IMPLEMENTATION OF FISHERIES CO- MANAGEMENT IN MWERU-LUAPULA FISHERY, NORTHERN ZAMBIA

By;

Ketiwe Kaluma

A dissertation submitted to the University of Zambia in partial fulfillment of the requirements of the degree of Master of Science in Environmental and Natural Resources Management

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DECLARATION

I, Ketiwe Kaluma, hereby declare that this dissertation; Implementation of Fisheries Co-management in Mweru- Luapula, Northern Zambia, has not been previously submitted for the award of an academic degree at this or any other University.

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Ketiwe Kaluma Date

CERTIFICATE OF APPROVAL

This dissertation by Ketiwe Kaluma has been approved as partial fulfillment of the requirements for the award of **Master of Science in Environmental and Natural Resources Management** by the University of Zambia.

Name	**Signature**	**Date**
Internal Examiner:		
Mr. G. M. Kajoba	é é é é é é é é é é ...	é é é é é é é é é .....
Internal Examiner:		
Dr. P.H. Nyanga	é é é é é é é é é é é	é é é é é é é é é é é
Internal Examiner:		
Dr. M.C. Mulenga	é é é é é é é é é é é	é é é é é é é é é é é
Supervisor:		
Dr. Bridget Bwalya Umar	é é é é é é é é é é é	é é é é é é é é é é é
Chairperson of the Board of Examiners		
Dr. M. Nyirenda	é é é é é é é é é é é	é é é é é é é é é é é

ABSTRACT

The introduction of Co- management in Mweru- Luapula fishery in the early 1990ôs by the Department of Fisheries (DOF) aimed at replacing exclusionary state control. However, lack of supporting legislation and funding in most fisheries led to its collapse. Currently, co-management legislation exists through the Fisheries Act No. 22 of 2011. The study aimed to examine co- management implementation in Mweru- Luapula fishery by evaluating the performance of Village Fisheries Management Committees (VFMCs), analyzing participation of fishers in management activities and assessing fisher compliance to fisheries regulations. Data were collected through structured interviews with 64 respondents, five focus group discussions and two key informant interviews with a traditional leader and an official from the Department of Fisheries in Nchelenge district. Ostromôs eight design principles and Prettyôs typology of participation were used to analyze the performance of the VFMC and fisher participation respectively. Thematic and content analysis was employed to analyze the data. Results show that despite the existence of a VFMC structure, failure to host elections since co- management inception suggests the possibility of ćelite captureô by the local leadership. A passive type of participation exists with only 11 percent of respondents attributing the by- law formulation process to the Department of Fisheries and fishers. Despite majority (92 percent) of respondents indicating awareness of the prescribed gear, fishers are undeterred from using illegal fishing gear owing to low penalty charges imposed on offenders and failure to integrate fishers in monitoring fellow fishersô activities. Weak enforcement of fishery regulations and a lack of clearly defined property rights by the fishing community therefore indicate poor implementation of the co-management system in Mweru- Luapula fishery. Therefore by sensitizing artisan fishers and the fishing community on their rights and duties in the co- management system and engaging them through dialogue in planning and decision- making, co- management can be revived. Future studies can therefore explore the role of Fishing Associations and how they can be integrated in co- management plans.

Keywords: compliance, participation, common pool resources, co- management

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ACRONYMS

AER	Agro- Ecological Region
BMU	Beach Management Unit
BVC	Beach Village Committees
CAMAP	Conservation and Management Action Program
CBM	Community Based Management
CBNRM	Community- Based Natural Resource Management
CCRF	Code of Conduct for Responsible Fisheries
CGIAR	Consultative Group for International Agricultural Research
CPR	Common Pool Resource
CSO	Central Statistics Office
CO	Company
DOF	Department of Fisheries
DRC	Democratic Republic of Congo
FA	Fishing Association
FAO	Food and Agricultural Organization of the United Nations
FGD	Focus Group Discussion
GRZ	Government of the Republic of Zambia
HIV/ STIs	Human Immune Virus/ Sexually Transmitted Infections

IAPRI	Indaba Agricultural Policy Research Institute
ICLARM	International Centre for Living Aquatic Resources Management
Kg	Kilogram
LTD	Limited
mm	Millimeter
NAZ	National Archives of Zambia
NGO	Non- Governmental Organization
NORAGRIC	Norwegian Centre for International Agricultural Development
PMRC	Policy Monitoring and Research Center
SADC	Southern African Development Community
SI	Statutory Instrument
SNDP	Seventh National Development Plan
SSF	Small- Scale Fisheries
TAs	Traditional Authorities
TAC	Total Allowable Catch
TURFs	Territorial Use Rights of Fisheries
UNZA	University of Zambia
VCDC	Village Conservation and Development Committee
VFMC	Village Fisheries Management Committee

