lack access to livelihood resources that are required to engage in other DST apart from subsistence farming (see for example studies by Y. Gautam & Andersen, 2016; Ibrahim & Mazancova, 2014). Diversification away from farming requires investment in financial resources as start-up capital and also social capital (Fang, Fan, Shen, & Song, 2014; Y. Gautam & Andersen, 2016). For instance, in Tanzania, in areas where government and other development projects have established irrigation schemes to increase agriculture outputs, people with access to financial resources in terms of credits and/ or cash are the ones who can afford the expensive inputs that are required in irrigated farming (Patnaik, 1990). While rich people can easily afford credits from different financial institutions, people with access to social capital in terms of being members of formal/ informal groups of savings and borrowings can access capital through borrowing from the groups. Furthermore, studies by Maliyamkono and Bagachwa (1990) and Mshote (2016) have also reported that, during off-farm seasons, men in Tanzania tend to migrate to urban/ semi urban areas where they are involved in informal business and irrigated farming. A study by Mshote (2016) shows that the brewing of local alcohol in the Iringa region of Tanzania is considered as the DST which is easily available to people with access to social capital. She pointed out that "Households involved in the local beer brewing industry could be categorized into two groups' i.e. local beer brewers and sellers. Trading of local beer was done normally on credit arrangement commonly known as "jumua", whereas

⁶⁴ These RBR include water, land for irrigation and for seasonal farming, fishery, forests to mention the few.

trust and established social capital were most binding. Under this arrangement, a local brewer supplies the local beer to sellers on credit, and the buyer is tied with consent to repay her/his debt after selling. Therefore social relations and trust between a brewer and seller(s) was crucial" (Mshote, 2016, p. 90).

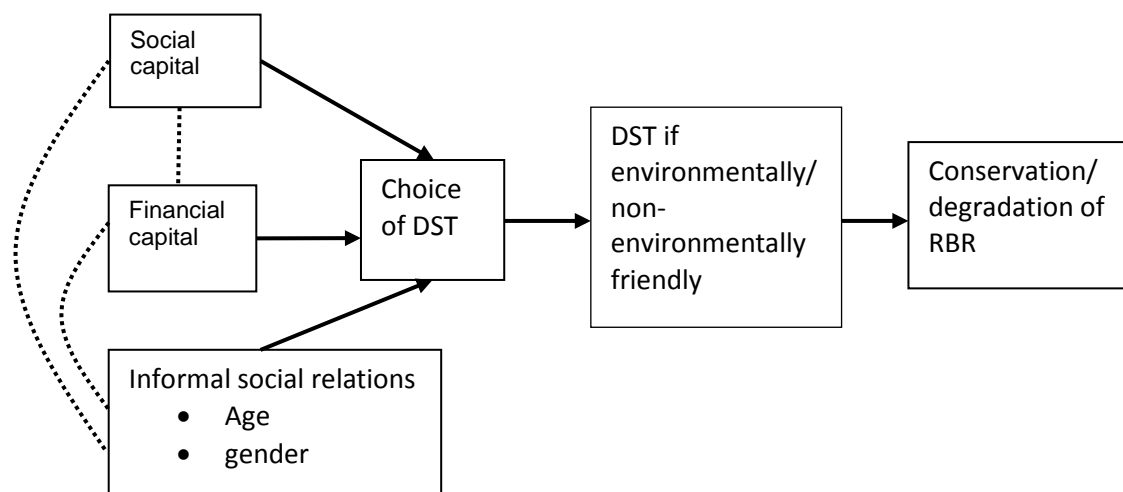
On the basis of the above arguments, this paper argues that access to social and financial capital is important for people to diversify their activities and to become multi-professional. In particular, access to these forms of capital are important for people to choose activities that make less/ sustainable use of natural resources, which have further implications on the sustainability of RBR. From this vantage point, this study aims to investigate the impact of social and financial capital on the choice of DST among people who live along river basin areas of Tanzania. Moreover, the study also links the choice of DST and its implications for the sustainability of RBR. In doing this, the research adds to the literature on livelihood analysis by showing how an individual's possession of social and financial resources impact on their occupational choices in rural areas where the majority of people depend on subsistence farming. The study will be of interest for developing policies/ strategies targeted at creating more opportunities for livelihood enhancements in rural communities but also for establishing natural resources based conservation strategies.

The rest of the paper is organized as follows: Section 2 presents a conceptual framework for the analysis. A brief explanation of the study areas is presented in section 3, followed by models and variables in section 4. Section 5 present the results and discussion of findings. The conclusion and policy recommendations are presented in section 6.

2. CONCEPTUAL FRAMEWORK

The concept of livelihood framework (Ellis, 2003) is used as the main framework of the study. The livelihood framework (LF) is designed to explain how development strategies (natural resources -based and non- natural resources -based activities) that are pursued by rural people depend on their access to resources, and how these strategies have implications on the status of RBR. DST that are pursued in river basin areas can be either environmentally friendly or non-environmentally friendly depending on the impact they have on the conditions of RBR. Environmentally friendly DST are those that make less/ sustainable use of RBR and thus are assumed to lead to RBR conservation.

Figure 4: Relationships between social and financial capitals and sustainability of RBR



Key:

- >** Relationship analyzed in research
- - - - -** Correlation among variables

Source: Adopted and Modified from Ellis (2003) and DFID (1999)

While the LF entails that different assets (physical, natural, human, social and financial capitals) are combined to pursue different DST, our conceptual framework focuses only on the role of social and financial capital in the choices of DST. For the sake of simplicity, this paper draws upon studies of unitary approaches or common preferences models (Becker, 1965; Singh et al., 1986)

and assumes that in rural areas of Tanzania, resources that are directly used in the production of goods i.e. physical and natural resources, are owned at household level rather than by an individual person. All households members use physical and natural resources for the production of goods. A further assumption is that social and financial capital are typically not directly employed in the production of goods, and they are normally owned by an individual member of the household. For instance, an individual household member can have access to financial capital in terms of credits, or can possess social capital in terms of being a member of youth or women's group. Thus, from our conceptual framework (figure 3), people are assumed to use their social and financial capital to engage in different DST.⁶⁵

In the literature, the assessment of social capital occurs at both individual level, the level that is also used in this study, and on a wider scale such as the community and/ or organization level (Schuurman, 2003; Titeca & Vervisch, 2008; Woolcock & Narayan, 2000). At the community level, social capital depends on factors such as political, legal and institutional environments to which the community/ organization belongs, but at the individual level social capital is mostly taken as an independent variable (Woolcock & Narayan, 2000). At the individual level, social capital includes the relationships that are based on norms, kinships and/ trust that a person has accumulated in her/ his lifetime, and the possession of a lasting network that can enable her/ him to gain social support and resources. To gain access to social capital, people in local communities usually form social clubs or associations and act collectively with the aim of managing risk and vulnerabilities (Woolcock & Narayan, 2000).

Financial capital is an important resource for people to venture into new DST or to finance an already existing DST. The literature shows that investment in non-farm DST requires access to financial capital in terms of cash or access to credits (Ibrahim & Mazancova, 2014). In addition, shifting from subsistence farming to large-scale farming also requires the use of sophisticated machines and other agricultural inputs such as fertilizers, pesticides, etc., all of which require access to financial resources (Chandio, Jiang, Wei, Rehman, & Liu, 2017). One of the sources of access to financial resources is through borrowing from financial intermediaries. However, most rural people access credits through borrowing from informal social groups, and through borrowing from people (Girabi, Mwakaje, & Elishadai, 2013). In this case, the study assumes that

⁶⁵ The study ought to include the variable 'education level' to measure human capital. However, the variable was not included because there was little variation on this variable with the majority of respondents (84%) only possessing primary level of education.

there could be a correlation between the variables that measure social capital and financial capital due to interdependence between them.⁶⁶

The analytical framework also shows that the choices of DST are affected by informal relation factors in terms of the age and gender of respondents. The literature shows that informal practices, grounded in norms, taboos and values, conventions, and customs, shape people's behaviour/ ways of doing things in society, including the way resources are accessed (see for example Cleaver, 2001; Leach et al., 1999; Mehta et al., 2001). Leach et al. (1999) argued that the livelihoods of some people in society might be affected because of socio cultural factors which restrict those people's engagement in certain activities. These socially constructed practices create differences in the occupational choices between different groups of people in society. According to LF, access to resources is also affected by informal social relation factors that are the products of socially constructed practices. Thus, apart from its direct influence on DST, age and gender might also have an indirect influence on DST (via access to social and financial capitals) as shown by the dotted line in figure 4.

To analyse the impact of social capital, financial capital and informal social relation factors on the choices of DST, the following two hypotheses are tested:

- i) *differences in access to social and financial capital affect people's choices of DST.*
- ii) *differences in informal relation factors in terms of age and gender affect the choices of DST.*

⁶⁶ In Tanzania, formal financial institutions do not reach the majority of rural people. A study by Lindvert, Yazdanfar, and Boter (2015) found out that people consider semi-formal capital from informal groups as the easiest way to access credits compared to loans from formal banks. Thus, an assumption is made in this study that financial capital in terms of credits are largely accessed through the informal groups of savings and borrowing. On the other hand, access to financial capital can be seen as a form of wealth, something which can enable the owner to easily access memberships in different groups.

3. STUDY AREAS AND DATA SOURCES

The study is based on a survey conducted among the households residing along Kilombero River (KR) in Kilombero district and Simiyu River (SR) in Meatu district (Tanzania) between March and June 2016. The two study areas are similar in terms of development strategies: the major development strategy in both areas is agriculture, where both seasonal and irrigated farming are practised.

Despite this similarity, the two study areas differ in locations. Kilombero is located in the Morogoro region in the eastern part of Tanzania, and Meatu is located at the lake zone in the northern part of Tanzania. The areas also differ in the types of secondary development strategies that are practised by native dwellers. While agricultural (seasonal) farming is a major development strategy in both areas, fishing and pastoral farming are considered to be the secondary development strategies in Kilombero and Meatu, respectively. Pastoral farming has recently started to be practised in Kilombero; most of the pastoral farmers are migrants from the northern part of Tanzania, including people from Meatu. In addition, irrigated farming is practised in both study areas. While vegetables, legumes and maize are irrigated in both study areas, Kilombero is famous for the irrigation of large farms of paddy rice. There are also differences in the ways the irrigation activities are conducted between the two study areas. In Meatu, irrigation activities are not formally organized by the society/ government: everybody practises it at her/his own convenience. In Kilombero, there are places where irrigation activities are well organized and the activities are conducted by the use of irrigation schemes. However, as in Meatu, there are some other places where these activities are unorganized.

In each study area, the survey covers two wards: Mofu and Signal wards in Kilombero district, and Kisesa and Mwabuma wards in Meatu district. The wards that were included in the survey were purposively selected they possess certain characteristics that cannot be found in other wards, for instance presence of multiple DST that depend/ do not depend on RBR. Villages in Kilombero are commonly formed by dwellers with similar cultural backgrounds and who practice similar development strategies. Thus to capture information on different DST, a total of 5 villages (three villages from each ward) were included in the survey in Kilombero district. These villages are Ihenga (an agro-pastoralist community), Ikwambi (a fishing community) and Mofu (a multicultural community) in Mofu ward, and Sululu (the modern irrigator's and traditional irrigator's community) and Signal (a multicultural community) in Signal ward. In Meatu district, the Simiyu River passes eight villages, which are located in three wards, namely Mwabuma, Kisesa and Mwasengela. There are no differences in the nature of economic activities practiced

in the wards. We chose four villages, two in Mwabuma ward and two in Kisesa ward based on the presence of secondary development strategies that are financed by the LVEMP project.⁶⁷ These villages are Kisesa and Ntobo from Kisesa ward, and Mwabuma and Mwashata from Mwabuma ward.

The survey covered all household members aged 18 and above who carry out different socio economic activities. A total number of 783 respondents, 359 in Kilombero district and 424 in Meatu district were reached during the survey.⁶⁸ A pre-tested questionnaire was the major tool of data collection. The survey was preceded by preliminary study visits to obtain prior information on the nature of social capital and development strategies that are pursued in the study areas. Interviews were conducted with government officials responsible for the governance of river basins and their resources. At ward level, informal discussions took place with leaders of the different groups of resource users. After the survey, focus group discussions (FGD) were conducted with the aim of obtaining information to supplement the quantitative data analysis. The FGDs were formed by some members of households who participated in survey. The main topics of discussion included access to resources in terms of access to social and financial capitals and relationships between informal social relations and access to resources, and the choices of DST.⁶⁹

⁶⁷ The Simiyu River is officially under the governance of Lake Victoria Basin Commission (LVBC). Currently, the Lake Victoria Environmental Management Project (LVEMP II), which is under the supervision of the LVBC, is implemented in the villages that lie along the river. The project deals with the conservation and protection of Simiyu river boundaries and mainly those citizens who had farms along the river are the project members.

⁶⁸ For a detailed discussion on the data collection process during the survey, including sampling procedures and selection of respondents, see section 4.1 in chapter 3.

⁶⁹ For a detailed discussion on the data collection process during FGD, see section 5.1 in chapter 3.

4. MODELS AND THE VARIABLES

In this study, DST is a function of an individual's access to non-physical resources (social, and financial capital), and informal social relations factors in terms of age and gender. Respondents were asked to rank their DST according to the order of importance in livelihoods. The first and second ranked development strategies are considered to be major DST, and the secondary DST, respectively.⁷⁰ Thus, both major DST, and the secondary DST are categorical variables, taking values of 1 if an activity chosen is seasonal farming, 2 if irrigated farming, 3 if fishing, 4 if traditional pastoralism, 5 if off-farm activities. Off-farm activities include all of the non-traditional development strategies that are pursued with the aim of increasing income, for example bee keeping, modern livestock keeping and informal trading. Due to the nature of traditional economic activities that are undertaken in our study areas, we expect people in Kilombero to depend on seasonal agriculture, fishing, irrigated agriculture and traditional pastoralism as their secondary DST. On the other hand, we expect people along SR to depend on both seasonal farming agriculture, traditional pastoralism and irrigated agriculture as their secondary DST.

Traditional pastoralism is considered as a non-environmentally friendly DST in both study areas since it involves the keeping of large numbers of cattle, which are grazed freely. Movements of such large groups of cattle cause soil and gully erosion in the areas where they pass. In addition, cattle destroy riverbanks and natural vegetation along the rivers because they normally graze along the rivers (URT, 2014). In Meatu, irrigated farming is a non-environmentally friendly DST because irrigation is conducted at the areas along/ close to the riverbanks, without any formal arrangements with the societies themselves or from the government. In some areas of Kilombero, agriculture has been transformed to a more commercial strategy due to the presence of modern and traditional irrigation schemes, which allows the conservation of RBR. Irrigation by the use of the schemes, particularly modern irrigation schemes, normally takes place in areas that are located away from the riverbanks which means that it is a more environmentally friendly activity. However, some people in Kilombero continue to practise

⁷⁰ Several studies use income variables as measures for development strategies/ household dependency on certain development strategy/ household's decision to participate in certain development strategy (see for example studies by de Janvry & Sadoulet, 2001; Fisher, 2004; Mitra & Mishra, 2011; J. K. Sesabo & Tol, 2005). All of these studies used the household as unit of analysis. In this study, where the individual member of the household is a unit of analysis, it becomes unrealistic to determine an individual income as in most of rural economies, production is done collectively by all members of households and the output from production is pooled.

irrigation that degrades RBR, for example irrigation practices that block the rivers or redirect them from their natural course and the cultivation of crops along the river banks. Fishing in Kilombero can be both an environmentally and non-environmentally friendly DST because of the practice of illegal fishing using dynamite, poisons, small nets and river blocking. However, fishing is considered as neither an environmentally nor non-environmentally friendly DST because it was not easy to collect relevant data via the questionnaire. Off-farm activities are also considered as the DST that makes less/ no use of RBR, and thus it is environmentally friendly.

The individual choice of development strategy, i.e. the major DST and the secondary DST are used as measures of development strategies. Alternative options of DST are not ranked in any particular order: they rather explain the characteristic of an individual in terms of what he/she does in life. In this case, the multinomial logit model is used to estimate the equation. The equation is modelled as in (Hill, Griffiths, & Lim, 2011, pp. 599-601).⁷¹

$$Z_{ij}^* = Y_i^* \alpha_{ij}^* + u_{ij}$$

where Z_{ij}^* shows the choice that an individual i makes among j alternatives (DST). Explanatory variables Y_i^* are identical across alternatives i.e. each one describes the development strategy that is pursued by an individual (and not the alternatives that an individual is facing). The vector of parameters to be estimated, α_{ij}^* , is specific to a certain alternative. As the dependent variable in a multinomial logit model takes the value of 1 to 5, the observed choice Z_i is defined as:

$$Z_i = \begin{cases} 1 & \text{if } Z_{i1}^* \geq Z_{ij}^* \\ 2 & \text{if } Z_{i2}^* \geq Z_{ij}^* \\ 3 & \text{if } Z_{i3}^* \geq Z_{ij}^* \\ 4 & \text{if } Z_{i4}^* \geq Z_{ij}^* \\ 5 & \text{if } Z_{i5}^* \geq Z_{ij}^* \end{cases}$$

The probability that individual i chooses alternative j , whereby $j = 1, 2 \dots 5$ becomes

$$P_{ij} = P(Z_i = j) = \frac{e^{\alpha_{ij}^* Y_i^*}}{\sum_{n=1}^j e^{\alpha_{in}^* Y_i^*}}$$

one of the reference alternatives, in our case alternative 1, and is set equal to zero to solve the identification problem and to make probability equal to one.