WARMA	Water Resources Management Agency
ZMW	Zambian Kwacha
ZSA	Zambia Statistical Agency

CHAPTER 1: INTRODUCTION

1.1. Background

Zambiaôs fisheries sector is vital for economic development through commercial and artisanal fishing activities. The large- scale commercial fisheries sector provides approximately 13,000 jobs to the urban and rural population through seed, feed and fish processing activities and supplies an estimated 20, 000 tons (71 percent) of total farmed fish to urban households (Genschick et al., 2017). Capture fisheries on the other hand, employ over 300, 000 people in various artisanal activities besides fishing namely; boat building and repair, net mending, fish processing and trade and supply approximately 85, 000 tons of fish to both rural and urban households (PMRC, 2015). In total, the fisheries sector contributes 3.2 percent to the national Gross Domestic Product (Ngôonga et al., 2019) and supplies about 55 percent of animal protein to Zambians (Genschick et al., 2017). Despite high productivity, the sector is characterized by low exports of (394 tons) compared to imports (4, 000 tons) of fish per year and lower per capita fish consumption of 7 kg compared to global estimates of 19.7 kg (FAO, 2016).

The fisheries sector in Zambia is sustained by the 12 million hectares of water resources in form of rivers, Lakes and swamps and 8 million hectares of wetlands (Shula and Mukuka, 2015). The 11 major fisheries within the two water basins namely; Congo basin (Lake Tanganyika, Bangweulu, Mweru and Mweru- Wantipa) and Zambezi Basin (Kafue, Kariba, Lukanga, Upper Zambezi, Lower Zambezi, Itezi- Tezhi and Lusiwashi) (Musumali et al., 2009) are highly exploited both at commercial and artisanal (small- scale) level.

Despite its huge contribution to rural and urban growth, the sector has remained largely underdeveloped_ arguably due to shifts in management regimes. Fisheries management regimes have changed over time, largely inspired by changed thinking in natural resources governance. Generally a brief history of the management of the fisheries sector in Zambia is presented in the next subsections. The account is divided into three periods; pre- colonial, colonial and post-colonial.

1.1.1. The Pre- colonial era: Exploitation of Fisheries by communities

During the pre- colonial era, which was before 1924, fisheries were communally owned by various ethnic groups and thereby managed under common property regime. This meant that by virtue of being a member of a particular tribe, one had rights to fisheries resources under the control or ownership of that tribe. In Mweru- Luapula fishery, fisheries products were used as valuable commodities for barter and tribute to local chiefs. They also opened up the region to migration activities which later culminated into intermarriages between local indigenous fishers and immigrating Luba people from the Congo side of the fishery (Annear, 2006). Similarly the *Ila* and *Plateau Tonga* (the *Balundwe*) of the Kafue Flats relied on the flood plains for food, shelter (using reeds) and pasture for cattle and wild animals (Chabwela and Haller, 2010).

Fishing activities were conducted using locally crafted gear such as spears, hooks, traps, baskets and dugout canoes. Fish poisoning was common among fishers on Lake Bangweulu in Samfya District. By scattering ground Tephrosia (*Tephrosia elongata*) locally known as *Ububa,* intoxicated fish would be caught by the men using spears and scooped by the women using baskets (Brelsford, 1946 cited by Chilonge, 2011). The relatively lower rural populations and undeveloped commercial fish trade networks enabled riparian communities to uphold their traditional customs and conduct fishing for subsistence. Thereby a steady demand for fish was supplied (Chabwela and Haller, 2010). Spiritual leaders known as the *mwami* or ôbig menô guided collective fishing (*Luwando*) activities on behalf of the entire community. They also developed and enforced traditional institutions in form of taboos and norms to regulate the timing of fishing activities, the territory, the type of gear to use and who to participate, all based on spiritual ancestral beliefs. Their belief that ancestral spirits were embodied in wild animals such as crocodiles led them to perform rituals and coordinate communal harvest of resources (Haller, 2014). This changed during the colonial era.

1.1.2. Colonial era: A myriad of Institutional changes

The advent of colonial rule introduced a new political regime which affected social and economic areas. The loss of political freedom by local communities also culminated in the loss of freedom to govern common pool resources, i.e. game, forests and fisheries communally as

they became state property and were governed as such. The Northern Rhodesia government appointed new traditional chiefs and leaders to manage affairs such as collection of the newly imposed hut tax and also appointed fish guards to regulate the use of fisheries resources (Musambachime, 1995). Common property regimes were replaced with exclusionary ócommand and Controlô systems that excluded fishing communities from managing fisheries (Chabwela and Haller, 2010). These new developments disrupted livelihood patterns and activities of most rural communities (Haller and Merten, 2008). Traditional and religious institutions and practices were replaced with new legislation that aimed at exploiting natural resources for commercial purposes (Annear, 2006). The opening up of fisheries in Northern Zambia to urban and commercial exploitation resulted in increased fishing effort of Lake Mweru and its subsidiary river, swamps and lagoons (Musambachime, 1987).

Positive outcomes during the colonial period were; the introduction of new species, new commercial fishing gear such as fine meshed draw nets and establishment of trade networks (dominated by Greek traders) within the country and other regions. Artisan fishers adopted fishing as a business aside from its subsistence importance (Haller, 2014). However, the increased fishing pressure led to dwindling stock of the highly prized *Mpumbu* or Luapula Salmon (*Labeo altivelis*) in the 1940ôs, thus prompting the colonial government to initiate conservation efforts by establishing fisheries regulations. Laws instituted during this period included; the Fish Protection Ordinance of 1929, the Fish Control Regulations of 1943 to 1945 and the Fish Conservation Act of 1955.

1.1.3. Post- colonial era: old wine in new skins

The era of political freedom from colonial rule after Zambia gained its independence in 1964 was received with anticipation by rural communities on how they would witness their political liberation, particularly liberalization of their access to fisheries. They hoped for the reinstatement of traditional systems of managing such resources. However, lawmakers merely revised some sections of the former Conservation Act of 1955 and maintained its concepts when they drafted the Fisheries Act No. 21 of 1974. Traditional authorities did receive their political authority to rule over their subjects and natural resources. The exclusion of communities from management of fisheries continued, much to the dismay of local fishing communities and their traditional

leadership. Exclusionary management was not unique to the fisheries sector but reflected the dominant thinking in natural resource governance at the time. It was only in the late 1980s and early 1990s when ówinds of changeô in the political sector across Sub- Saharan Africa brought about a paradigm shift in schools of thought about community participation in natural resources governance.

Inconsistent management of fisheries by the Department of Fisheries due to low budget allocations, pressures from the international community to engage resource users in management and the need to explore community- based natural resources management programs (CBNRM) provided a platform for the revision of the Fisheries Act of 1974. Therefore the Fisheries Act No. 22 of 2011 was formulated and promulgated. The Act promotes a óCo- managementô approach to engage riparian communities in decision- making through community representation at Village level. Through this approach, communities can plan for the utilization of their resources, thereby attaining a sense of ownership that would consequently promote sustainable fisheries management. The Act provides for the; development of aquaculture as a means to offset dependence on capture fisheries and establishment of a fisheries development fund to provide a revolving fund for fisheries committees. The revolving fund system enables fisheries committees to raise revenue through avenues such as licensing *(GRZ, 2011)*. The Fisheries Act of 2011 also promotes the precautionary approach; implying the need to keep exploitation in check and avoid resource extinction. This would be achieved through (but not limited to) enforcement of the closed fishing season, closed breeding areas and a licensing system for all fishers *(GRZ, 2011)*.

The Fisheries Act of 2011 emphasizes on the importance of resource conservation by highlighting various fishing methods and gear that prove detrimental to the fishery as a whole *(GRZ, 2011)*. Therefore this new fisheries Act has the potential to offset major challenges of overexploitation of fisheries resulting from open access and weak enforcement of regulations which have surrounded the fisheries sector since the colonial- era.

1.2. Problem statement

Institutional changes during the colonial era replaced traditional fisheries governance systems with exclusionary state control. Exclusion of fishers from management of fisheries as well as

inconsistent state presence prompted illegal fishing activities that later culminated in fish stock decline (Haambiya et al., 2015a, Malasha, 2007). Overexploitation of fisheries further reduced fisher incomes and increased fisher- to- fisher conflicts among migrant and resident fishers. This prompted the Department of Fisheries to pilot co- management of fisheries in the late 1980s (Malasha, 2007). Fishing Associations (FAs) and Village Fisheries Management Committees (VFMCs) were formed by fishers on Lakes Mweru, Tanganyika, Bangweulu and Kafue Flats (Malasha, 2007). However, the lack of legal recognition and limited financial support restricted the operations of VFMCs in Tanganyika and Bangweulu fishery, thus limiting co- management implementation (Banda et al., 2015) and these efforts stalled until the promulgation of the Fisheries Act of 2011 which provides a legislative framework for the involvement of fishing communities in management through a co- management system. However, co- management is not a panacea to effective management of natural resources. Scholars have shown challenges such as capture of community benefits by local elites, lack of functional participation by community members, rent seeking behavior and corruption (Bwalya, 2007; Platteau et al., 2014; Nunan et al., 2018). Few studies have evaluated the performance of co- management across major fisheries in Zambia (see for instance Banda et al., 2015; Haambiya et al., 2015a, 2015b). Therefore this study intended to evaluate co- management implementation in Mweru- Luapula fishery by evaluating the performance of co- management institutions.