⁷¹ see also <http://kurt.schmidheiny.name/teaching/multinomialchoice2up.pdf>

Social capital is measured in terms of social relationships that an individual person can have through being a member of social formal or informal organizations. A group member is a dummy variable that takes the value of 1 if a person is a member of a social group and 0 if a person is not a member. The assumption is that, by being a member of groups such as resources user groups, savings and credits groups etc. people can mobilize both financial and other kinds of resources that can enable them to smoothly participate in different DST. A membership in a group is expected to increase the likelihood of an individual participating in other DST compared to seasonal farming. An individual's access to credits is used as the proxy for financial capital. Access to credit is expected to increase the likelihood of an individual participating in different non-farm DST compared to seasonal farming. Based on the conceptual framework, the variables that measure social capital and financial capital were expected to be dependent on each other. Thus, the Spearman's rank correlation test, r_s , was run to assess whether there are correlations between the variables. The test results give a Spearman's correlation coefficient of 0.3774 with significance level of 0.000. This shows a weak/ moderate positive correlation between the two variables. The correlation is rather weak in Kilombero with the coefficient of 0.34, and moderate in Meatu with the coefficient of 0.41. Since the variables are not strongly correlated, we continue with the analysis that include both variables in the model.

Two variables, age and gender are used to measure social relation factors that relate to informal social relations. These factors are considered to create differences in social status and thus some form of power to some members of the societies. Age, a continuous variable, is measured by number of years. An increase in age by one year is expected to increase the likelihood of people engaging in traditional pastoralism, fishing, irrigated farming and off farm activities versus seasonal farming as the old people are assumed to accumulate more wealth (Simoes, Crespo, & Moreira, 2016) that can be invested in these activities. However, the study assumes further that the impact of 'age' on the dependent variable may not be similar along all ages,⁷² i.e. there exists a threshold where the impact of age is reversed⁷³ and thus we expect an inverse U-shaped relationship between age and the choice of a certain DST (see also Simoes et al., 2016). Therefore, we add another variable age square to capture the change in slope as the number of

⁷² The impact of age on the dependent variable may not be linear along all ages: a linear model means that the additional year of age will lead to a constant change in access to livelihood resources regardless of whether the respondent is young or old.

⁷³ Old people are assumed not to be ready to participate in multiple DST because of their physical and mental health status. In addition, most of them are risk averse because they perceive less time to be left for them to recover their investment (Simoes et al., 2016).

years (age) increases. Since the impact of age on the dependent variable is assumed to be positive, we expect age square to have a negative sign, as its coefficient (given by the first derivative) will be less than one. Based on the conceptual framework, age was expected to indirectly affect DST through its impact on social and financial capitals. The correlation coefficients measuring the interdependence between age and membership in a group, and age and access to credit give the results of $r_s = 0.21$ and $r_s = 0.11$, respectively. The coefficients are significant at less than the 1% level which implies the presence of a weak positive correlation between the variables. Thus, only the direct impact of age on DST was included in the analysis.

The variable female is used to capture the influence of 'gendered' social relations. Female is a dummy variable taking the value of 1 if a person is woman and 0 if a man. Men are reported to have a wide range of social networks, which are also more business/ work oriented (Koellinger, Minniti, & Schade, 2013), something that is assumed to ease their journey of becoming multi-occupational. Limited access to financial resources to venture into other activities is also a barrier to women to participate in different activities as women are reported to prefer to use their own money, rather than borrowing (Carter & Shaw, 2006; Sena, Scott, & Roper, 2012). The relationships between a variable that measure gender i.e. female and different secondary DST can be positive or negative depending on the nature of development strategies. Females are less likely to practice fishing and traditional pastoralism since these DSTs are considered men's activities. On the other hand, females are more likely to practice irrigated farming and off-farm activities as they are expected to help their households in pursuing these activities (see also Warner & Campbell, 2000). The correlation test between female and membership in a group gives a Spearman's coefficient of -0.05, though the results are not significant which shows that there is no correlation between the two variables. On the other hand, the correlation between female and access to financial capital gives a coefficient of -0.08, which is significant at less than the 5% level. This indicates the presence of weak association between the variables, thus only the direct impact of female on DST was included in the analysis.

The study also tries to determine whether there are differences in results that are due to river basin (location) factors. Locational variables may capture factors such as infrastructural and market development and other institutional factors that are specific to the study area (J. K. Sesabo & Tol, 2005). Thus, to capture these effects, a dummy variable that shows river basins differences was added in the models. The variable takes the value of 1 if the basin is Kilombero and 0 if the basin is Meatu.

5. RESULTS AND DISCUSSION OF FINDINGS

This section presents the results and a discussion of the findings. Subsection 5.1 gives the descriptive results on the household members' choices of the major DST, and the secondary DST. Given that agriculture is practiced by the majority of people in rural areas and a large share of agricultural products are consumed within the households, secondary DST is an important source of living to earn income to support personal needs. Thus in addition to major DST, the secondary DST is considered a way to diversify activities to escape poverty. Subsection 5.2 shows the descriptive results on access to financial and social capital in both study areas. The last part, subsection 5.3, presents the statistical results from the model together with the results from the FGDs.⁷⁴

5.1. DEVELOPMENT STRATEGIES

Table 13 shows the distribution of respondents according to their choices of the major DST, and the secondary DST. Historically, the livelihoods of the inhabitants of Kilombero depend on subsistence agriculture and fishing while in Meatu livelihoods mainly depend on agriculture and traditional pastoralism. In both study areas, farming depends on rain and river basin resources (RBR), as people practice irrigation. Fishing depends solely on RBR. While more than 80% of the population in Tanzania are engaged in agriculture (UNDP, 2015), our data also shows that the majority of our respondents (70% in Kilombero and 89% in Meatu) are involved in seasonal farming as the major DST, followed by irrigated farming (22% and 8%). Fishing is ranked third in Kilombero (8%) and traditional pastoralism is ranked third in Meatu (2%). The category off-farm activities is not ranked among the major development strategy in both areas. The significant Fisher's Exact Test shows that there is an association between the choice of the major DST and the location of the river basin.

Secondary DST does not seem to be a strategy that is available to everyone in both study areas. Table 13 shows that 422 (54%) of 783 respondents practise secondary DST. 180 (50.1%) out of 359 respondents in Kilombero are engaged in secondary DST while in Meatu, 242 (57%) of 424 respondents practise secondary DST. In addition, secondary DST differ between the two study areas. While the majority (47.2%) ranked seasonal farming as the secondary DST in Kilombero,

⁷⁴ Descriptive statistics on the distribution of age and gender of respondents according to district are presented in section 5.1 of chapter 3 (see table 2, 3 and 4).

traditional pastoralism is ranked by the majority (45%) in Meatu (see table 5). As in primary DST, in both study areas, the majority (24.4% in Kilombero and 32.2% in Meatu) ranked irrigated farming as the second DST. While fishing is ranked third as the secondary DST in Kilombero, seasonal farming is third in Meatu. 9.4% of respondents who practise secondary DST in Kilombero choose traditional pastoralism as their secondary DST. In addition, 4.4% and 7.0% of respondents in Kilombero and Meatu respectively, rank off-farm activities as their Secondary DST. The highly significant Fisher's Exact Test shows a strong association between the choice of the secondary DST and River basin.

Table 13: Primary Development Strategy according to District

Primary DST	District						χ^2
	Kilombero		Meatu		Total		
	Freq.	%	Freq.	%	Freq.	%	
Seasonal farming	252	70%	376	89%	628	80%	78**
Irrigated farming	78	22%	35	8%	113	14%	
Fishing	29	8%	0	0%	29	4%	
Traditional Pastoralism	0	0%	9	2%	9	1%	
Total	359	100%	424	100%	783	100%	
Secondary DST							
Seasonal farming	85	47.2%	38	15.7%	123	29%	117.3**
Irrigated farming	44	24.4%	78	32.2%	122	29%	
Fishing	26	14.4%	0	0,00%	26	6%	
Traditional Pastoralism	17	9.4%	109	45.0%	126	30%	
Off-farm	8	4.4%	17	7.0%	25	6%	
Total	180	100.0%	242	100%	422	100%	

Notes: Freq. = frequency; χ^2 = Pearson's chi-square; ** Significant at 1% level.

Source: Author's Survey Data, 2016

5.2. ACCESS TO SOCIAL AND FINANCIAL CAPITAL

Table 14 shows the distribution of respondents according to the memberships of different groups. 132 (17%) out of 783 respondents in both study areas are members of the groups. Further results from each study area show that 20% of all respondents in Kilombero and 14% in Meatu are members of the groups. The significant Pearson chi-square result shows that there is association between individual's access to social capital and river basin.

Table 14: Membership in a group(s)

District	Member of a group					
	No		Yes		Total	
	Frequency	%	Frequency.	%	Frequency	%
Kilombero	287	80%	72	20%	359	100%
Meatu	364	86%	60	14%	424	100%
Total	651	83%	132	17%	783	100%

Pearson chi-square (1) = 4.8358 Pr. = 0.028

Source: Author's Survey Data, 2016

In both study areas, there are informal groups of money saving and borrowing, commonly known as village community banks (VICOBA).⁷⁵ The groups (formal and informal resources user groups) that are found in Kilombero include modern livestock keepers, irrigators and farmers groups. In Meatu, the groups include farmers, beekeepers and modern livestock keepers groups. The membership of most resources users' groups belongs to the household, but the heads of households/ spouses attend the meetings and pay the fees. Examples of the formal groups are the irrigator association in Sululu villages in Kilombero, and farmer, beekeeper and modern livestock keeper groups in Meatu, which are supported by the LVEMP II project. The Beach Management Unit (BMU) group was formed under the supervision of the government officials in Mofu ward, Kilombero. The group was supposed to bring the fishermen together in the governance of fishing activities in the ward. However, at the time at which the study were conducted, no activities were occurred in the group. Thus, respondents said that the group only exists on paper.

Table 15 shows the distribution of group membership according to the types of the groups. In both study areas, the majority of the members are involved in farmer groups, followed by irrigator groups in Kilombero and VICOBA groups in Meatu. The category other social groups⁷⁶

⁷⁵ In VIKOBA groups, members deposit money in every agreed period (usually once a week/ month). The deposited money is lent to the members as loans. The loans are returned after an agreed period, with the agreed interest rate. At the end of the term, usually after a year, the group is closed and the members get back the money they deposited plus the profits. Profits come from the interest payments. Members who deposited large amounts of money receive higher shares of the profit than the others do.

⁷⁶ Examples of other social groups include groups of good neighborhoods and *upatu*. The former refers to the groups' commitment to support each other during the period of emergencies such as illness, death and even wedding celebrations. Other groups focus on supporting each other on provision of labor power during farming and harvesting

is ranked third in Kilombero followed by fishing, women and VICOBA groups, which are all listed as number 4. In Meatu, the irrigator group is ranked number 4 followed by modern livestock keepers and beekeeper groups.

Table 15: Types of Groups

	Kilombero		Meatu		Total	
	Frequency	%	Frequency	%	Frequency	%
1 Irrigators	12	16%	9	13%	21	15%
2 Farmers	17	22%	22	32%	39	27%
3 Fishing	11	14%	0	0%	11	8%
4 Traditional pastoralism	1	1%	1	1%	2	1%
5 Modern Livestock	1	1%	8	12%	9	6%
6 Beekeeping	0	0%	7	10%	7	5%
7 Women	11	14%	2	3%	13	9%
11 VICOBA/ SACCOS	11	14%	13	19%	24	17%
12 Other groups	12	16%	6	9%	18	13%
Total	76	100%	68	100%	144	100%

Source: Author's Survey Data, 2016

Table 16: Access to credits

District	Access to Credit					
	No		YES		Total	
	Frequency	%	Frequency	%	Frequency	%
Kilombero	259	72%	100	28%	359	100%
Meatu	355	84%	69	16%	424	100%
Total	614	78%	169	22%	783	100%

Pearson chi-square (1) = 15.4064 Pr. = 0.000

Source: Author's Survey Data, 2016

Table 16 shows the descriptive results on access to credit. While 22% of all respondents have access to credit, results from each study area show that 28% of respondents in Kilombero and 16% of respondents in Meatu have access to credit. The significant Pearson chi-square shows

season. For example, for each group member, a day is allocated to help household's harvesting of the crops. All group members pool their labour and participate on the activity. In *upatu*, some people, particularly women, are involved in informal groups of local money lending and self-finance from relatives and friends.

that there is a strong association between access to financial capital and river basin i.e. people in Meatu and Kilombero differ in their access to financial capital.

Table 17 shows the major source of finance (credits) in both study areas. The majority of respondents in both study areas reported obtaining credit informally, from their friends or relatives, followed by the informal money lenders. Borrowing from VICOBA in Meatu and from other sources in Kilombero are ranked third, while VICOBA and commercial banks are number four in Kilombero and Meatu respectively.

Table 17: Sources of credits

	Kilombero		Meatu		Total	
	Freq.	%	Freq.	%	Freq.	%
1. Commercial banks	4	4%	7	10%	11	7%
2. NGO	5	5%	0	0%	5	3%
3. SACCOS/ VICOBA	12	12%	11	15%	23	14%
4. Government	0	0%	2	3%	2	1%
5. Friend/ relative	29	30%	29	41%	58	34%
6. Informal money lenders	25	26%	17	24%	42	25%
7. Others	23	23%	5	7%	28	17%
	98	100%	71	100%	169	100%

Source: Author's Survey Data, 2016

Social groups provide loans in terms of cash or inputs and other forms of material support, for instance providing help during the preparation of the farms or when harvesting the crops. The members of the formal groups that are supported by the government benefit by receiving credit and other forms of support from the government agencies. For example, LVEMP provided tractors and machines to the groups for the processing of sunflower oil. The members of the group benefit by paying half of the price for using the tractor or the sunflower oil machine.

Some types of formal loans are provided by microfinance banks such as the National Microfinance Bank, Vision Fund, and Tanzania Investment Bank in Meatu district, and FINCA and the National Microfinance Bank in Kilombero district. However, the loans are mostly only affordable for business people, civil servants and large irrigators in Kilombero district. Respondents in Meatu mentioned that this kind of credit is commonly available to people who are more educated and possess collateral. VICOBA provide loans to the members in terms of cash, and it is an easy source of finance for people in both study areas.

5.3. RESULTS FROM THE MODEL

The study ought to analyse the determinants of an individual's participation in the major (primary) DST and secondary DST. Results at the level of impact of explanatory variables on the choice of major DST show that neither informal social relation factors nor accesses to social and financial capital affect the choices of major DST. These results do not surprise the researcher because the results from descriptive statistics also show that most of the respondents (80.2%) practice seasonal farming as the primary DST. This implies that, seasonal farming is the traditional DST that is available and accessible by everyone, regardless of the differences in access to social and financial capitals and informal social relations factors. Thus, we opt to continue with the analysis of secondary DST.

Table 18 presents the summative findings of the multinomial logit model focusing on the factors affecting individual choice of secondary DST. Three models that use the data from both study areas and data that are disaggregated by river basins are estimated. The goodness-of-fit test results show the significant results for the model that combines data from the two study areas and the model that use Meatu data. These results are shown on the last row of table 18.

Variables that capture access to social and financial capitals reveal that both a membership in a group an access to credit affect the choice of secondary DST. However, when the analysis is conducted using the data from each study area separately, access to social capital is a significant factor in both Kilombero and Meatu, and access to financial capital is only significant in Meatu. Thus, these findings lead us to not reject our first hypothesis.

The model that combines all data (model 1) shows that the odds for individuals who are member of a formal and/or informal group (as compared to a non-members) to participate in traditional pastoralism relative to irrigated farming are higher by a factor of 0.392. The results from the model that uses the data from Meatu (model 3) are in line with the findings of model 1. The odd ratio in model 3 shows that being a member of a social group in Meatu decreases the likelihood of participating in traditional pastoralism relative to irrigated farming by a factor of 0.412. Both results are significant at less than 5%. In Kilombero, the findings related to the comparison of participation in traditional pastoralism relative to irrigated farming are not significant.