1.3. Aim

The aim of this study was to evaluate co- management institutions in Mweru- Luapula Fishery, Nchelenge district.

1.4. Specific Objectives

The specific objectives of the study were to:

i. To evaluate the performance of Village Fisheries Management Committees (VFMCs) in Mweru- Luapula fishery
ii. To analyze participation of fishers in management activities in the study area
iii. To assess compliance of fishers to operational rules in the study area

1.5. Research Questions

i. To what extent are fishery stakeholders involved in the establishment of management committees in Mweru- Luapula fishery?

ii. How do fishery committees represent the interests of diverse fishers in the fishing area?

iii. How are the fisheries committees accountable to the fishers in the study area?

iv. How do relations between fishery committees and the DOF affect implementation of fishery by- laws in the fishery?

v. What types of participation mechanisms are adopted to engage fishers in fishery management activities in the study area?

vi. What is the role of the DOF in implementation of co- management activities?

vii. How does the relationship between fishers and committee members affect compliance to fishery by- laws in the study area?

viii. How does participation of fishers in formulation of fishery by- laws affect their compliance in the study area?

ix. What is the role of the fisheries committees in sanctioning fishery offenders?

1.6. Significance of the study

The overall objective of the Department of Fisheries is ―to promote sustainable utilization of fisheries in Zambia‖ by employing research to develop extension strategies and training programs‖. Due to low budgetary allocations to Capture Fisheries Research, the department is unable to conduct research across all parts of the fishery. Therefore this study, along with others, will supplement for the department‘s financial constraints and provide new information on current fisheries practices which can be adopted to achieve its objective.

This study will enable the DOF to identify contextual challenges that are currently prevailing in implementing co- management and design ways of improving the system.

The research findings will add to the ongoing co- management discussion and provide a review to policy- makers on the performance of the new Fisheries Act.

1.7. Organization of the Dissertation

This dissertation is organized into six chapters. Chapter one gives an overview of the studyôs background including the problem statement, aim, objectives and the significance of the study. Chapter two presents a review of co- management benefits, challenges, conditions and typologies. It also highlights relevant theories and concepts used in the study. Chapter three describes the location, geology, soils, vegetation, climatic variables and socio- economic characteristics of the study area. Chapter four gives a description of the secondary and primary sources of data; the sampling procedure employed for the study; data collection instruments and data analysis tools. Chapter five presents and discusses the findings of the studyôs three objectives in line with relevant literature and Chapter six gives the study conclusion and recommendations.

CHAPTER 2: LITERATURE REVIEW

2.1. Introduction

This chapter presents a review of co- management benefits, challenges, typologies and conditions for successful co- management. Ostromôs Eight Design Principles for Enduring CPRs, Participation and Institutions are also discussed as relevant theories for this study.

2.2. Co-management

Berkes et al., (1991, p. 6) defined co- management as ñthe sharing of power and responsibility between the government and local resource usersò while Singleton (1998, p. 7) defined it as ñ the term given to governance systems that combine state control with local, decentralized decision-making and accountability and which, ideally, combine the strengths and mitigate the weaknesses of eachò.

Jentoft et al., (1998, p. 423) referred to co- management as ña collaborative and participatory process or regulatory decision- making between representatives of user- groups, government agencies research institutions and other stakeholdersò. Jentoft et al., (1998) emphasized that ñpower sharing and partnerships were an essential part of the definitionò. And according to Pathmanandakumar (2017, p. 2), co- management is ña relationship between a resource- user group and another organization or government agency for management purposes in which some degree of responsibility and/ or authority is conferred to both partiesò.

These definitions entail that co- management is a complex system that consists of collaborations/ relationship/ partnerships between/ among state agencies and private players for the purpose of sharing responsibility/ authority and management tasks over a common natural resource. Jentoft (1989) distinguished co- management from other common property management systems as he contended that co- management entails the distribution of influence in the decision- making process across all concerned actors.

2.2.1. Review of fisheries co- management in the African context

Co- management has been adopted in small- scale fisheries management in developing countries, especially in the tropics (Purcell and Pomeroy 2015). Small- scale fisheriesô role as a source of livelihood, food security and cash incomes has potential to reduce poverty among developing and low- income countries (Vlachopoulou, 2014). By nature small- scale fisheries tend to be multi- species and require the use of multiple types of gear. Resultantly they are complex to manage and often exposed to harmful fishing practices and overexploitation (Purcell and Pomeroy, 2015).