The model that uses Kilombero data shows a person who is a member of a group is 15.56 times more likely to participate in off-farm activity versus traditional pastoralism. While the results in the Kilombero model are significant at less than 5%, the results are insignificant in the model that uses Meatu data. Findings from the FGD show that there are different formal and informal groups of resource users, VICOBA groups and groups of good neighbourhoods in both study

areas. Most of the groups that are formally registered by the government receive support from government agencies and provide loans and other forms of support to their members. However, informal groups are important sources of finance for people wishing to invest in off-farm activities such as informal trading and modern livestock keeping. Furthermore, informal groups also provide important financial capital for those who practise irrigated farming, enabling them to buy inputs such as fertilizer and pesticides. While social groups assure an easy form of finance to the members, borrowing from friends and/ or relatives is a major source of finance to most people, both group and non-group members. One important finding from the FGD is that the majority of the group members are the heads of the households and/ or their spouses. A young man in Ihenga village said:

“Young man like me cannot be allowed in the VICOBA because of lack of enough money to contribute as deposits. Furthermore, for us who still live with our parents, we cannot be trusted to join the groups because we do not have our own household farms that can function as guarantee that we cannot migrate from the village. However, those young men with their own households and other properties such as farms, they have the opportunity to join the groups.”

Pertaining the analysis of financial capital, the model that combines data from two study areas shows that access to credits increases the likelihood of a person practising off-farm DST relative to other DST such as seasonal farming (by 4.22 times), irrigated farming (by 5 times), traditional pastoralism (by 8.7 times) and fishing (by 5.4 times). All results are significant at less than 1% level. The data from Meatu shows that access to credits increase the likelihood of practising off-farm activities relative to other DST such as seasonal farming (by 8.067 times), irrigated farming (by 8.98 times) and traditional pastoralism (13.07 times). All results are significant at less than 0.1% level. During the FGD, the majority of respondents in Meatu mentioned that they do not have the guarantee of getting enough money to contribute to the social (VICOBA) groups on a weekly basis. Thus, most of them rely on informal borrowing from business persons or from colleagues. Business persons provide loans with the requirements of returning the loan with a 50% interest rate. However, borrowing from business people is accompanied by the risk of losing property/ assets. A man in Ntobo village said that: *“Borrowing from business people is very risky: if one fails to return the loan with the interest, the lender might take any asset that is owned by the borrower, ranging from the cattle to the land”*. Borrowing from colleagues is based on trust, sometimes with interest and sometimes without interest, depending on the agreements between the two parties (a lender and a borrower). People in Kilombero also mention that they normally borrow from individual people, particularly during the farming season. Unlike in Meatu

where the loan is repaid in terms of cash, a borrower in Kilombero is required to repay the loan in terms of crops (bags of paddy rice) after harvesting. These kinds of loans are expensive because the market price of the bag of paddy rice that lenders need for the repayment of the loan is three times that of the amount borrowed. Although the loan from business persons are very expensive, people are often left with no option because of problems of hunger, disease etc.

Results that show that informal social relation factors in terms of age are significant determinants of the secondary DST lead us to not reject our second hypothesis. The model that combines data from two study areas shows that an additional year of age increases the likelihood of a person to participate in traditional pastoralism rather than irrigated farming by 10%. Results on the variable age square show that as the age increases, the impact of each marginal increase in age on the participation in traditional pastoralism (vs irrigated farming) is less than the previous impact by a factor of 0.99.⁷⁷ These results are less significant. These findings were also confirmed by the FGD. In pastoralist communities, young people mentioned that traditional pastoralism is a job for old people. Old men for example need cattle to pay the bride price when they want to add more wives, or to pay for the bride price when a son gets married. Old women can also easily obtain cattle, particularly goats, as the bride price when their daughters get married.

Gender is also found to be an important factor that affects the choice of the secondary DST. In the model that combines all data, results show that the odds for females to participate in traditional pastoralism versus irrigated farming are lower by a factor of 0.556 compared to their male counterparts. Similar results are also found in Meatu where the odds for women to participate in traditional pastoralism versus irrigated farming are lower by a factor of 0.539 compared to men. Results in both models are significant at less than 5% level.

In Kilombero, being a woman reduces the odds to participate in fishing versus irrigated farming by a factor of 0.15. In addition, women in Kilombero are 6.372 times more likely to participate in off-farm versus fishing farming compared to their male counterparts. These results were also confirmed in FGD. In pastoralist communities, all cattle belong to men, mostly to the heads of households. Women in these communities never use their earnings to buy cattle because they fear men can either sell them or use them to pay for the bride price when they add more wives.

⁷⁷ By taking the first derivative of the estimated equation, the exact point at which the impact of age on the dependent variable starts to diminish is 49.15. Thus, with respect to engagement in traditional pastoralism versus irrigated farming, a person is considered to be old when he/ she is at age of 49 and above.

On the other hand, women in fishing communities of Kilombero are not allowed in the fishing areas/ camps. Women themselves said that they have never been to the fishing areas. These findings are consistent with Leach et al. (1999) who highlighted that livelihoods in some societies might be affected not only because the resources are unavailable, but also due to socio-cultural factors, which restrict the use of certain resources.

Findings focusing on river basin differences show that people in Kilombero are more likely to practice seasonal farming versus other DST such as irrigated farming (by 3.243 times), traditional pastoralism (by 13.9 times) and off-farm activities (by 4.253 times) as a secondary DST compared to people in Meatu. In addition, the odds ratios show that people in Kilombero are also 4.3 times and 3.271 times more likely to practice irrigated farming and off-farm activities, respectively versus traditional pastoralism. In sum, these findings show that people in Kilombero are more likely to practise seasonal farming, and less likely to practise traditional pastoralism as the secondary DST. During FGD, it was found that in some Kilombero villages, for example Sululu, people practise irrigated farming as their major DST by the use of modern irrigation schemes, thus seasonal farming becomes their secondary DST. Staple food and cash crops such as paddy rice and maize are irrigated within the schemes. In some other areas, where climatic conditions allow two seasons' cultivation of crops, people practise seasonal farming as both their major and secondary DST. During the rain seasons, only paddy rice is cultivated because of the wet nature of the areas. The land retains its wet character even when the rain season is over which allows the cultivation of maize and vegetables soon after the harvesting of paddy rice. On the other hand, in Meatu district, there is one farming season whereby almost everybody cultivates staple foods (mainly maize) and other cash crops such as cotton, sunflower and legumes. People rely mostly on seasonal farming as the major DST; irrigated farming is a subsidiary DST with people cultivating vegetables for petty informal trading. While mainly of those who have farms along the river practise irrigated farming, traditional pastoralism is also a subsidiary DST for the majority of people in Meatu.

Table 18: Multinomial logistic regression results on the Determinants of the choice of secondary development strategy

	Model 1: All data		Model 2: Kilombero		Model 3: Meatu	
	z	RRR	z	RRR	Z	RRR
Age						
Pastoralism vs Irrigated Farming	2.05	1.102*	0.80	1.10	1.55	1.085
Age square						
Pastoralism vs Irrigated Farming	-1.92	0.999	-0.77	0.99	-1.43	0.999
Gender (if female = 1)						
Pastoralism vs Irrigated Farming	-2.11	0.556*	-0.50	0.72	-1.97	0.539*
Off-farm vs Fishing	2.12	6.372*	1.86	7.24		
Fishing vs Irrigated Farming	-2.43	0.150*	-2.36	0.15*		
Social Capital (group member = 1)						
Pastoralism vs Irrigated Farming	-2.40	0.392*	-1.48	0.49	-1.96	0.412*
Off-farm vs Pastoralism	1.66	2.612	209	15.56*	0.14	1.109
Financial Capital (access to credit = 1)						
Off-farm vs Seasonal Farming	2.73	4.222**	1.01	2.28	2.77	8.067**
Off-farm vs Irrigated Farming	3.10	5.009**	1.07	2.46	3.25	8.976**
Off-farm vs Pastoralism	3.91	8.738**	1.81	7.21	3.84	13.067**
Off-farm vs Fishing	2.49	5.403*	1.22	2.99		
River basin (1 if river is Kilombero)						
Seasonal vs Irrigated Farming	4.09	3.243**				
Seasonal farming vs Pastoralism	7.64	13.911**				
Seasonal farming vs Off-farm	2.85	4.253**				
Irrigated Farming vs Pastoralism	4.26	4.289**				
Off-farm vs Pastoralism	2.17	3.271*				
Multinomial logistic regression: Number of observations:	422		180		242	
LR χ^2	184.78**		28.21		34.55**	

Notes: Dependent Variable is the secondary development strategy that an individual pursues (DSTSE). DSTSE is a categorical variable, taking values of 1 if an activity chosen is seasonal farming, 2 if irrigated farming, 3 if fishing, 4 if traditional pastoralism (pastoralism) and 5 if off-farm activities. All three models are estimated by using multinomial logit model. RRR is a short form for the relative risk ratio, which shows the factor change in odds of a person to participate in a certain (specified) DST relative to another DST for unit change in an independent variable. Z score are reported to show the directions of changes of the independent variables. A 'z' coefficient is the z-score for test of $\beta = 0$. LR χ^2 is the value of a likelihood-ratio chi-square for the test of the null hypothesis that all of the coefficients associated with independent variables are simultaneously equal to zero (Long & Freese, 2003, p. 76). ** Significant at 1% level; * Significant at 5% level.

Source: Author's survey data, 2016 (Stata output).

6. CONCLUSION

This chapter has empirically shown how differences in people's access to social and financial resources results in differences in the choices of DST that people pursue for the enhancement of their livelihoods. Informal social relation variables show that, while old people are more likely to participate in traditional pastoralism, women are less likely to participate in traditional pastoralism and fishing activities. Findings also reveal that access to social capital helps people to participate in irrigated farming and off-farm activities instead of traditional pastoralism. Financial capital is important for people to diversify to off-farm activities away from all other activities that make use of RBR. In particular, access to social capital is important for people in Kilombero to engage in off-farm activities instead of traditional pastoralism. In Meatu, those with financial capital are more attracted to engage in off-farm activities. These findings imply that people without access to these forms of capital have to rely on the RBR and other natural resources such as seasonal land for their survival. This has implications for people's wellbeing and the status of natural resources that are used.

Incentivized by the poor performance in traditional rural activities, particularly seasonal farming, rural people look for new/ alternative opportunities to raise their livelihoods. Irrigated farming and off-farm activities are some of these opportunities. However, these opportunities are not easily available to all groups of people, as they need access to some resources to finance them. For example cultivating a well-organised irrigation scheme requires timely planting, the application of inputs such as fertilizers and pesticides and timely harvesting. Those who have either the money to finance the activities directly or membership of organizations that supply credit in terms of cash/ material inputs, can easily meet the requirements of cultivating in irrigation schemes. Furthermore, investing in off-farm activities such as beekeeping, modern livestock keeping or informal trading also requires some sort of initial investment to finance the activities.

Informal groups are important sources of rural finance. The majority of rural people access credit through informal VICOBA groups that are established based on trust between the members. Access to credit through VICOBA requires no collateral in terms of physical assets, thus the majority of poor people easily access the loans. Despite the usefulness of these groups to the rural population, these kinds of loans are not easily available to all groups of people. Findings show that membership to most of these groups belongs to the households, and is mainly accessed by household heads or their spouses. This implies that other members of households such as children who are above 18 cannot easily access social capital and credit, until they are

married and have their own households. Thus, we recommend policies to consider establishing credit/ group lending programs that not only provide credit to people in rural areas but also policies that consider different groups of people in the community. For instance, our findings show that as people age they are more likely to participate in traditional pastoralism, which implies that a loan that is provided to the household head who is aged, is more likely to be spent on adding more cattle. Unless modern methods of livestock keeping are used, this kind of investment has implications on the status of RBR.

Our study sheds light on the importance of social and financial capital for the diversification of rural livelihoods and the conservation of RBR base. Thus, the findings highlight that in Kilombero those with access to social and/ or financial capital are less likely to practice traditional pastoralism (non-environmentally friendly DST); a finding that conveys important information to policy makers and other practitioners dealing with KR conservation. For instance, investment in irrigation schemes in areas with permanent rivers has the potential to increase agricultural outputs while at the same time conserving the natural resources base.

In Meatu, both traditional pastoralism and irrigated farming are considered non-environmentally friendly DST. While cattle are freely grazed and taken to drink water along the river, irrigated farming is conducted in areas very close to the riverbanks. All these activities contribute to the widening of SR. Thus, the findings that show that people with access to financial capital are more likely to participate in off-farm activities are important for policies aimed at improving both the livelihoods and RBR conditions.

This study has pooled data across villages in Meatu and across villages in Kilombero. However, the author recognizes that even among villages of the same area, there could be village-specific factors that affect household behaviours in terms of the uses of RBR and the choices of DST. Even the available opportunities on the choices of DST differ across the villages. Thus, even the policies that aim at improving rural livelihoods and natural resources conditions may not work similarly across all villages of the same area. Furthermore, households in the villages may differ in their willingness to accept those policies because of different interests that drive their preferences for the choices of DST and uses of natural resources. For instance, agro-pastoralist communities prefer cattle not only because livestock can easily be converted to cash, but also because they stand as a symbol of wealth in the society, and are used for other social activities such as bride prices. Therefore, the suggestion is made for future research to include in the analysis the role of village-specific factors on the choices of RBR.

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CHAPTER 8

AWARENESS ON DEGRADATION AND ATTITUDES TOWARDS CONSERVATION OF RIVER BASIN RESOURCES: A COMPARATIVE ANALYSIS OF KILOMBERO AND SIMIYU RIVERS IN TANZANIA

1. INTRODUCTION

This chapter addresses relation 5 of the analytical framework presented in chapter 2 and aims to analyse the influence of respondents' awareness of river basin resources⁷⁸ (RBR) degradation (cf degradation awareness) on pro-environmental behaviour. This is done by controlling demographic and economic factors of the respondents. Pro-environmental behaviour is defined by (Kollmuss & Agyeman, 2002) as the "behaviour that consciously seeks to minimize the negative impact of one's actions on the natural and built world" (p. 40). In this study, pro-environmental behaviour refers to the use of methods that reduce the chances of degrading RBR when pursuing development strategies (DST). These methods are more likely to conserve RBR.

Several theoretical perspectives exist on people's behaviour with regard to the use of natural resources. According to neoclassical economists (see for example Coase, 1960; Pigou, 1920) environmental resources are characterized as public goods, and thus individuals have no incentive to protect them. While the benefit of degrading the environment are accrued by the individual, the social costs are borne by everybody in society. Neoclassical economists propose the intervention of government into price structures to internalize the social costs of degradation so that they become part of private costs of using resources. In addition to government intervention, new institutional theories advocate the role of effective institutions in terms of rules, regulations and organizations to reduce transaction costs associated with governing human behaviour (Coase, 1960; North, 1990; North & Davis, 1971). From the literature of institutional theories, two schools of thought emerged, namely; mainstream institutionalism and critical institutionalism. While mainstream institutional theories partly use the ideas of new institutional economists to emphasize the communal (collective) management of natural resources (Ostrom, 1990), critical institutionalism emphasises the study of the role of cultural norms in understanding people's behaviours (Cleaver, 2001).

In most of the theories on people's behaviour in relation to the use of natural resources, attention is drawn to the determinants of pro-environmental behaviour; and it is found that they are influenced by policies at various levels, and thus are external to an individual resource user. Recent attitudinal studies emphasize the need to understand people's awareness of environmental problems to be more informed on people's behaviour as regards the use of natural resources (see for example Aregay et al., 2018; Gelcich & O'Keeffe, 2016; Paço & Lavrador, 2017; Pothitou et al., 2016). In the literature,

⁷⁸ River basins support people's livelihoods through provision of important natural resources such as water for irrigation, arable land, forested areas, fisheries, recreational centers to mention a few. As a result, people who live in the areas along river basins depend on these river basins resources (RBR) to pursue different development strategies (DST).

environmental awareness is regarded as an outcome of environmental knowledge. For instance, Zareie and Navimipour (2016) define environmental awareness as a component that includes “factual knowledge about the environment and recognition of environmental problems” (p. 3). Environmental knowledge is gained through education (formal and informal), life experience (Aregay et al., 2018), beliefs and norms on environmental issues and interaction with other individuals (Pothitou et al., 2016). People with environmental knowledge are regarded as being more aware (mindful) of the magnitude and consequences of degradation of natural resources. In this study, degradation awareness is referred to as the act of being conscious of RBR degradation problems i.e. possession of general knowledge about RBR degradation and the factors that drive its changes (see also Aregay et al., 2018; Paço & Lavrador, 2017). The assumption is that resource users who are more knowledgeable about RBR degradation problems are more aware of the need for conservation of RBR and they are more likely to adopt pro-environmental behaviour when pursuing their development strategies (see also Aregay et al., 2018; Siddharth & Kumar, 2017).