In the African region, co- management of fisheries has been adopted by countries such as Côte dôIvoire, Senegal, Nigeria, South Africa, Tanzania, Zimbabwe, Malawi and Zambia (Kosamu, 2015). Major reasons for its adoption include; desire to improve compliance to regulations by involving users in decision- making (Kosamu, 2015; Nunan et al., 2018), depletion of fish stock, lack of monetary resources to finance centralized command and control regimes, inadequate government personnel, and pressure from international organizations and international treaties (Haambiya et al., 2015a; dô Armengol et al., 2018; Vlachopoulou, 2014). Various experiences provide an account of the successes and failure of fisheries co- management.

In East Africa (Kenya, Tanzania, Uganda), co- management institutions on Lake Victoria (on the Tanzanian jurisdiction) have yielded notable successes such as improved boat registration, licensing of fishers and increased sharing of information and collaborations among various fisheries stakeholders (e.g. boat owners, the youth, local traders etc.) (Onyango, 2014; Nunan et al., 2015). However, the high usage of undersized nets, limited enforcement capacity by regulatory agencies and high incidence of corruption among the public service workers undermine the co- management system in the region (Etiegni et al., 2016; Nunan et al., 2018).

In the Southern region, Malawiôs co- management system on Lake Chiuta successfully facilitated the ban of destructive seine net fishing activities through enforcement of locally developed rules by the Beach Village Committees (BVCs). As a result, various benefits such as stabilized catches and increased household incomes accrued to local fishers. This is attributed to the collective action of local fishers and sufficient support from state departments (Njaya 2005; Donda, 2017).

Similarly, fisheries co- management in South Africaôs KwaZulu- Natal province promoted sustainable harvesting practices, increased trust and communication among various stakeholders and granting of access rights to previously excluded subsistence small- scale fishers (Sowman et al., 2003; Napier et al., 2005). However, the fisheries remain threatened by overexploitation due to heightened poverty among fishers.

On the other hand, co- management systems at the Olifants Estuary collapsed, owing to numerous challenges such as illegitimacy of regulations, dissatisfaction by local fishers with Fishing Committee leadership, the lack of financial and technical resources to support small-scale fisheries and uncertainty due to new legal reforms (Sowman et al., 2003; Hauck and Sowman, 2001).

The failure or success of the co-management system witnessed across different fisheries suggests that co-management is not a blueprint prescription or approach. Rather the interplay of various factors has potential to either repress or support co-management projects (Napier, et al., 2005).

2.2.2. Benefits of co- management

Co- management has been viewed as an alternative to failed centralized management system adopted worldwide. It offers resource users the opportunity to co- manage natural resources with state agencies and make decisions that eventually affect the wellbeing of those resources (Donda, 2017; Sverdrup- Jensen and Nielsen, 1997). Various benefits accrue both to the user- groups and state agencies. User- groups or private actors derive material and immaterial benefits such as; financial support, technology, scientific information, sustained resource pool, increased cash income and sustained livelihoods (Singleton, 2000; Sandström and Rova, 2010).

Co- management results in legitimacy of the regime system (Jentoft et al., 1998). Allowing resource users to influence the decision- making process enables them acquire scientific information on ecological conditions of their ecosystem and encourages their input in design of regulations (Donda, 2017). Their participation resultantly reduces government biasness towards meeting government needs and improves the quality of regulations that are ultimately designed. As a result, resource users are encouraged to comply with resource regulations (Jentoft et al., 1998; Ho et al., 2016). Gutiérrez et al., (2011) highlighted enhanced sense of ownership,

collective ownership of regulations and better monitoring, control and surveillance by resource users as benefits of implementing co- management.

State agencies on the other hand benefit from co- management by achieving their conservation goals through sustainable practices; incurring reduced management costs by delegating or sharing monitoring activities with resource users, improving management by incorporating local ecological knowledge with scientific knowledge and acquiring better understanding of the local socioeconomic conditions of the resource community (Pathmanandakumar, 2017). Additionally, resource usersô also provide social capital to state agencies which encourages partnerships and networks to be formed among the various actors. Social capital refers to ótrust and institutions of local groupsô (Carlsson and Berkes 2005).

Co- management also offers conflict resolution benefits where local disputes can be managed locally and cheaply through the various established local level institutions (Donda, 2017). In addition, the process of information sharing creates trusts and changes the behaviour and attitudes of resource users towards state agencies and fellow resource users, thereby reducing conflicts with the higher authorities (Jentoft et al., 1998; Ballet et al., 2009).

2.2.3. Challenges of co- management implementation

Several challenges associated with co- management approaches have been documented. For one, state agencies in developing countries are crippled financially thus their support for co-management initiatives remains low (Pathmanandakumar, 2017). The stateôs low financial support inhibits it from conducting research to assess ecological conditions, generate scientific knowledge or sensitize local resource users on sustainable resource use (Haambiya et al., 2015a). It also hinders state agencies from providing salaries to enforcement institutions or committees (Banda et al., 2015). Lack of appropriate policies and legal frameworks to support and strengthen the legitimacy of local institutions such as Fishing Associations in small- scale fisheries undermines their role in the co- management system (Chabwela and Haller, 2010; Haambiya et al. 2015a).