Based on the above discourse, this paper assesses how pro-environmental behaviour with regard to the use of RBR is influenced by people’s awareness of the degradation of RBR. Findings from this study are important for both the design and implementation of conservation initiatives. Studies on awareness help us to form an understanding of interests, social values and experiences that are embedded in people’s lives (Bennett, 2016; Jefferson et al., 2015). This kind of information provides important inputs for developing new conservation initiatives and for monitoring the implementation of ongoing initiatives. For instance, information on people’s perceptions of degradation problems can give a clue to the question of why people support/ do not support the ongoing conservation initiatives (Gelcich & O’Keeffe, 2016). Furthermore, through this information, the expected reactions of different groups towards a new policy can be predicted earlier and the strategies to reduce negative behaviours can be planned in advance.

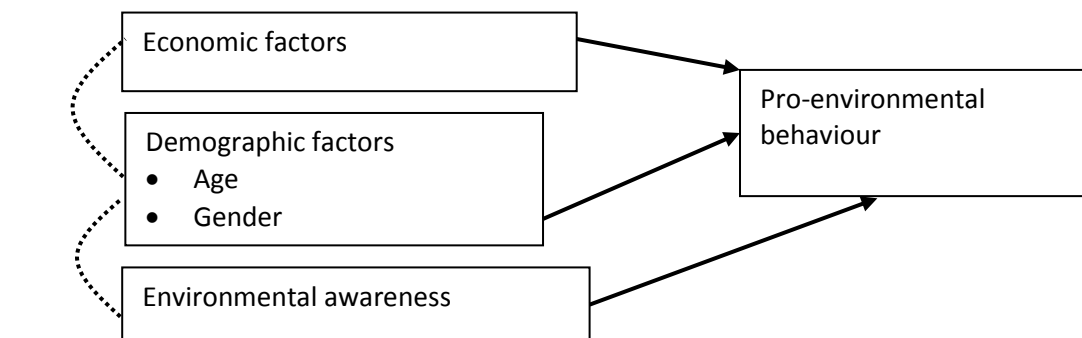
The rest of the paper is organized as follows: section 2 present the conceptual framework for the analysis followed by a description of the study areas and data sources in section 3. Section 4 presents methods of data analysis. Results are presented in section 5. Section 6 and 7 present a discussion of the findings, and conclusion, respectively.

2. CONCEPTUAL FRAMEWORK

Figure 5 provides the analytical framework for studying people’s attitudes towards conservation behaviour. While the main aim of the study is to assess the influence of degradation awareness on pro-environmental behaviour, two more constructs namely ‘economic factors’ and ‘demographic factors’ are added as control variables. These variables may have a direct/ indirect influence on attitudes towards conservation behaviour.

Demographic factors such as age and gender are considered to affect people’s attitudes towards conservation though their results differ between studies. For instance, there is no consensus on the impact of age on conservation behaviour. On the one hand, old people are regarded as having positive attitudes towards conservation because they have experienced various changes in environmental conditions in their lifetime (Aregay et al., 2018; Masud & Kari, 2015). On the other hand, studies claim that young people are more likely to have positive attitudes towards conservation because they usually have more years of schooling than older people, and it is also more likely that they will experience the effects of less environment friendly behaviour over a longer period (Tomićević, Shannon, & Milovanović, 2010).

Figure 5: Relationships between factors that affect attitudes towards conservation of RBR



Key:

—————> Relationship analysed in research

- - - - - Correlation among variables

Source: Adopted and Modified from Literature (Agarwal, 1992; Aregay et al., 2018)

In terms of the influence of gender on conservation behaviour, different studies arrive at sharply diverging conclusions.⁷⁹ Some argue that women are less likely to conserve because they tend to have less access to resources, environmental education and information compared to men (see for example studies by Mwangi, Meinzen-Dick, & Sun, 2011; Sun, Mwangi, & Meinzen-Dick, 2011). Other studies consider women to be more environmentally conscious compared to men because of their higher dependency on natural resources. The traditional roles of rural women, for instance fetching water, collecting firewood and providing vegetables and legumes to the household, depends on the state of their surrounding natural environment. Thus, women are seen as being more environmentally responsible than men are because their tasks are highly affected by environmental problems (see for example studies by Agarwal, 1992, 2009, 2010). Finally, there are also studies that do not find a significant gender impact (Aregay et al., 2018).

Access and ownership of economic resources have long been reported as the economic reasons for adopting pro-environmental behaviours (Aikens, Haven, & Flinn, 1975). Livelihood resources, both natural and other resources such as human, social, physical, and financial capital, that are owned/controlled by rural people show how wealthy a person is and these resources may be combined to pursue different DST. For instance, land that is used for agriculture is combined with labour resources and other inputs to produce goods. The decision may also involve the allocation of land to different crops or undertaking non-farm activities such as self-employment in rural micro-enterprises. People in rural communities do not have the same access to livelihood resources (Scoones, 1998). Those with diverse activities are assumed to possess multiple resources such as land, financial capital and social networks, and are less likely to depend on the environment for survival (Alejandro, 2012). They have a range of options to choose from and they can easily switch between strategies to secure their livelihoods (DFID, 1999). Naughton-Treves and Treves (2005) (as cited in Dickman, 2010) argue that people with multiple income generating activities are less likely to practice methods that damage the natural environment compared to those who depend on a single means. People without access to diverse resources tend to depend solely on natural resources for their survival, thus may find that their conservation efforts actually compromise their livelihood needs (J.K. Sesabo, Lang, & Tol, 2006).

Other studies look beyond the question of access and ownership to consider the influence of resource users' awareness of environmental problems as a factor that affects pro-environmental behaviour. In their study of farmers' adoption of new technology, Adesina and Zinnah (1993) show that farmers'

⁷⁹ For a detailed discussion on the topic, see the studies by Arora-Jonsson (2011); Holvoet and Inberg (2014); C. Doss, Meinzen-Dick, Quisumbing, and Theis (2017).

perceptions of the appropriateness of conservative technology affect their attitudes towards adopting it. A recent study by Aregay et al. (2018) in China shows that people who have knowledge and positive attitudes on local environmental conditions and conservation practices are also more likely to perform those behaviours. Pothitou et al. (2016) show that households with greater environmental knowledge are more likely to demonstrate home energy conservation behaviours. Other studies, however, have shown that environmental knowledge does not necessarily have a significant impact on attitudes towards conservation (Aregay et al., 2018) and may even have negative impact on promotion of conservation initiatives (Songorwa, 1999). A study by Paço and Lavrador (2017), for instance, point out that students with higher levels of environmental knowledge do not demonstrate pro-environmental behaviour. Frederiks, Stennerl, and Hobman (2015) argue that there is a gap between what people actually are aware of and their actions because people do not always act according to their consciences. Further, they argued that despite people's awareness of the benefits of saving energy to protect the environment, the majority still fail to take steps to save energy. They referred to the concept as the 'knowledge-action gap' i.e. "There is often a sizeable discrepancy between peoples' self-reported knowledge, values, attitudes and intentions, and their observable behaviour" (Frederiks et al., 2015, p. 1385).

From the above, the following hypotheses are formulated:

- i. *Demographic factors in terms of age and gender affect people's attitude towards conservation of RBR.*
- ii. *People with access to multiple resources are more likely to practise pro-environmental behaviour as regards the use of RBR.*
- iii. *People who are aware of degradation of RBR are more likely to demonstrate positive behaviour towards RBR conservation.*

3. STUDY AREAS AND DATA SOURCES

The study is based on household surveys conducted among people living in Kilombero River Basin (KRB) in Kilombero district and Simiyu River Basin (SRB) in Meatu District. Kilombero district is situated in Morogoro region in the eastern part of Tanzania. KRB is the largest contributor of water that flows into Rufiji River, the largest river in Tanzania (Danida/WorldBank, 1995; WRED, 2002). Resources that are available in Kilombero include water, fish, wild animals, and forests, to mention a few. Historically, livelihoods of the inhabitants of Kilombero depend on subsistence agriculture and fishing. While fishing depends solely on RBR, agriculture depends on RBR (as people practice irrigation) and rain fed agriculture. Agriculture has been transformed to a more commercial strategy due to the presence of modern and traditional irrigation schemes, which allow the cultivation of crops throughout the year. Livestock keeping is now considered one of the major DSTs due to inflows of migrants who are agro-pastoralists. In Kilombero, there is an increasing pressure on RBR use because of increasing human activities within and along the river. Inflows of migrants who look for fertile and irrigated land, pasture, and employment in the sugar industry are among the reasons for the increasing pressure on RBR use in Kilombero (Monson, 2012).

SRB is located in the northern part of Tanzania, and is one of the six rivers that drain Lake Victoria on the Tanzanian side.⁸⁰ Meatu district in particular, is situated in Simiyu Region. RBR that are available in Meatu include water, arable land, wild animals (mainly at Maswa Game Reserve), trees, sand and stones. Historically, most of the people who live along SRB are agro-pastoralists who practise both farming and livestock keeping. Their major economic activities are farming (both irrigation and rain fed agriculture) and traditional pastoralism.⁸¹ Meatu district has two river catchment areas that are used for different economic activities: irrigation activities are conducted in the lower catchment while the upper catchment area is not commonly used for agricultural activities. Traditional pastoralism is widely practiced in all areas along Simiyu River. Degradation practices in forms of overgrazing, farming along the riverbanks and uses of agrochemicals in agricultural activities are reported to threaten RBR found at both Simiyu River and Lake Victoria (Ningu, 2000; URT, 2014). Degradation practices have resulted

⁸⁰ Lake Victoria is the largest lake in Africa and it is shared by three countries namely Tanzania, Kenya and Uganda, and it is the source of the longest river in Africa, the Nile River. The Simiyu River and all other rivers that feed Lake Victoria are officially under the governance of Lake Victoria Basin Commission (LVBC). Currently, the Lake Victoria Environmental Management Project (LVEMP II), which is under the supervision of the LVBC, is implemented in the villages that lie along the rivers. The project deals with the conservation and protection of river boundaries and mainly those citizens who had farms along the river are the project members.

⁸¹ Traditional pastoralism in this study refers to the act of keeping the large number of animals that move freely searching for pasture and water.

in RBR problems such as water shortages, soil and gully erosion, deteriorating water quality, deforestation and erosion and expansion of Simiyu River banks (URT, 2014).

Before conducting the survey, preliminary study visits were used to obtain prior information on RBR use, DST and nature of RBR conditions. Discussions were held with districts officials responsible for the governance of river basins and their resources namely; district council, ward and village officials. We also organised discussions with different groups of resource users at wards/ villages levels, for example associations of irrigators, farmers, livestock keepers and fishers. Information from these discussions were used to confirm explanatory variables and to formulate hypotheses.

The survey covers five villages in Kilombero, which are located in Mofu ward and Signal ward. The villages were selected to capture differences in DST. These villages are Ihenga (an agro-pastoralist community), Ikwambi-M (a fishing community) and Mofu (a multicultural community) in Mofu ward, and Sululu (the modern irrigator's community in Sululu hamlet and the traditional irrigator's community Ikwambe hamlet) and Signal (a multicultural community) in Signal ward. In Meatu district, the survey covers four villages: two from Mwabuma ward and two from Kisesa ward. As in Kilombero, the selection of villages in Meatu was partly based on differences in the nature of DST, particularly the presence of secondary DST financed by the LVEMP project. These villages are Kisesa and Ntobo from Kisesa ward, and Mwabuma and Mwashata from Mwabuma ward.

A survey was organised in which 313 households participated, 148 in Kilombero district and 165 in Meatu district. In Kilombero district, a total number of 83 and 65 households were surveyed in Mofu and Signal wards, respectively. In Meatu, 80 and 85 households were surveyed in Kisesa and Mwabuma wards, respectively.⁸² At the household level, we used intra-household⁸³ data, i.e. data from heads of households, spouses, children (biological children who are 18 years old and above) and other members of households who are 18 years and above, to study whether there are differences in degradation awareness. As a result, a total number of 783 respondents, 359 in Kilombero district and 424 in Meatu district were reached. The questionnaire was the major tool of data collection.

⁸² For a detailed discussion of the data collection process during the survey, including sampling procedures, sample size in each village and selection of respondents, see section 4.1 in chapter 3.

⁸³ In studies of intra-household differences, different household members are assumed to differ in terms of preferences. The intra-household resource allocation refers to the processes in which different productive resources are allocated among household members and the resulting outcomes of those processes (see for example Haddad et al., 1997). These processes of resource allocation may result in inequalities in access to resources between household members and the way benefits from resources are used.

Resource mapping and focus group discussions (FGD) were conducted to obtain information to supplement survey findings. Participants of FGD consisted of some members from the surveyed households. Participants were asked to give their views on the concept of RBR degradation and to link the concept with the DST that are found in their villages. Firstly, participants were requested to give their perception on the status of RBR, and compare it with the past (10 or more than 10 years back depending on their age) status of RBR in their areas. This was done with the help of maps. After showing the current RBR, participants were asked to include on the maps the RBR that existed in the past but have disappeared. The mapping activities were followed by discussions on changes in RBR status and the reasons for the changes. Respondents were also asked to link changes in RBR status with DST and behaviours of different social groups.⁸⁴

⁸⁴ For a detailed discussion on the data collection process during FGD, see section 5.1 in chapter 3.

4. DATA ANALYSIS

According to our conceptual framework, pro-environmental behaviour in relation to the use of RBR is a function of demographic factors, economic factors and degradation awareness. A variable conservation behaviour/ attitude towards conservation of RBR is used to measure pro-environmental behaviour. Conservation behaviour is a dummy variable taking a value of 1 if a person uses conservation methods and 0 if otherwise. As our dependent variable has binary outcomes, a logit regression model is used to estimate the following equation:

$$Y_{it}^* = X_i^* \beta_i^* + \varepsilon_i^*, \quad Y_i = 1 \text{ if } Y_i^* > 0, 0 \text{ otherwise } \quad i = 1 \dots n;$$

Where; Y_i = attitude towards conservation of RBR

X_i = vector of explanatory variables

β_i = vector of parameters to be estimated

ε_i = error term

Two variables, age of respondent and gender are used to measure demographic characteristics of respondents. Age, as measured in numbers of years, is expected to either increase or decrease the likelihood of a person practising conservation behaviour. However, an impact of age on the dependent variable is not expected to be linear along all points, thus a variable age square is added to measure a point at which the impact of age on the dependent variable starts to change. The impact of age square on conservation behaviour is expected to be the opposite of the impact of age on the dependent variable. The literature presented in section 2 shows different arguments regarding the relationship between gender, particularly in the southern part of the world, and conservation behaviour. While women are expected to have a negative attitude to conservation behaviour because of their poverty, they are, on the other hand, expected to have positive attitudes because of their higher dependency on natural resources. Thus, the study expects either positive or a negative relationship between female and conservation behaviour.

To measure access to multiple resources, a variable participation in multiple activities is used. Those who participate in more than one DST are assumed to have access to a wide range of resources. Thus, respondents were asked to indicate the types of activities they pursue for their livelihoods. Participation in multiple activities takes a value of 1 if a respondent practices more than one DST, and 0 if one DST. Access to multiple resources is expected to be positively related with conservation behaviour.

In their book “Dynamic Sustainabilities”, Leach et al. (2010) argue that there is no static definition of the concept of environmental sustainability, i.e. the concept differs from one resource type to another, and across societies. The conceptualization of sustainability (in terms of RBR degradation in our case) depends on the nature of the resource that is studied and how resource users perceive the concept in their own context. Thus, the study considers the aspects of degradation that are mentioned by resource users themselves as the measures of degradation awareness. In this case, people’s perception of the concept are grasped from the survey by asking them to give their opinion on the concept of degradation of river basins and their resources and the reasons for the RBR degradation in their respective areas. There are different responses as regards the indicators of RBR degradation practices and their causes. Answers on the causes of degradation are used as measures of degradation awareness. The answers are coded and categorised into 3 different measures,⁸⁵ namely: deforestation; poor method of conservation method when pursuing DST; and government failure to conserve RBR.

- Deforestation: this variable includes responses that highlight that degradation is caused by the clearing of land for different purposes such as expansion of farming and residential areas and cutting of trees for construction of houses, burning of charcoal and firewood. Deforestation is often said to destroy water catchment areas and riverbanks. As a result, riverbanks have expanded, which further result in the flooding of rivers during periods of heavy rainfall. Deforestation in water catchment areas have resulted in the deterioration of water quality and even in the reduction in the volumes of water flow. Respondents in this category also mentioned deforestation as among the major causes of climate change and too long periods of drought. ‘Deforestation’ is a dummy variable, taking a value of 1 if a respondent perceives RBR degradation as the problem caused by deforestation, and 0 if otherwise.
- Poor method of conservation method when pursuing DST: respondents who mentioned poor methods of conservation practices associate degradation practices to unsustainable methods of farming, fishing, pastoralist methods when conducting DST. Examples of these practices include farming within the riverbanks, fishing methods that use poisons and blocking of rivers and livestock keeping methods such as overgrazing and grazing of cattle along riverbanks. ‘Poor conservation method’ is a dummy variable, taking a value of 1 if a respondent perceive RBR degradation as the problem caused by poor methods of conservation practices, and 0 if otherwise.

⁸⁵ The codes are based on the responses received during data collection.

- Government failure to conserve RBR: this variable includes a range of answers underpinned by an insistence that government actions have been insufficient to manage RBR; these answers were combined and coded as 'government role'. While some respondents blame the authorities for poor implementation of laws that govern RBR uses, others argue that the government has not provided enough education on RBR conservation. Some respondents complain that available infrastructures do not support initiatives to conserve RBR. Government development of modern infrastructure such as modern irrigation schemes and water troughs for cattle are needed to achieve the long-term sustainability of RBR. 'government failure to conserve RBR' is a dummy variable, taking a value of 1 if a respondent perceives RBR degradation as the problem caused by insufficient government actions, and 0 if otherwise.

The relationships between variables that measure degradation awareness and attitude towards conservation behaviour are not known, as we do not have theory-based evidence to support them. Thus, the impact can be negative or positive.

According to our conceptual framework, demographic factors may influence dependent variables, indirectly, through degradation awareness and through their impact on economic factors. Spearman's rank correlation tests, r_s , were run to measure correlations between variables. Results in Table 19 reveal the presence of neither moderate nor strong relationships. In this case, we conclude that there are no interdependencies between variables, thus we continue with the estimation of the equation that includes all suggested variables.

Table 19: Spearman's rank correlation

	Spearman's rho		
	Age	Female	Multiple DST
Economic factors			
Multiple DST	0.1764**	-0.2671**	
Perception factors			
Deforestation	0.0752*	-0.0357	0.0514
Poor conservation methods	0.0935**	-0.1645**	0.0686
Government failure to conserve RBR	-0.0165	0.0455	0.0130

Note: ** Significant at less than 1% level; * Significant at less than 5% level

Source: Author's Survey Data, 2016

A variable is added to determine whether there are differences in attitudes towards conservation of RBR that are caused by differences in location factors, i.e. factors that are specific to the study area. The variable that measure locational differences, 'river basins', takes a value of 1 if a respondent resides in Kilombero and 0 if in Meatu. The impact of river basins differences on dependent variables can be negative or positive, as we are not aware of location specific factors that affect conservation behaviours.

To assess whether there are differences in conservation behaviour across different groups of people, we ran a second model that adds to the first model interaction variables between demographic factors and access to multiple resources, and between demographic factors and degradation awareness factors. The impact of interaction variables on conservation behaviour cannot be predicted with certainty, as we do not have theory-based evidence to support the arguments. Thus, we expect either positive or negative relationships between those variables and conservation behaviour.

5. RESULTS

This section presents the findings on attitudes towards conservation of RBR among people residing in Kilombero and Meatu districts in Tanzania. A use of conservation methods demonstrates a person's attitude towards conservation behaviour, which further contributes to RBR sustainability. The results are presented in the following subsections.⁸⁶

5.1. ATTITUDE TOWARDS CONSERVATION OF RBR

Table 20 shows that 50.4% of all respondents use conservation methods: 49.6% and 51.2% of all respondents in Kilombero and Meatu respectively use conservation methods. The Pearson chi-square results are not statistically significant. This suggests that there is no association between attitudes on conservation behaviour and the specific river basin.

Given that people differ in the types of DST they pursue, the study ought to identify the types of conservation methods that are used. Three conservation methods are identified, namely methods that protect rivers, methods that protects fish and methods that protect soil.⁸⁷

Table 20: Attitudes towards conservation behaviour

		Kilombero		Meatu		Total	
		Frequency	%	Frequency	%	Frequency	%
Conservation Behaviour	No	181	50.4%	207	48.8%	388	49.6%
	Yes	178	49,6%	217	51.2%	395	50.4%
Total		359	100%	424	100%	783	100%

Pearson chi-square (1) = 0.1984 Pr. = 0.656

Source: Author's Survey Data, 2016

⁸⁶ Descriptive statistics on the distribution of age and gender of respondents according to district are presented in section 5.1 of chapter 3 (see table 2, 3 and 4).

⁸⁷ Methods that protect rivers combines responses on the use of farming, pastoralist and/ or irrigation methods that protect rivers and their surrounding areas. Examples of these methods are irrigation methods that do not lead to the loss of water, farming and/ or pastoralist methods that protect riverbanks and protection of riverbanks through planting of trees along the river. To measure methods that protects fish, respondents who are engaged in fishing activity were asked whether they practice methods that do not destroy fish and riverbanks. A variable methods that protect soil includes respondents' answers on the use farming and/ or pastoralist methods that protect soils cover.

The last column of table 21 shows that 38% of all respondents use methods that protect rivers and 20% of all respondents use methods that protect soil. The majority of respondents in both study areas use methods that protect rivers, though the percentages in Meatu (41%) are larger than in Kilombero (34%). The percentages of respondents who use methods that protect soil are almost similar in both study areas, i.e. 20% and 19% in Kilombero and Meatu, respectively. In Kilombero, 11% of all respondents use conservative methods of fishing. The Pearson chi-square result shows a significant association between methods that protect rivers and river basin and between methods that protect fish and river basins. The former findings can partially be associated with the result of the presence of the LVEMPII projects in Meatu district, which give support to villagers who move their economic activities away from the river banks. The latter is definitely due to the fact that fishing is not regarded as a development strategy in Meatu. There is no significant association between methods that protect soil and river basins. This implies that in both study areas, there are no differences in the conservation methods that are used to protect the soil base.

Table 21: Types of RBR conservation methods

		Kilombero		Meatu		Total		χ^2
		Freq.	%	Freq.	%	Freq.	%	
Methods that protect rivers	No	237	66%	250	59%	487	62%	4.11*
	Yes	122	34%	174	41%	296	38%	
	Total	359	100%	424	100%	783	100%	
Methods that protect soil	No	289	81%	341	80%	630	80%	0.0007
	Yes	70	19%	83	20%	153	20%	
	Total	359	100%	424	100%	783	100%	
Methods that protect fish	No	321	89%	422	96%			41.02**
	Yes	38	11%	2	4%			
	Total	359	100%	424	100%			

Notes: Freq. = frequency; χ^2 = Pearson's chi-square; ** Significant at 1% level; * Significant at 5% level.

Source: Author's Survey Data, 2016

5.2. AWARENESS OF DEGRADATION OF RBR

Table 22 presents descriptive statistics on degradation awareness. Results show that the majority of our sample, i.e. 654 out of 783 respondents, indicate the presence of degradation of RBR in their respective areas. When data are further broken down according to the specific river basin, results show that 89% and 79% of people in Kilombero and Meatu, respectively, indicate the presence of

degradation. Pearson chi-square shows that the association between degradation awareness and river basins is statistically significant.

Respondents justify their answers regarding the presence of degradation by showing their concerns on the current status of RBR compared to some years back. Answers are coded and summarized in four aspects namely:

- status of fish i.e. decrease in amount and availability of different types of fish species;
- status of water i.e. decrease in volume of water that flows into the river and the number of permanent rivers/ streams;
- status of land i.e. deterioration in quality of arable land; and
- status of forest i.e. decrease in areas and density of forest cover.

Table 22: Presence of RBR degradation

	Are there degradation of RBR?					
	Kilombero		Meatu		Total	
	Frequency	%	Frequency	%	Frequency	%
No	39	11%	90	21%	129	16%
Yes	320	89%	334	79%	654	84%
Total	359	100%	424	100%	783	100%

Pearson chi-square(1) = 15.1711 Pr. = 0.000

Source: Author’s Survey Data, 2016

Table 23 summarises findings and demonstrates that of the 783 respondents, the majority (79%) reported a deterioration in the status of forest cover, followed by status of land, (62%), status of fish (60%) and status of water (52%).⁸⁸ When comparisons are made between two study areas, results show that 88% and 71% of respondents in Kilombero and Meatu, respectively, are concerned about the degradation of the forest. The majority of respondents in Kilombero (71%) are concerned about degradation of fish compared to Meatu, which is 51%. Degradation of land seems to be a major concern in Meatu. 75% of responds in Meatu reported the deterioration of the land status compared to 48% in Kilombero. There are minor differences in responses on the degradation of water between study areas, i.e. 53% in Kilombero and 50.5% in Meatu. Pearson chi-square results show significant associations between the statuses of land and river basins, fish and river basins, and forest and river

⁸⁸ The number of responses do not sum to the number of people who mentioned degradation practices because some respondents fall into more than one category.

basins. These results were also confirmed during FGD where people in Kilombero complained of the increasing incidences of deforestation and illegal fishing. For instance, the survival of Namwai forest (a ward forest) in Mofu is threatened by increasing human activities within the forest. A man in Ihenga said that: *“When I arrived here in the early 2000s, there was a huge forest that bordered the ward with the other ward. But now, the situation has changed. As you look at the map, many areas of forestry have become farms. The jungles have disappeared.”* In Meatu, while forests and fish have for long been degrading, there are continuing cases of degrading soil base due to farming and traditional pastoralism methods that destroy the soil base. As a result people have experienced decreases in land productivity and been aware of decreases in the depth of Simiyu River. Pearson chi-square results on association between water status and river basins are not statistically significant. There are no differences in the perceptions of the changes of water status between study areas. Both areas experience problems of the decrease in volume of water flow into the river and the disappearances of some of the streams that used to feed the larger rivers.

Table 23: Nature of RBR degradation according to respondents living at different river basins

		Kilombero		Meatu		Total		χ^2
		Freq.	%	Freq.	%	Freq.	%	
Status of water	No	168	47%	210	49,5%	378	48%	0.581
	Yes	191	53%	214	50,5%	405	52%	
	Total	359	100%	424	100%	783	100%	
Status of land	No	186	52%	108	25%	294	38%	57.51**
	Yes	173	48%	316	75%	489	62%	
	Total	359	100%	424	100%	783	100%	
Status of fish	No	105	29%	208	49%	313	40%	31.79**
	Yes	254	71%	216	51%	470	60%	
	Total	359	100%	424	100%	783	100%	
Status of forest	No	44	12%	124	29%	168	21%	33.3**
	Yes	315	88%	300	71%	615	79%	
	Total	359	100%	424	100%	783	100%	

Notes: Freq. = frequency; χ^2 = Pearson’s Chi- square; ** Significant at 1% level.

Source: Author’s Survey Data, 2016

When asked to give their views on reasons for the degradation of RBR, 248 (32%) of respondents relate RBR degradation with deforestation activities, 275 (35%) relate it with poor conservation practices when pursuing DST and 200 (26%) link it with insufficient government efforts to protect RBR (see table

24). Results that compare two study areas show that large percentages of respondents in Kilombero relate RBR degradation problems with poor methods of conservation when pursuing DST (44% Kilombero vs 28% Meatu) and deforestation (36% Kilombero vs 28% Meatu). In Meatu, the majority relate a problem with government failure to protect RBR (32%), compared to responses from Kilombero, which stand at 18%. Pearson chi-square results on the association between all variables and river basins are statistically significant. During FGD, people in Kilombero link the degradation to human activities. Increasing human activities such as the clearing of land for agriculture and settlement are further associated with the increase in population of both human beings and cattle. A man in Ihenga complained that:

“Before invasion of pastoralist migrants, the villagers had fewer than 4 to 8 cows, but now you find one person with a hundred cows. If every household had such a large number of cattle, the whole area would be desert. The government authorities always promise to come with actions to reduce the amount of cattle, but they never do so”. Another man who is a pastoralist added that “We heard that in some other districts, government have allocated land for farming and for pastoralism. But for us, we do not have specific areas of grazing. As a result, people find themselves invading in river protected areas. We have the feeling that we have been forgotten in society.”

Table 24: Reasons for the degradation at different river basins

		Kilombero		Meatu		Total		χ^2
		Freq.	%	Freq.	%	Freq.	%	
Deforestation	no	229	64%	306	72%	535	68%	6.311
	yes	130	36%	118	28%	248	32%	
	Total	359	100%	424	100%	783	100%	
Poor conservation methods	no	201	56%	307	72%	508	65%	22.99**
	yes	158	44%	117	28%	275	35%	
	Total	359	100%	424	100%	783	100%	
Government failure to protect RBR	no	295	82%	288	68%	583	74%	20.75**
	yes	64	18%	136	32%	200	26%	
	Total	359	100%	424	100%	783	100%	

Notes: Freq. = frequency; χ^2 = Pearson’s chi-square; ** Significant at 1% level.

Source: Author’s Survey Data, 2016

Cross tabulations were conducted to determine the association between variables that measure degradation awareness and attitudes towards conservation behaviour. Results in Table 25 show that the majority of respondents who mentioned all three categories (deforestation 52%, poor conservation methods 57% and government failure to protect RBR 58%) use conservation practices. Apart from the variable deforestation, the other two variables show statistically significant Pearson-chi-square results.

Table 25: Reasons for the degradation and conservation behaviour

		Conservation Behaviour						χ^2
		No		Yes		Total		
Deforestation	No	270	50%	265	50%	535	100%	0.5648
	Yes	118	48%	130	52%	248	100%	
	Total	388	50%	395	50%	783	100%	
Poor conservation methods	No	270	53%	238	47%	508	100%	7.49**
	Yes	118	43%	157	57%	275	100%	
	Total	388	50%	395	50%	783	100%	
Government failure to conserve RBR	No	304	52%	279	48%	583	100%	6.13*
	Yes	84	42%	116	58%	200	100%	
	Total	388	50%	395	50%	783	100%	

Notes: Freq. = frequency; χ^2 = Pearson's chi-square; ** Significant at 1% level; * Significant at 5% level.

Source: Author's Survey Data, 2016

5.3. ATTITUDES TOWARDS CONSERVATION BEHAVIOUR: LOGIT MODELS RESULTS

Table 26 presents findings from logit models on factors affecting attitudes towards the conservation of RBR. Three models were estimated separately to see the differences in results between the models that pool data of two study areas versus the models that disaggregate data by basin. These models are labelled in table 18 as model 1. As explained in the last paragraph of section 4, model(s) 2 add to the first model(s) interaction variables between explanatory factors. In all our models, the goodness-of-fit tests show statistically significant results as given by chi-square results (LR χ^2) in the last row of table 18. These results imply that our independent variables, taken together in full models, explain the dependent variables better than the models with only constant terms.

For each basin, the interpretation of results is based on model 1 because most variables in model 2 (apart from the variables that measure economic factors) are not statistically significant. Table 26 shows that five out of seven independent determinants of conservation behaviour are statistically

significant. Demographic factors in terms of gender and age are not significant determinants of attitudes towards RBR conservation in Meatu. In Kilombero, gender is the only significant factor that affects attitudes towards conservation of RBR. Results show that the odds for women (versus men) to practice conservation methods are lowered by a factor of 0.7 (when data are pooled) and by a factor of 0.55 (when Kilombero data are used). These statistically significant results of the variable female partly confirm our first hypothesis. During FGD, female respondents mentioned that they do not need to use methods of conservation as the majority of them depend only on seasonal farming. While fishing and traditional pastoralism are commonly practised by men, women who practise irrigated farming mentioned that they do not have modern equipment that is more likely to cause degradation of water. A women in Sululu village said: *“We women use buckets to irrigate our farms. We do not use machines that pump large amounts of water from the river. Our activities do not contribute to destruction of RBR.”* However, these women admit to farming areas close to riverbanks in order to have easy access to water because they do not use water pumps. Men access water pumps by either buying or renting equipment. In Signal village, women said that they practice irrigation with their spouses using pumps and buckets. Pumping water from a river is a man’s role. Women only help with planting, weeding and harvesting.

Economic factors are also important determinants of conservation behaviour. In both study areas, results show that people who pursue more than one DST are more likely to use conservation methods compared to people who depend on one DST for their livelihood. In the model that pool data from the two study areas, the odds for practicing conservation behaviour is almost doubled (odds ratio of 1.95) for people with multiple DST versus people who practice a single DST. Results from the basin’s level show that people with multiple DST in Kilombero and Meatu are 2.25 times and 1.62 times, respectively, more likely to practice conservative behavior compared to people without multiple DST.

The study also sought to establish whether there are gender differences in the impact of access to resources on conservation behaviour. The variables that capture the interaction between female and multiple activities are not statistically significant. These results confirm our second hypothesis that people with access to multiple resources are more likely to have positive attitudes towards the conservation of RBR, regardless of their gender. Survey findings were also confirmed during the FGD. People who depend on a single DST are not able to diversify their strategies. These people may be forced to over-exploit RBR because of their dependence on those resources. For instance, although cattle are considered a source of gully erosion in the areas where they pass, some people in Meatu rent out their land to be used as pasture. These people fully depend on the land they own as the source of livelihood. While a person depends on the same piece of land for growing crops during farming seasons, she/he may rent it out for feeding cattle when the season is over. A widow in Ntobo said:

“I was married as a fifth’s wife. Our husband split his farm and gave each of the wives a plot to cultivate. I was the younger wife who depends mostly on a husband’s income. After death of our husband, life became difficult on my side. Unlike my colleagues (old wives) who cultivate with their children, my children are too young to help with the farm’s works. I have a farm to cultivate without access to labour. I have to lend my field to pastors so that I can survive with my children. Although the farm is ruined by cattle, I have no other way to get money.”