The complexity of defining communities is another challenge to co- management (Berkes et al., 1998). Carlsson and Berkes (2005) describe communities as complex; non- coherent and non-

homogenous entities with ‘unpredictable behaviour’. Their dynamic nature results in group interests that are constantly changing therefore incorporating the various actors into decision-making units and meeting their unique interests can be challenging. However, the dynamic and iterative nature of the co- management system enables continual re- adjustment of the management arrangements to suit prevailing conditions.

Elite capture is one other problem that can cripple the co- management process. Elite capture occurs when local elites such as local individuals or groups with unequal access to social, political and economic power dominate or capture participatory projects and benefits (Schmidt and Theesfeld, 2013). Conditions such as existence of strong local leadership may work against the co- management ideology of involving resource users in decision- making and end up benefitting the few local elites. Schmidt and Theesfeld (2013) argue that the co- management tenet of devolution of power has potential to fuel elite capture and disadvantage the minority and marginalized individuals in a community. This is because local elites have high literacy abilities which enable them to communicate with outsiders and can thereby influence the decision-making process to their favour (Platteau et al., 2014; Theesfeld, 2008). Resultantly, the local minority are not fully involved in the management process and do not accrue the same benefits as the local elites. Platteau et al., (2014) also highlight high poverty levels and gender disparities as factors that enhance the problem of elite capture in resource communities.

Corruption is another challenge to the co- management system. Corruption occurs when payments of bribes are made to avoid sanctions, penalties or imprisonments and enable illegal practices to continue (Nunan et al., 2018). In the management of small- scale fisheries, ‘petty corruption’ is prevalent where enforcement officers or agents warn fishers of upcoming patrols in exchange for bribes. This form of weak and inconsistent enforcement of rules is dominant among enforcement officers at state as well as local level whose aim is to supplement for inadequate salaries (Nunan et al., 2018). Other factors such as high market price for scarce resource units, insufficient resources for implementing regulations and power imbalances between state agencies and poor artisanal fishers encourage illegalities to persist (Medard et al., 2016).

Sundström (2013) notes that when corrupt practices thrive, trust among resource users and enforcement agents is reduced. Consequently, the legitimacy of the regulations becomes compromised and resource users are not compelled to adhere to them (Jentoft, 2000). Nunan et al., (2018) reveal that corrupt practices and illegalities in small- scale fisheries co- management on Lake Victoria are perpetuated by fishers, Beach Management Unit (BMU) Committee members, the police, the judiciary and local politicians.

2.2.4. Typologies of Co- management

Sen and Nielsen (1996) classified co- management arrangements into five broad types based on the role of the state and resource users (see Table 2.2). These include; Instructive, Consultative, Cooperative, Advisory and Informative.

Table 2.2: Typology of Co- management

Type of co- management	Description of co- management
Type A. Instructive	There is only minimal exchange of information between government and users. It differs from centralized management in the sense that the mechanisms for dialogue with users exist, but the process tends to be government informing users on the decisions they plan to make.
Type B. Consultative	Mechanisms exist for governments to consult with users but all decisions are taken by government.
Type C. Cooperative	This type of co- management is where government and users cooperate together as equal partners in decision- making.
Type D. Advisory	Users advise government of decisions to be taken and government endorses these decisions.
Type E. Informative	Government has delegated authority to make decisions to user groups who are responsible for informing government of these decisions.

Source: Sen and Nielsen, 1996, p. 406

Co- management has been defined broadly by many scholars. Consequently, no universal definition exists, instead, the various concepts used interchangeably include; ócollaborative managementô, óadaptive managementô, ócosystem managementô and ócommunity-based managementô (CBM) (Jentoft et al., 1998; Berkes, 2009). One question that is commonly asked is whether or not co- management is community based natural resources management.

According to Sen and Nielsen (1996) the presence of government in the decision- making process distinguishes co- management from CBNRM. Similarly Ballet et al., (2009) stated that CBNRM involves sole management of natural resources by local communities whereas co-management includes a variety of players namely; central government, local authorities and local communities. In this dissertation, the position that co- management is a type of CBNRM is adopted.

2.2.5. Conditions for successful co- management

Studies examining the success of co- management in fisheries from around the world have shown mixed results. Reviews of case studies have revealed some patterns or commonalities among successful cases, as well as conditions for successful co- management.