Other people rent out their land to be used for the production of bricks in Kilombero. This activity is mostly practiced along the rivers to have easy access to water. RBR are destroyed because the activity involves digging the land for soil, leaving large holes in the land.

There are different results as regards the relationship between degradation awareness and conservation behaviour among the two study areas. Findings in Kilombero show that people who perceive the role of government in the management of RBR to be insufficient are 2.42 times more likely to use conservation methods compared to those who do not have this perception. Findings for people who perceive degradation as the outcome of deforestation and poor methods of conservation methods are not significant. During FGD we found that pro-environmental behaviours are not common among residents of Kilombero. For instance, although the Environmental Management Act (URT, 2004, p. 49) prohibits the carrying out of human activities in the area “beyond sixty metres” from the riverbanks, we found that the majority of the villagers do not adhere to this rule. With the exception of irrigation activities that are conducted by using modern irrigation schemes, other irrigation activities are conducted within protected riverbank areas. Pastoralists graze their cattle widely, including riverbank areas. Most human activities have resulted in soil and gully erosion and the widening of riverbanks. A man in Mofu village said: *“In the past, we did not experience floods because river banks were not eroded. Now, human activities along CCM River and Luipa River have eroded riverbanks. This allows water to disperse out of their channels, which results in the destruction of crops.”* In Mofu village, villagers decided to increase the height of the CCM River by digging a trench to prevent flooding. In almost all FGDs, we found that no single group of resource users would admit that their actions contribute to the degradation of RBR. Even when respondents accept that not practising pro-environmental behaviour is a cause of degradation of RBR, they would tend to blame other groups of resource users for the degradation practices. For instance, while farmers would associate the problem with the increasing number of cattle, agro-pastoralist would associate it with poor fishing methods, and fishers would associate it with both irrigation methods and pastoralism. Other people blame government authorities for being silent on the increase of degradation practices in Kilombero. For instance, a group of young men in Ihenga blames a district council for not taking measures to protect a forest, which is close to their village. One of the participants said:

“I have been here for more than 10 years, but I have never heard any campaign that requires people to plant trees. People keep on cutting trees without planting even a single tree.” Another man added that: “The government has contributed greatly to the damage of rain forests and rivers. For a long time, the government forgot to set up land use plans for better land utilization and conservation.”

The results from a model that combines all data and a model that uses Meatu data reveal that degradation awareness is an important determinant of attitudes towards conservation behaviour, particularly in Meatu. In Meatu, people who think that degradation is caused by an insufficient role of the government to protect RBR are 3.15 more likely to use conservation methods compared to those who do not have that perception. Results also show that the odds for practicing conservation behaviour are 2.81 higher for people who perceive poor methods of conservative practices as the source of degradation of RBR (compared to those who do not have this perception). Furthermore, respondents who perceive that degradation of RBR is caused by deforestation (versus who do not perceive this) are 2.09 times more likely to practice conservation behaviour. In line with the third hypothesis, these results imply that degradation awareness leads to positive behaviour towards conservative of RBR. During FGD the importance of environmental awareness for RBR conservation attitudes becomes obvious. While there are almost no forests/ woodland areas in the surveyed villages, some few trees belong to private people. Some people planted trees on their own initiative after learning of its importance. An old man in Mwabuma said:

“During dry season, this place is hot and dusty because there are no trees. I decided to plant trees around my house and along my farm, which is close to the river to reduce impacts of bad weather, and to get enough firewood for my household and for business purpose. Furthermore, after receiving beekeeping’s education from LVEMP project, I decided to use my trees along the river to keep bees. Currently, I earn more income from beekeeping”.

Deforestation has long been a tradition for people along SRB, which has left the land in a semi-desert state. Some respondents still do not consider afforestation as one of the ways to conserve RBR. A woman in Mwashata asserted, *“I do not agree with planting trees in my farm along the river because trees attract wild animals”*.

In addition, the majority of respondents mentioned that some RBR such as small streams and fish have disappeared, though they have different opinions as to the reasons for the disappearance. On the one hand, some respondents thought disappearances of RBR are caused by environmental degradation. A man in Kisesa village said:

“In the past, there were so many fish in the river and even in the small streams. Nowadays, there are neither streams, nor fish. Even when one is lucky to get fish from the river, they are very small in shapes. Those streams disappeared because people started to cultivate close and within the streams.”

On the other hand, other villagers thought there are other factors that cause some RBR to disappear and not necessarily human activities. For instance, a man in Mwashata village thought that the disappearance of fish is caused by government actions to overprotect Lake Victoria. He stressed: *“Sometimes we think government authorities have put a barrier (fence) inside the lake that fish should not swim up to our river”*. He continues by saying that *“government denies us cultivating along the river so that they can protect the lake. These efforts leave us in poor conditions while benefitting people who live along the lake.”*

Some respondents associate environmental problems with the will of God to punish people because of their bad deeds. While one of the elders said that: *“Environmental problems for instance reduction in rainfall is the will of God and that human being cannot prevent it”*, another elder argued: *“Society is facing environmental problems because of bad doings of young generations. Young people do not respect elders: that is why God is punishing this generation by cutting off the rains, taking back the fish and drying up the rivers.”*

In Mwashata village, elders argued that the short rainfall season and long periods of drought lead to decrease in volume of water flow in the river. When they were asked for the reasons, they said they did not know the reason behind this. They added that there are no human activities that threaten the environment, particularly, RBR. These kinds of responses reveal the importance of environmental knowledge for people to become aware of the benefits of conserving rivers and their resources.

Table 26: Logistic Regression model on determinants of Conservation Behaviour

Conservation Behaviour	ALL data				Kilombero data				Meatu data			
	Model 1		Model 2		Model 1		Model 2		Model 1		Model 2	
	Odds Ratio	z	Odds Ratio	z	Odds Ratio	z	Odds Ratio	z	Odds Ratio	z	Odds Ratio	z
Demographic factors												
Age	1.02	0.73	1.02	0.64	0.99	-0.12	1.00	0.01	1.04	1.00	1.03	0.78
Age square	1.00	0.00	1.00	0.18	1.00	0.16	1.00	0.22	1.00	-0.09	1.00	0.48
Gender (if female =1)	0.70*	-2.2	0.66	-1.00	0.55*	-2.43	0.87	-0.23	0.93	-0.33	0.75	-0.50
Economic Factors												
Multiple DST	1.95*	4.10	5.02*	2.01	2.25**	3.33	7.27	1.55	1.62*	2.11	14.96*	2.08
Perception factors												
Government failure to conserve RBR	2.41**	3.98	2.52	0.87	2.42*	2.40	1.09	1.37	2.43**	3.15	2.04	0.48
Poor methods	2.04**	3.55	4.08	1.50	1.61	1.60	6.32	1.28	2.22**	2.81	3.07	0.82
Deforestation	1.51*	2.04	1.32	0.27	1.07	0.23	1.64	0.30	2.09**	2.60	1.77	0.39
Interactions												
Multiple DST* Age			1.00	-0.01			1.00	0.14			0.98	-0.96
Multiple DST* Female			0.75	-0.88			0.92	-0.17			0.57	-1.16
Government failure* Age			1.01	0.48			0.99	-0.40			1.01	0.39
Government failure* Female			1.43	0.76			0.91	-0.10			189.1	1.03
Poor methods* Age			0.98	-1.67			0.97	-1.30			0.98	-1.30
Poor methods* Female			1.06	0.13			0.56	-1.00			1.74	0.92
Deforestation* Age			1.00	0.26			1.01	0.62			0.99	-0.41
Deforestation* Female			1.33	0.68			0.71	-0.60			2.12	1.24
River basin differences												
(if Kilombero River = 1)	0.85	0.97	0.84	-1.06								
Logistic Regressions	All data: Model 1		Model 2		Kilombero: Model 1		Model 2		Meatu: Model 1		Model 2	
Number of observations	783		777		359		354		424		419	
LR χ^2	118.42**		129.96**		44.9**		52.34**		90.84**		101.89**	

Note: Dependent Variable is Conservation behaviour, a dummy variable taking a value of 1 if a person uses conservation methods and 0 if otherwise. All models are estimated using Logistic regression. Odds ratio shows the factor change in odds of a person to use conservation methods (conservation behaviour) for a unit increase in an independent variable. Z score are reported to show the directions of changes of the independent variables. A 'z' coefficient is the z-score for test of $\beta = 0$. LR χ^2 is the value of a likelihood-ratio chi-square for the test of the null hypothesis that all of the coefficients associated with independent variables are simultaneously equal to zero (Long & Freese, 2003, p. 76). ** Significant at 1% level; * Significant at 5% level.

Source: Stata output/Own estimation

6. DISCUSSION

This chapter has assessed how people's awareness of the degradation of RBR influences attitudes towards the conservation of RBR, taking into account respondents' economic and demographic factors. A comparative analysis was conducted involving people residing along Kilombero River and Simiyu River in Tanzania. Our findings reveal that 50.4% of all respondents use conservation methods. Demographic factors in terms of age and gender are not significant determinants of conservation behaviour in Meatu. However, in Kilombero, gender is a significant factor. Findings also show that women are less likely to use conservation methods compared to their male counterparts. In fact, this is a gender effect in the sense that it is not that women are by nature less or more inclined to conserve but the underlying gender relations limit them to specific activities. Women themselves think that they do not need to use conservation methods because they normally do not engage in DST that make intensive use of RBR, for example fishing and traditional pastoralism. Although they conduct their activities along the rivers, women who practise irrigation farming do not consider that their activities contribute to degradation because they do not use heavy machines to irrigate. In this case, women's negative attitude towards conservation may be associated with a lack of knowledge of degradation problems.

Further, our findings show that participation in more than one DST is likely to influence positive behaviour towards conservation of RBR compared to participation in a single DST. People with multiple DST are assumed to own several resources, which they use to engage in different DST. These findings are in line with studies by Infield (1988) and Hackel (1999), which show positive relationships between household endowments in terms of land, labour and other livelihood resources and conservation practices. The presence of market failures causes high rates of natural resource depletions because the poor tend to harvest the resources in order to meet current consumptions (Perrings, 1989) rather than wait for long term benefits (Pender, 1996).⁸⁹

The findings also indicate the presence of degradation awareness in both study areas, though results differ. Findings show that degradation awareness affects attitudes towards conservation behaviour positively, particularly in Meatu where all three categories of degradation awareness

⁸⁹ However, some researchers have found different resource consumption patterns among the poor. For instance, because land is the only asset available for the poor, the poor may have strong incentives to manage their land well (Pender et al., 2004).

(related to deforestation, poor methods of conservative practices and insufficient government's role) are significant. In Kilombero, respondents' perceptions of the insufficient role of government is the only significant factor. These findings have two implications. On the one hand, findings reveal that promotion of environmental awareness is an important factor for the sustainable use of RBR. In this case, we confirm our third hypothesis that people who are aware of degradation of RBR are more likely to demonstrate positive behaviour towards RBR conservation. On the other hand, insignificant results of the other two variables in Kilombero reveal that awareness does not always lead to positive attitude towards conservation. The positive and significant findings in Meatu can be associated with governmental projects that aim to protect Simiyu River. In addition, for a long period people in Meatu have been experiencing the substantial negative impact of degradation practices. For instance, deforestation practices have resulted in the desertification of the area.⁹⁰ The experiences of negative impact of environmental changes may have facilitated the positive attitude towards conservation.

⁹⁰ Drangert (1993) in his study "Who Cares about Water in Sukuma Land" shows that Sukuma land (including Meatu) was densely forested before World War II. However, the forest were highly degraded when we conducted his study; only a few mango trees could be seen. During our own field study, we saw few mango trees. Both the forests and natural vegetation were highly degraded due to cutting of trees, overgrazing and extensive cultivation.

7. CONCLUSION

Pro-environmental behaviour in terms conservation of RBR resources reflects the knowledge that people possess of degradation problems. However, awareness alone may not be enough because river basins and their resources face the public goods' problems i.e. conservation of RBR is seen as a government or non-governmental organisation's role, and not everybody's responsibility. People and communities need to be made aware that conservation of RBR is not an option that a person/ community may choose, but a necessary action for sustainability of resources. This can be achieved through proper implementation of rules that govern the use of RBR.

The study recommends the designing of education programmes to raise environmental awareness among different groups of resources users. However, since awareness does not always lead to positive attitudes towards conservation, the provision of education should be matched with incentives that encourage resource users to practice pro-environmental behaviour. A good example of this is the project that compensates people for moving their activities away from the river banks in Meatu.

The fact that some people over-exploit RBR because of the lack of alternative resources to earn livelihoods underscores the need to establish community projects that reach a wide range of people, with different needs. For instance, while district councils allocate some funds for the empowerment of women's groups, there should be other efforts to identify women with special needs, including e.g. women who cannot afford to be members of those groups because of lack of resources. In addition, implementation of laws that require people to move their activities away from riverbanks should occur alongside the construction of facilities such as irrigation schemes, wells and cattle drinking troughs. Such efforts will conserve the RBR without affecting people's livelihoods negatively.

Policy makers and other practitioners should target different groups of people according to their roles in the communities during design/ implementation of conservation practices. These groups are more likely to spread knowledge to a wide range of people through peer group discussions or other roles of mentorships they have. For instance, because of their gender role of raising and taking care of families, women play an important social role of imparting knowledge to children and other household members. Thus, targeting this group can assure an easy transfer of knowledge to different members of households.

The study recognizes that it may be difficult to incorporate perceptions and awareness features of different groups of people in policy papers. The presence of too many ideas from different

individuals may make the application of concepts difficult. However, understanding people's awareness of degradation of RBR and its impact on pro-environmental behaviour is important for identifying factors that are likely to affect the implementation of conservation strategies. This kind of information is critical during the design and implementation of conservation initiatives.

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CHAPTER 9

CONCLUSION

1. SUMMATIVE OVERVIEW

1.1. INSIGHTS FROM THEORY

Chapter 2 presents the theories that explain the governance of natural resources with a focus on the factors that contribute to people's use of natural resources, impact on their livelihood and that lead to the degradation of natural resources. The chapter sets out the concept of livelihood framework (LF) that describes how people combine different livelihood resources, including natural resources, to enhance their livelihood. This framework is used to elaborate on the relationships between access to resources, development strategies (DST) and livelihood outcomes. While the literature discusses a broad range of different livelihood outcomes, increased well-being and sustainable use of river basins resources (RBR) are the most important outcomes in this study. Throughout the dissertation, we use the livelihood framework as the major tool for analysis; and the LF employed is modified to address some of the criticisms levelled against the model. These criticism include the failure of LF to conceptualize the issues of access to resources, inadequate consideration of the impact of social relations on livelihood outcomes and the limitation of LF in terms of the economic indicators of wellbeing as the main measures of livelihood outcomes.

The chapter also presents various theoretical perspectives on the institutional theories of natural resources management, particularly with regard to the management of shared/common resources. These theories range from older perspectives such as neoclassical theories and institutional economics to the current theoretical debate between mainstream and more critical institutionalists. The roles of community and social relation factors in the governance of natural resources are also covered in this section.

To address the criticism of LF, the chapter has also reviewed different theories that explain access to natural resources. The property right theory shows that different individuals/organisation may possess different forms of rights over the use of shared resources such as water. While some people may hold rights, for example to use water for domestic purposes, others may have rights to use water for productive activities such as fishing and irrigation. Furthermore, other resources can be owned as private property, for example private rights to own and use land. The rights can also be permanent or seasonal, for instance when land is rented. All these types of rights affect the way resources are used and managed. One of the important things that is noted from the literature is that legal possession of rights to the use of resources or physical ownership is not a sufficient condition for the household/ individual to benefit from the resource. Institutional factors moderate the whole process of gaining benefits.

For instance, some individuals not only hold the rights to use a shared resource but they may also hold the rights to decide how and when to use it. Holding such rights may entail some form of power. Those who hold power may use it to their advantage i.e. to gain more benefits from resources than other resource users. In addition to the power that may be derived from formal authority, other forms of power can also be derived from informal social relations such as gender, age and other forms of socially constructed practices. The chapter also presents intra-household theories to elaborate on how socially constructed practices create inequalities in the ways different household members use household resources and accrue benefits from the use of goods produced from those resources. Along the same lines, intersectionality theories are used to show the ways in which livelihood outcomes of some people are affected more than others because of their positioning at the intersect of different social categories.