Gutiérrez et al., (2011) identified the presence of community leaders as one condition that facilitates success of co- management. For example, traditional authorities or independent local leaders who are skilled, committed and highly motivated act as an entry point through which the state can transfer rights and authority to the entire community as well as promote strong social cohesion among the resource users.

Imposing ódirect regulationô mechanisms such as Total allowable catch (TAC) in form of individual and community fish quotas and Territorial Use Rights of Fisheries (TURFs) helps to prevent overfishing of resources and encourages ecological stewardship. Enforcing óindirect regulationsô such as community- based protected areas, closed seasons and limiting the number of resource users, the type, size and number of gear allowable helps control total harvesting effort. It also helps avert open access and enables restoration of degraded areas (Jentoft, 1989; Gutiérrez et al., 2011).

Increasing the legitimacy of regulations is another condition that re- enforces resource usersô desire to concentrate on group interests voluntarily and forgo personal ambitions thus strengthening management schemes. According to Jentoft (1989) increasing legitimacy involves; designing resource regulations that provide solutions to actual resource problems, imposing restrictions on resource users equitably, involving resource users in the decision- making process, and directly involving users in implementation and enforcement processes.

Evans et al., (2011) refer to strong state agencies that provide a bottom- up management system by decentralizing authority and responsibilities to user- groups, promoting the creation of strong social networks among stakeholders and strongly enforcing institutions against intruders.

Njaya (2007) refers to decentralization as the transfer of power, authority and responsibilities to local government structures or lower level institutions such as community level committees. It reduces power imbalances which often occur between the state and the resource users by equipping the latter with decision- making abilities.

Establishing social networks entails building vertical cooperation between resource users and state agencies as well as horizontal cooperation between/ among resource users at the same level (Etiegni et al., 2016). Such networks enable resource users acquire resources for example capital, to diversify their livelihoods and build resilience to natural resource uncertainties. Delivering effective community training and empowerment is another factor that facilitates co- management (Pomeroy et al., 2001).

And finally Kosamu (2015) identifies Ostromôs (1990) eight design principles (Table 2.3) as necessary conditions that support successful management of natural resources.

Table 2.3: Design principles illustrated by long- enduring CPR institutions

Clearly defined boundaries Individuals or households who have rights to withdraw resource units from the CPR must be clearly defined, as must the boundaries of the CPR itself.
Congruence between appropriation and provision rules and local conditions Appropriation rules restricting time, place, technology, and/ or quantity of resource units are related to local conditions and to provision rules requiring labor, material, and/ or money.
Collective- choice arrangements Most individuals affected by the operational rules can participate in modifying the operational rules.
Monitoring Monitors, who actively audit CPR conditions and appropriator behavior, are accountable to the appropriators or are the appropriators.
Graduated sanctions Appropriators who violate operational rules are likely to be assessed graduated sanctions (depending on the seriousness and context of the offense) by other appropriators, by officials accountable to these appropriators or both.
Conflict- resolution mechanism Appropriators and their officials have rapid access to low- cost local arenas to resolve conflicts among appropriators or between appropriators and officials.
Minimum recognition of rights to organize The rights of appropriators to devise their own institutions are not challenged by external governmental authorities.
For CPR that are parts of larger systems: Nested enterprises Appropriation, provision, monitoring, enforcement, conflict resolution, and governance activities are organized in multiple layers of nested enterprises.

Source: Ostrom, 1990, p. 69

The ability of resource user- groups to exclude none- members and modify resource rules builds their sense of ownership toward the resource which consequently enhances their compliance to locally crafted rules (Kosamu, 2015). However, the existence of these conditions in a particular resource community is not a guaranteed panacea to the complex CPR problems encountered when implementing co- management due to the interplay of various factors which eventually undermine co- management efforts (Carlsson and Berkes, 2005; Jentoft, 1989).

2.3. Participation in co- management

Bass et al., (1995) note that ópartici pation means different things to different peopleô It can be used to mean individuals passively listening to a higher authority/ figure or them identifying their own needs, designing solutions and enforcing them.

A lack of clarity on what the user of the term actually means has potential to mask an agenda for manipulation (Pretty, 1994). Therefore to avoid misinterpretation and misunderstanding, it is needful to explicitly define the actual actions that one is required to perform.

Scholars such as Arnstein (1969) (*A ladder of citizen participation*), White (1996) (*The forms and functions of participation*) and Pretty (1994) (*The typology of participation*) expressed the concept of participation as levels, forms and functions and typologies.

2.3.1. Arnstein's (1969) Ladder of citizen participation

Arnstein (1969) distinguished the various levels of citizen participation into eight steps (shown in Table 2.4). Each level represents the amount of power the citizen has in influencing outcomes of a project activity.