In the final section, the concept of LF together with a number of concepts from the theories on access to natural resources and institutional theories on management of natural resources are used to develop the analytical framework that guides the study.

1.2. METHODOLOGY

Chapter 3 shows the study design and the methodology for the data collection activities and data analysis. A mixed methods research design was used to address the research questions. Data were collected in three phases whereby the qualitative—quantitative—qualitative approaches were used sequentially.

Before proceeding with the field research settings, we embarked on exploratory qualitative research to gather prior information to clarify some of the variables that are used in the analytical framework, and to aid the selection of the study districts and villages. This included field visits to river basin board offices in Kilombero basin and Simiyu basin, and visits to Kilombero and Meatu districts council offices and their respective wards and villages. The exploratory qualitative research was useful to obtain background information on the livelihood situations along the river basins, including RBR uses and dependencies, governance of river basins, and RBR conditions in the study area. In addition to the use of relevant literature, conceptualizations of some of the variables, for example RBR, DST and degradation of RBR

needed to be grasped at the field level.⁹¹ Thus, the preliminary field visit also helped to validate the definition of the concepts used in the analytical framework. In addition to discussions with government officials responsible for the management of RBR in the study areas, we also had discussions with different resource user groups such as associations of irrigators, pastoralists and farmers who live and work in the study areas. Further to that, the information from the field visit helped us to identify the surveyed districts and villages. Consequently, the Kilombero and Meatu districts were selected as the areas of study.

The quantitative design involves a household survey carried out in Kilombero and Meatu districts. A survey questionnaire was used to collect data to test the relations highlighted in the analytical framework and to obtain initial answers to the research questions. However, the findings from our survey could not provide a detailed understanding of the relationships between variables. Thus, focus group discussions together with resource mapping and benefit analysis were employed to supplement the findings from the quantitative approach. While focus group discussions were used as a major method of data collection during the third phase of data collection, resource mapping and benefit analysis were used to aid the conduct of the discussions, particularly on the issues that seem to touch personal (family) issues and cultural norms of respondents.

The study also employed a document review to further supplement data, and in particular, to answer the first research question. The study gathered data from different published and unpublished materials such as books, reports, papers, statistical abstracts from government ministries/ agencies and districts/villages authorities. This information was used to identify and assess rules and regulations (at the national/ sectoral, district, village and community levels) that define activities that are used in river basin management at local levels.

The comparison between the two study areas i.e. Kilombero basin and Simiyu basin shows some differences in the nature of the basins, secondary DST, cultural norms with regard to conservation behaviour and institutions (organisations) that support conservation of RBR. While Kilombero basin lies in the natural wetland flood plain, with several rivers that flow throughout the year, Simiyu basin is a seasonal area, with increasing amounts of water during the rainy season. These differences make the Kilombero basin a potential area for the conduct of irrigation activities throughout the year. In addition, the area is also attractive to pastoralist

⁹¹ As proposed by (Leach et al., 2010), some of the concepts such as resources and sustainability differ across societies, and their definitions should better reflect the situation in a specific setting.

migrants who seek pasture and water for their cattle. Due to the presence of large rivers, fishing is largely practised in Kilombero basin. In Meatu, traditional pastoralism is considered as the secondary DST as the majority of the people in this area are agro-pastoralists. In both areas irrigated farming is practised, but in Meatu it is limited to small-scale vegetable gardens, with little use being made of irrigation schemes. In Kilombero, irrigation activities are conducted in both large-scale and small-scale farms. In the modern irrigation schemes, large farms of paddy rice are irrigated throughout the year. In some other areas, traditional irrigation schemes and/or water pumps are used for irrigation.

There are different institutions that support conservation of RBR in the two study areas. In Kilombero, most irrigation activities are coordinated through the irrigators association. These groups receive government support in terms of education and services on sustainable methods of farming and conservation of RBR. In Meatu, there are groups of farmers, modern livestock keepers and beekeepers who receive support and education on RBR conservation from the governmental project called The Lake Victoria Environmental Management Project (LVEMP II). The project works on the conservation of Simiyu River banks with the aim of reducing the environmental degradation facing Lake Victoria.

The chapter also gives a brief description of the position of a researcher in a study setting and how that position might affect the data collection activity. The chapter ends by highlighting the limitations of the data collection activity in each phase, and their implications on the study's validity and reliability.

1.3. FINDINGS

1.3.1. POLICIES ON GOVERNANCE OF RIVER BASIN RESOURCES: IMPLICATIONS ON PEOPLE'S LIVELIHOODS AND RESOURCE CONSERVATION

Chapter 4 addressed the first research question, which seeks to understand the ways in which the existing governance structures affect uses of RBR and its implications on people's livelihoods and RBR conservation. We showed how, over time, the policies on the governance of water resources have been changed to reflect the priorities of the contemporary government systems. We then gave an overview of the current policy (national water policy) that governs water resources, together with its institutional frameworks. The linkages between the current national water policy and other sectoral policies in the planning and management of water resources are also highlighted in the chapter. The chapter then reviewed literature on the impact of the

policy's implementation on people's livelihoods (in terms of access to RBR) and RBR conservation. This is done by highlighting the strengths and challenges of the implementation of the water policy.

Findings revealed that the new policy and its institutional framework have been successful in helping people to organise resource users groups (RUGs) such as water users associations, irrigators associations and beach management units. Through RUGs, resource users have been able to join collective efforts to acquire permits to use shared RBR. RUGs also provide opportunities for resource users to gain access to other services from the government, for example credits and farming extension services. As a result, some people have started improving the practise of their DST, which also translates into the improvement of their livelihoods. In addition, the policy and the related institutional framework have brought different stakeholders into the planning and management of RBR. RUGs have their representatives at all levels of planning and management of river basins. This provides opportunities for people to adopt integrated approaches of sustainable use and conservation of RBR. Some RUGs have been successful in protecting RBR through enforcement of rules, resolution of conflict and the introduction of activities that generate income but at the same time conserve RBR.

Despite these successes, the study has also highlighted several factors hindering the effective and sustainable use of river resources in the basins. These factors are mainly related to inadequate institutional frameworks to include all stakeholders in the implementation of water policies, conflicting objectives of sectoral policies and conflicts between cultural values and formal rules on the use of RBR.

The findings show that the institutional frameworks have not adequately included the majority of smallholder RBR users in policy implementation. While the policy is based on the good intention of devolving the task of water resources management towards the lowest social level of the basin, large water users and elites tend to accrue more benefits from the implementation of the policy compared to smallholders (poor) resources users. For example, people with access to multiple resources in terms of cash, credit, networks, knowledge, skills and information can easily afford individual water permits or collective permits through RUGs, compared to people without access to such diverse resources. Involvement in RUGs requires a certain amount of financial capital to pay for membership charges and other costs associated with forming, joining and registering the groups. Basic knowledge of the roles of RUGs in transforming people's livelihoods is also required for a person to be aware of the expected benefits. In most cases, only elite members of societies have access to the kind of resources that are required to become

members of RUGs. In addition, in some cases smallholder users who are also members of RUGs have no choice but to rent out their user rights to outsiders. Some resource users also prefer cultivating on their farms outside the schemes where there are no resource users group's rules, for instance payment of water fees and the application of pesticides and fertilizers. Consequently, poorer layers of a community tend to belong to those groups that accrue few benefits compared to resources users with access to diverse resources.

The conflicting sectoral policies on the uses of RBR also contribute to the exclusion of the smallholder resource users. While the national water policy aims to benefit all stakeholders, including, smallholder users, other policies seem to favour large resource users. For example, the policies that aim to increase agricultural production typically involve allocating substantial areas of land and quantities of water to large investors. In some areas (for example in Wami-Ruvu basin),⁹² the resources that were allocated to large-scale investors were previously used by smallholder resource users. Such policies left the smallholder resource users worse off because they are left with fewer resources to depend on.

The study also found that rules on the use of RBR are not effectively implemented. Although village by-laws regarding the management of resource use are in place, they lack enforceability because villagers tend to rely on norms and customary systems to solve disputes when accessing resources. In some areas (for example in Kilosa district)⁹³, some village leaders were reported to lack the skills to implement the policy. This makes the objective of conserving RBR even more difficult because the punishment to those who degrade the resources does not necessary reflect the actual value of degradation.

While gender is mentioned in the policy document, we found that this component disappears from the implementation guideline documents. In particular, gender based strategies are not reflected in the section of water resources management which already predicts its policy evaporation at later stages of implementation. As a result, no concrete gender strategies or gender-based indicators are taken into consideration during the implementation.

⁹² For more detail, see a study by van Eeden et al. (2016).

⁹³ See a study by Masifia and Sena (2017).

1.3.2. INTERSECTIONALITY AND AN INTRA-HOUSEHOLD ANALYSIS OF ACCESS TO RBR

The issues of access to RBR are central in chapters 5 and 6. The chapters address that part of the second research question, which seeks to study the ways in which different groups of people within and between societies access RBR. In line with its analytical framework, the thesis defines individual access to RBR in terms of practical rights (norms) to use household owned RBR to pursue different livelihood activities and the ability to benefit from the goods that were produced from the use of RBR. The analysis from these chapters specifically addresses the first and second relation of the analytical framework presented in chapter 2. The chapters demonstrate that the livelihoods of some people who live in the villages along river basins in Tanzania might be affected by differences in practical rights to use household owned RBR to pursue different livelihood activities, and the ability to benefit from the goods that are produced from the use of RBR. These differences are the result of cultural norms and beliefs that create diverse social relations in the society. Diversities in terms of wealth, knowledge, age, and gender create differences in power relations among actors.

The major difference between the two chapters is in terms of the data used in the analysis. In chapter five, data from Mofu ward of Kilombero district were used to make a comparative analysis of access to RBR between fishing and agro-pastoralist communities. In particular, the chapter applied intersectionality theory to examine how informal social relations in terms of age and gender interact to affect practical rights to use RBR and the ability to benefit from the use of RBR. As we mentioned earlier in chapter 3, the environmental and weather conditions of Kilombero district attract migrants from different parts of the country, particularly agro-pastoralists from the Lake zone of Tanzania. Agro-pastoralist migrants tend to live in their own villages, separate from the native dweller groups. Thus, we used data from Kilombero to capture differences that may exist between different socio-economic groups.

Chapter 6 used intra-household and intersectionality theories to analyse the relative benefit that household members gain from the use of goods produced by households living along the Simiyu River in Meatu District. The analysis in chapter 2 addresses only the second relation i.e. the determinant of the ability to benefit from resources.⁹⁴ As we mentioned earlier in chapter 1

⁹⁴ In line with the analytical framework, the ability to benefit from the use of goods produced by a household is defined as the freedom that a person has with regard to decision-making about the goods that are produced within the household.

(section 4), Meatu district is formed by households with extended families who pool resources that are directly used in production. While all household members were assumed to share resources, drawing upon intra-household literature, the paper argues that there might be intra-household differences in terms of decisions regarding the uses of goods. Thus, the utilities of some household members derived from using the household's produced goods might not be maximized if they do not possess decision-making powers on the uses of goods.

Our findings show that both practical rights to use RBR and benefits from the use of resources are highly gendered, though their impact differs according to age and ethnicity. One common feature in all cultural groups is that the norms that deny women's rights to use RBR result in a gendered distribution of labour, especially when access to RBR leads to income-generating activities. Findings in Kilombero revealed that women cannot be involved in fishing and traditional pastoralism, the activities that are practised for income generation. In Meatu, both women and men play major but different roles in the production of goods. While women are involved in the production of corn (staple food) and cash crops, they also assume extra responsibility for cultivating crops to provide legumes and vegetables for their families. Women make decisions on the goods that are not sold at market such as vegetables while men make decisions on the uses of goods that have a higher market value.

The findings also show that women are less likely to benefit from the use of resources; however, this is not the case for all women. Women who are native to Kilombero district mentioned having the freedom to make decisions on the use of goods without involving their spouses, while their counterparts, particularly women in the agro-pastoralist community, admitted that they must involve their husbands whenever they want to sell their crops, even crops that were produced by the women themselves. These findings can be interpreted in two ways. On the one hand, results may imply that women who are native dwellers (predominantly of Ndamba descent) have the freedom to make decisions on the use of household produced goods because they are women with a firm base in their own local clan. On the other hand, one could argue that women in the agro-pastoralist community (predominantly of Sukuma descent) might have lost decision-making power because of migration. These two arguments bring us to the findings from chapter six, which show that women in Meatu have subordinate roles in terms of decision-making regarding the use of households produced goods, particularly goods that are sold at market.

The findings from Meatu confirm intra-household theories by showing that the ability to benefit from the use of goods produced by a household differs between men and women, old and

young, and between members who have a different relationship to the household head, which suggests that differences in social identities associated with age, gender and marital status are important. In Meatu, the decision-making power is largely reserved for the male heads of households.

In line with intersectionality theories, we conclude that both men and women are heterogeneous groups in societies. Some people are positioned at the intersection of different social identities, associated with age, gender and marital status, and thus they experience multiple effects. While it is generally perceived that women in rural areas are the victims of norms that deny their development, this is not the case for all women. In Kilombero, older married females who are native to the district are more advantaged in terms of the ability to benefit when compared to young married women. In Meatu, the study concludes that the impact of social identities is not homogeneous across all household members. For example, due to their gender, marital status and age, older unmarried people, older women and unmarried women are less likely to benefit from the use of goods produced by a household.

Interestingly, qualitative findings also reveal that men are also found to be heterogeneous groups, particularly when we compare fishing and agro-pastoralist communities. While men in the fishing community have rights to engage in fishing (an income generating activity), they depend on women (particularly their wives) to make decisions on the use of goods produced within the household.

1.3.3. THE CHOICE OF DEVELOPMENT STRATEGIES AND RBR DEGRADATION

Chapter 7 addresses that part of the second research question, which seeks to analyse how access to resources affects the choices of DST that people pursue for the enhancement of their livelihoods. The chapter also addresses the third question, which aims to shed light on the ways in which DST that individuals choose and RBR degradation are interlinked. Data from the households residing alongside Kilombero River and Simiyu River in Tanzania are used in the analysis.

The chapter argues that in rural areas where the majority depend on subsistence farming, people diversify their DST from farming to non-farm activities to improve their livelihoods. However, the diversification strategy is not automatically available to everybody because it requires possession of livelihood resources that are important to engage in other DST apart from subsistence farming. Thus, the paper also argues that access to social and financial capital are

important to allow people to diversify their activities and become multi-professional. In particular, access to these forms of capital are important for people to be able to choose activities that make less/ sustainable use of natural resources, which have further implications for the sustainability of RBR.

The study analyses determinants of the choice of major DST and secondary DST. On the one hand, findings reveal that neither informal social relation factors nor access to social and financial capital affect the choices of major DST. These results are connected to the fact that the majority of respondents (80.2%) practise seasonal farming as the primary DST. Seasonal farming is the DST that is available to almost everyone: it is largely used to cultivate maize, millet and paddy rice, the crops that assure household's food security. On the other hand, informal social relation variables in terms of age and gender are significant factors influencing choices of secondary DST.

The findings on the impact of livelihood resources show that both access to social and financial capital affects the choice of secondary DST, though the results slightly differ between the study areas. The study links the findings with policy initiatives related to the conservation of natural resources. In Kilombero, access to social capital is an important factor for people to diversify their activities away from traditional pastoralism, an activity that is not environmentally friendly. In Simiyu, access to financial capital increases the likelihood of people participating in off-farm activities instead of other activities that overwhelmingly rely upon RBR, such as traditional pastoralism and irrigated farming.

1.3.4. AWARENESS OF RBR DEGRADATION AND PRO-ENVIRONMENTAL BEHAVIOUR

Chapter 8 addresses the last research question, which aims to assess the ways in which people's awareness of RBR degradation and pro-environmental behaviour are interlinked, with reference to economic and demographic factors among respondents. Degradation awareness is referred to as the act of being conscious of the RBR degradation problems. Pro-environmental behaviour refers to the practice of methods that reduce chances of degrading RBR when pursuing development activities. The assumption was that resource users who are more knowledgeable of RBR degradation problems are also more aware of the need for the conservation of RBR and they are more likely to adopt pro-environmental behaviour when pursuing their DST.

A comparative analysis was carried out among people residing in Kilombero and Simiyu districts in Tanzania. The study found the presence of degradation awareness in both study areas. Degradation awareness affects attitudes towards conservation behaviour positively, particularly in Meatu where all variables that measure degradation awareness are significant. In Kilombero, some of the variables are not significant. These findings have two implications. On the one hand, they reveal that the promotion of environmental awareness is an important factor for the sustainable use of RBR. On the other hand, insignificant results of some variables indicate that awareness does not always lead to a positive attitude towards conservation. Drawing upon these findings, degradation awareness alone is not a sufficient condition for people to practise pro-environmental behaviour.

2. CONTRIBUTION TO THE LITERATURE

This study makes several contributions to the literature. Findings reveal the importance of distinguishing between practical rights to use resources, and benefits derived from their use when studying access to resources. While practical rights to use resources are important for engaging in production, wellbeing is improved when people are able to use what they have produced to achieve their personal goals.

In addition, this study adds to the literature on access to resources by, quantitatively, studying rights to use resources and the ability to benefit from the goods produced from the resources. Most quantitative studies on the topic concentrate on access to resources in terms of possession of material goods and pay little attention to the question of whether people can use the resources, and if they can benefit from the use of resources to satisfy personal needs. To the best of my knowledge, and at the time of writing, there is no study that uses quantitative data to analyse access to resources in terms of practical rights to use resources and the ability to benefit from the use of resources.

The study also contributes to the livelihood literature by elaborating on how informal social relation factors affect access that different groups of people have to livelihood resources, choice of DST and conservation of RBR. Most studies treat factors such as age, gender and marital status as demographic/ individual characteristics and report the results that only portray differences between groups of people. This study uses the literature on informal social relations to demonstrate that the differences in results are not fixed; they are rather caused by socially constructed practices. Socially constructed practices (embedded in cultural norms) create differences in informal social relations, which further create differences in access to resources between groups of people both within society and within households. This has a further impact on livelihood outcomes in terms of occupational choices and conservation behaviours.

Further to that, this study has showcased the ways in which informal social relation factors interact to bring about different outcomes for different groups of people. Our study adds to the literature on intersectionality theories by showing the importance of further distinguishing groups of respondents when conducting research in the social sciences. In particular, while the works of intersectionality theory had its roots in studying the intersect of social categories across different ethnicity/race groups, we analysed the impact of the intersection of social identity factors between a single ethnic group, and across different ethnic groups. The study has demonstrated that women and men are heterogeneous groups across not only cultural backgrounds but also within a single community.

The study adds to the literature on intra-household analysis of livelihood outcomes by collecting data from different male and female household members, beyond husband and wife status, and/ heads of households. Most studies on intra-household analysis have used data that compares male-headed and female-headed households, husbands and wives (Nation, 2010; Ngigi, Mueller, & Birner, 2017; Ngo & Wahhaj, 2012; Van Aelst & Holvoet, 2016) while missing out on the analysis of differences among different male and female members of households.

Finally, yet importantly, our study contributes to the literature on governance of natural resources by showing that awareness of environmental issues is an important factor for people to practice pro-environmental behaviour, although it is not sufficient by itself. Awareness is the product of knowledge, which also depends on (among other things) cultural norms on the use of resources. In addition, those with multiple DST are more likely to practice pro-environmental behaviour compared to those who depend solely on seasonal farming. This option is not available to all people because of lack of access to diverse livelihood resources. Access to livelihood resources in terms of financial and social capital is important for people to become multi-professional, and to diversify from non-environmentally friendly to environmentally friendly DST.

3. POLICY RECOMMENDATIONS

Several policy recommendations are suggested based on the findings from this study. First, there is a need to design strategies that include the majority of smallholder resource users in the implementation framework of the existing water policy. While the policy is based on the laudable intention of devolving the task of water resources management to the lowest social level of the basin, large water users and middle class resource users accrue more benefits from the implementation of the policy than the poorer resource users. The smallholder users, mostly poor people, have thus far somehow been excluded from the implementation framework. In this regard, we recommend that the government, through its local authorities and social security agencies, designs affirmative action that will enable the majority of poor users to accrue benefits from the water policy.

To improve access to resources for different groups of people, the study recommends that policies that target the rural population should take into consideration the types of activities that women (and men) and youths (and elders) engage in. In addition, the information that shows intra-household dynamics (e.g. the levels at which resources are pooled, the types of resources that are shared, gendered distribution of roles in production and gender roles in decision-making regarding the use of household produced goods) may help to determine the groups that are more affected by intra-household resource allocation. This kind of information is important to aid the design of policies/ programmes that target the needs of different groups of people in society. For example in areas where women invest their labour in the production of cash crops while the income from those crops is accrued by men, policies that target the production of cash crops are more likely to benefit men rather than women. On the other hand, the policies that seek to improve the production of crops traditionally grown by women, such as legumes and vegetables will not only improve food security in households, but also improve women's income if the goods are sold at market. Furthermore, policies that target the development of infrastructure for traditional pastoralism such as allocating areas for pasture and water drinking points are more likely to save time that is spent by youths (often male children) who travel long distances looking for pasture to feed their cattle. In addition, such policies will also help to conserve RBR that are damaged because of cattle grazing. Thus, it is imperative that policy makers and other practitioners who work on the improvement of rural people's livelihoods, take into account the roles that different groups of people play in the production of goods.

The study also sheds light on the importance of social and financial capital for the diversification of rural livelihoods from non-environmentally to environmentally friendly DST. This shows that rural finance is important for both the improvement of livelihoods and the conservation of the RBR base. Informal groups, in terms of VICOBA, are important sources of rural finance as access to credit is based on trust and initial amounts invested by members, rather than collateral in the form of physical assets. Thus, we recommend that policy-makers consider the establishment of credit/ group lending programs that can easily provide credit to people in rural areas and also take into account different groups of people in the community. For instance, in addition to the funds that district councils allocate to empower women's groups, there could be other efforts made to identify women with special needs, for example women without access to money that would allow them to join resources groups.

Pro-environmental behaviour in terms conservation of RBR resources reflects the knowledge that people possess of degradation problems. Our findings show that there is still a general lack of environmental knowledge. Some resource users still perceive the new rules as a means by which the government can collect tax. Thus, the government needs to raise awareness of the importance of protecting shared resources. It is important to design awareness programmes that build capacities of RUGs before/ after their registration. This will not only make people aware of the importance of sustainable RBR use, but also empower them in terms of the management of the resources they use. Furthermore, given that village officers and leaders of RUGs play an important role in the conservation of catchment areas and water sources (they create the channel through which people participate in RBR management) special 'leadership' training would help them build their capacity to manage their groups effectively. However, because the findings revealed that awareness does not always lead to positive attitudes towards conservation, the provision of education should run parallel to incentives that encourage resource users to practice pro-environmental behaviour. A good example of this is the project that compensates people to move their activities away from the riverbanks in Meatu. In addition, the implementation of laws that require people to move their activities away from riverbank areas should also involve the construction of facilities such as irrigation schemes, wells and cattle drinking troughs. Such efforts will conserve the RBR without affecting people's livelihoods negatively.

4. AREAS FOR FUTURE RESEARCHES

In this section, several areas for future research are highlighted. In Tanzania, institutional frameworks for the implementation of water policy require planning and management of RBR to be done at the basin level with the involvement of all stakeholders. Consequently, resource users with different interests on RBR have been brought together to manage the shared resources. In the literature, this is referred to as a polycentric governance system, which includes collective action by multiple stakeholders (resources users, formal organizations and informal customary organizations) to govern common resources (Ostrom, 1990). The stakeholders are supposed to complement each other's actions by filling the gaps that cannot be covered by one part. Through this approach, different stakeholders are also able to build their social network that provides opportunities for knowledge and experience sharing, mobilization of resources and conflict resolution as the actors differ in skills, experiences and in their levels of influence in policy settings (Bodin & Crona, 2009; Lemos & Agrawal, 2006). Bodin and Crona (2009) contended that social networks can be more important than formal institutions for effective enforcement and compliance with environmental regulations (p. 366). Drawing upon the above argument, we propose future studies to apply social network analysis methodology to study the effectiveness/impact of these networks of resource users on conservation of RBR.

The formation of such social networks is triggered by the formal system of laws. Studies have shown that informal social networks are also important for the management of shared resources (see for example studies by Bodin & Crona, 2009; Salpeteur et al., 2016). For instance, in Kilombero basin, most agro-pastoralist migrants have migrated from severe degraded areas. These migrants are more likely to bring technologies that might destroy traditional conservation knowledge of the local communities in the destination area. Future research could also use social network analysis to study the impact of informal social networks on degradation/conservation of RBR. In particular, the studies can assess the nature of informal networks that migrant agro-pastoralists are engaging with and the extent to which they affect RBR degradation problems.

Future research might also examine differences between the livelihood of people who have migrated from Simiyu basin to Kilombero basin searching for areas to practise agro-pastoralism, and the livelihood of people in the areas of origins. Such comparative case-study research can zoom in on several specific topics, for example migration and change in norms, analysis of welfare of the migrant households and remittances to their relatives at their respective areas of origin, and migration and its impact on degradation of RBR.

This study faces several limitations, which are highlighted here to suggest avenues for future research. The findings revealed that women and men are heterogeneous groups that differ in terms of several factors including cultural norms. Cultural norms create differences in power relations between men and women and different groups of people in societies, which result in further differences in access to resources and livelihood outcomes. One of the limitations of these findings is the failure to consider the dynamic nature of informal social relation variables. Power relations between men and women are the result of practices that have been inherited from previous generations, though they change as society and its priorities change. The changes in these practices may be brought about by factors such as changes in climate, socio-economic conditions, population, technology and migration (Leach et al., 1999). Because of these changes, individuals find themselves changing their strategies and adopting new ways of livings, which also result in changes in their norms and rules. Thus, the study recommends that future research pays attention to the process or social trajectory through which power relations between men and men change over time.

This PhD has quantitatively examined the intersections of informal social relations variables. The major limitation of a quantitative approach is its failure to provide a detailed understanding of the variables being studied. In our study, collection and analysis of the quantitative data could not provide detailed information on the reality that is experienced by the people who are trapped in the intersect of different social categories. For this reason, we suggest additional studies to qualitatively examine the manner in which these inequalities in access to RBR occur. This can be done by, for example, attending to the voices of people who are locked into the intersections of those social categories. Ethnographic research methods can be used to gain a detailed understanding of the experiences of these people and of behaviours and norms of the entire society. The behaviour that may be perceived by outsiders as a discriminative norm may not necessarily be perceived as such by the community, even by those who seemed to be affected by such norms.

The findings revealed that being older and female (an older spouse or an older unmarried female) had no advantage in terms of the freedom to make decisions on the use of household goods. It is highly likely that there are further differences related to different types of marriage (monogamy/polygamy) or different categories of unmarried women (widow/divorcee/never married), which this study has not explored. Sukuma is one of a number of ethnic groups in Tanzania that practise polygamy, which may involve even more social differences compared to monogamous marriages. Further study should explore whether the position of women in a marriage, being the first, older or younger wife, for example, leads to differences in the freedom

to make decisions on the use of household goods. This may not only be due to cultural factors but also relate to a husband's preferences.

5. CONCLUDING REMARKS

The debate on the governance of common pool resources (CPR) has evolved over time. Consequently, different schools of thought on the governance of CPR have been proposed and some have been used to design policies to conserve CPR. Despite these appeals, in most developing countries, including Tanzania, river basins and their resources continue to be put under pressure. There is still an information gap on the behaviour that governs the use of these resources. Human behaviour has become complex and difficult to predict because of the continuing changes of the social environment. Changes in factors such as technology, urbanization, climate and population largely influence people's behaviour and norms on the use of the RBR. The presence of different and unpredicted behaviour regarding the use of CCPR poses challenges to the development of policies and intervention strategies that can work across different areas.

To this end, the author argues that it is important to have a country's policy and clear implementation framework for the governance of water resources. However, these measures are not sufficient in themselves to solve the complex and diverse natural resources problems. As suggested by (Ostrom & Cox, 2010), there are no "blueprint" solutions to natural resource problems. RBR problems in particular differ across the basins/ cultural norms (p. 452). Thus, the policy documents and the rules should not be taken as blueprints that can easily be made to fit a range of RBR problems. In addition to the national policy and institutional frameworks, different management options/ solutions may be needed to suit the specific needs of particular basins/ sub-basins. These policies to conserve RBR should run parallel with programmes to improve the livelihood of communities that depend on those resources. For instance, in our study area, more efforts may be needed to redress the imbalance created by norms of degradation practices along the Simiyu basin, providing education and incentives for people to practice conservative behaviour will contribute to this effort. In Kilombero, affirmative action may be needed to embrace traditional conservative norms of Kilombero people as well as preventing the transmission of the culture of degradation practices from other areas of the country to Kilombero basin. Different intervention strategies need to be applied in different basins to suit the specific needs of the area.

Finally, and importantly, research approaches should change the focus from the assumptions of homogeneity in human behaviour to the consideration of differences in human agencies. Both intra-household and intersectionality theories are important to study these differences. This kind of research is not only useful academically, it is also important for the development of

policies and other intervention programmes that target different groups of people in communities. The findings that reveal these dynamics will provide valuable information to policy makers and other practitioners on who to target as well as how to formulate strategies that will help to achieve the desired results.

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SAMENVATTING (SUMMARY IN DUTCH)

Meer dan tien jaar geleden besliste de Tanzaniaanse regering haar beleid inzake het beheer van de watervoorraden te hervormen, om over te gaan van een overwegend gecentraliseerd systeem naar een meer participatieve aanpak. Om dit beleid te realiseren, was een gelijktijdige beschouwing nodig van zowel de ecologische als de sociaal-culturele context van het stroomgebied, en moesten de verschillende belanghebbenden betrokken worden bij de planning en het beheer van de watervoorraden. Verwacht werd dat het beleid zou leiden tot het behoud van de waterbestanden, en dat zonder negatieve gevolgen voor de broodwinning van mensen die afhankelijk zijn van deze bronnen.

Maar ondanks deze beleidshervorming worden de natuurlijke bronnen die aanwezig zijn in de stroomgebieden van Tanzania toch verder aangetast. Al zijn de factoren die verantwoordelijk zijn voor de aantasting van deze bronnen goed omschreven in de literatuur, toch is er nog steeds een tekort aan inzicht op het vlak van de kenmerken van individuen die bepalend zijn voor hun gebruik van de natuurlijke bronnen. Vertrekkende vanuit deze vaststelling willen we met deze studie dieper ingaan op de factoren die van invloed zijn op het gebruik van de natuurlijke bronnen in verschillende sociaal-economische en culturele contexten. De inzichten van onze studie dienen om het beleid te onderbouwen dat gericht is op de verbetering van de levensstandaard op het platteland zonder daarbij echter de natuurlijke hulpbronnen in het stroomgebied verder te belasten. Concreet analyseren we de kenmerken van huishoudens die bepalend zijn voor beslissingen over het gebruik van de natuurlijke bronnen en beoordelen we de verbanden tussen de mate waarin mensen toegang hebben tot de bronnen, de keuzes voor bepaalde ontwikkelingsstrategieën en de aantasting van de bronnen.

De studie maakt gebruik van gegevens verzameld bij huishoudens gevestigd langs het stroomgebied van de Kilombero en de Simiyu. Intrahuishoudelijke gegevens werden verzameld bij verschillende gezinsleden van 18 jaar of ouder die verschillende sociaal-economische activiteiten uitoefenen. Het onderzoek omvat verschillende methoden, met achtereenvolgens een kwalitatieve, een kwantitatieve en opnieuw een kwalitatieve benadering om de onderzoeksvragen te beantwoorden.

Uit de bevindingen blijkt dat informele sociale verhoudingen van invloed zijn op zowel de praktische rechten op het gebruik van natuurlijke bronnen als op het voordeel dat men uit dit gebruik haalt. Dit resulteert dan weer in verschillende beroepskeuzes. Terwijl bijna iedereen aan seizoensgebonden landbouw doet om het eigen gezin te voeden, hebben informele sociale verhoudingen en de toegang tot sociaal en financieel kapitaal invloed op de deelname aan

activiteiten die inkomsten genereren. Tot slot, maar evenzeer relevant, zijn ook gender, de mate waarin mensen deelnemen aan verschillende inkomensgenererende activiteiten en milieubewustzijn, belangrijke factoren die mee bepalen in welke mate mensen milieuvriendelijk gedrag stellen.

De studie levert een belangrijke bijdrage aan de literatuur over de toegang tot hulpbronnen, evenals aan de beleidskaders, door aan te tonen hoe belangrijk het is om een onderscheid te maken tussen enerzijds de praktische rechten op het gebruik van hulpbronnen en anderzijds het voordeel dat mensen halen uit het gebruik ervan. Bovendien bekrachtigt deze studie theorieën rond intersectionaliteit en intra-huishoudelijke relaties, door aan te tonen dat zowel mannen als vrouwen heterogene groepen vormen in de samenleving. De bevinding dat de toegang tot sociaal en financieel kapitaal een belangrijke factor is om mensen van niet-milieuvriendelijke op milieuvriendelijke activiteiten te doen overschakelen, levert relevante informatie op voor beleidsmakers en andere actoren die zich inzetten voor het behoud van hulpbronnen. De studie toont daarenboven aan hoe belangrijk het is om mensen via voorlichting milieubewuster te maken en om via specifieke stimulansen milieuvriendelijk gedrag aan te moedigen.