Table 2.4: Arnsteinôs Ladder of citizen participation

Citizen Control Delegated Power Partnership	Citizen Power
Consultation Informing Placation	Tokenism
Therapy Manipulation	Non participation

Source: Cornwall, 2008, p. 270 (adapted from Arnstein, 1969)

From the bottom up, Arnstein shows how citizens with no delegated authority are engaged in some management process or activity and are considered to be participating. The recruitment of these citizens by ópowerfulô actors (such as state agencies) is manipulative in nature and may be an act of óappeasement of the less powerful groups (usually resource users)ô.

Tokenism appears similar to nonparticipation but involves some form of dialogue between actors. At this level, citizens enjoy some form of interaction during the consultation process. It however, still remains a lower- level form of interaction as the citizens are unable to dictate or direct the final outcome of that interaction.

The final three levels of participation represent a higher-level type of interaction where collaboration between powerful actors and citizens occurs. Both entities have an avenue to share their views on the final outcome of their activities. The citizen is not merely being óinformedô or óappeasedô, but has been given authority to influence change.

2.3.2. White's (1996) forms and functions of participation

White (1996) described participation as a framework to show the different forms, functions and interests of the individuals involved.

Table 2.5: Typology of Interests

Form of Participation	What 'participation' means to the implementing agency	What 'participation' means to those on the receiving end	Function of Participation
Nominal participation	Legitimation- to show they are doing something	Inclusion- to retain some access to potential benefits	Display
Instrumental participation	Efficiency- to limit funderôs input, draw on community contributions and make projects more cost- effective	Cost- of time spent on project- related labour and other activities	As a means to achieving cost-effectiveness and local facilities
Representative participation	Sustainability- to avoid creating dependence	Leverage- to influence the shape the project takes and its management	To give people óvoiceô in determining their own development
Transformative participation	Empowerment- to enable people to make their own decisions, work out what to do and take action	Empowerment- to be able to decide and act for themselves	Both as a means and an end, a continuing dynamic

Source: Cornwall, 2008, p. 273 (adapted from White, 1996, p. 7- 9)

Whiteôs Nominal participation corresponds with Arnsteinôs Nonparticipation level where less powerful actors have no real active role in shaping project activity outcomes.

Instrumental participation can be used to explain Arnsteinôs Tokenism where community members provide their resources (skills, knowledge) but may lack actual power to direct the project itself.

Representative and Transformative participation gives a description of Citizen power, where community members have access to decision- making due to delegated authority from the more powerful actors (state agencies). Dissimilar to Nominal participation, partnerships formed between the two entities results in actual change of community members.

2.3.3. Pretty's (1994) Typology of Participation

Pretty (1994) notes that participation can be used as a disguise to entice people, more often, resource users, into participating in activities or projects they have little interest in. They are compelled to provide labor (*Instrumental participation*) in return for some benefits. Participation also becomes a tool to facilitate data collection by government agencies or development projects (*Tokenism*). By failing to develop the capacity (skills, knowledge e.t.c.) of less powerful actors, their involvement in the project ceases once the project is terminated. Pretty (1995) proposed seven types of participation as a way to describe its usage by various actors (See Table 2.6).

Table 2.6: Typology of Participation

A Typology of participation: how people participate in development programs and projects	
Typology	**Components of Each Type**
Manipulative	Participation is simply a pretense, with peopleôs órepresentatives on official boards, but who are unelected and have no power.
Passive Participation	People participate by being told what is going to happen or has already happened. It involves unilateral announcements without listening to peopleôs responses.
Participation by consultation	People participate by being consulted. External agents define problems and information gathering processes and so control the analysis. Such a consultative process does not concede any share in decision- making, and professionals do not take on board peopleôs views.
Participation for Material incentives	People participate by contributing resources, for example labor, in return for food or cash.
Functional Participation	Participation is seen by external agencies as a means to achieve project goals, especially reduced costs. People may participate by forming groups to meet predetermined objectives related to the project.
Interactive Participation	People participate in joint analysis, development of action plans and formation or strengthening of local institutions. Participation is seen as a right, not just the means to achieve project goals.
Self- Mobilization	People participate by taking initiatives independently of external institutions to change systems. They develop contacts with external institutions for resources, technical advice and retain control over how resources are used.

Source: Pretty, 1995, p. 2

CHAPTER 3: DESCRIPTION OF THE STUDY AREA

3.1. Introduction

This chapter discusses the geographical setting of the study area by describing the geology, soils, vegetation and climatic variables and also discusses the study areaôs socio- economic characteristics.

3.2. Location and Size

Lake Mweru lies on the border between Zambia and the Democratic Republic of Congo (DRC). Its surface area is 5,120 km^2 with a length of 131 km and a maximum width of 56 km. On the Zambian side, its shoreline covers 4 districts namely Mwense, Kawambwa, Nchelenge and Chiengi.

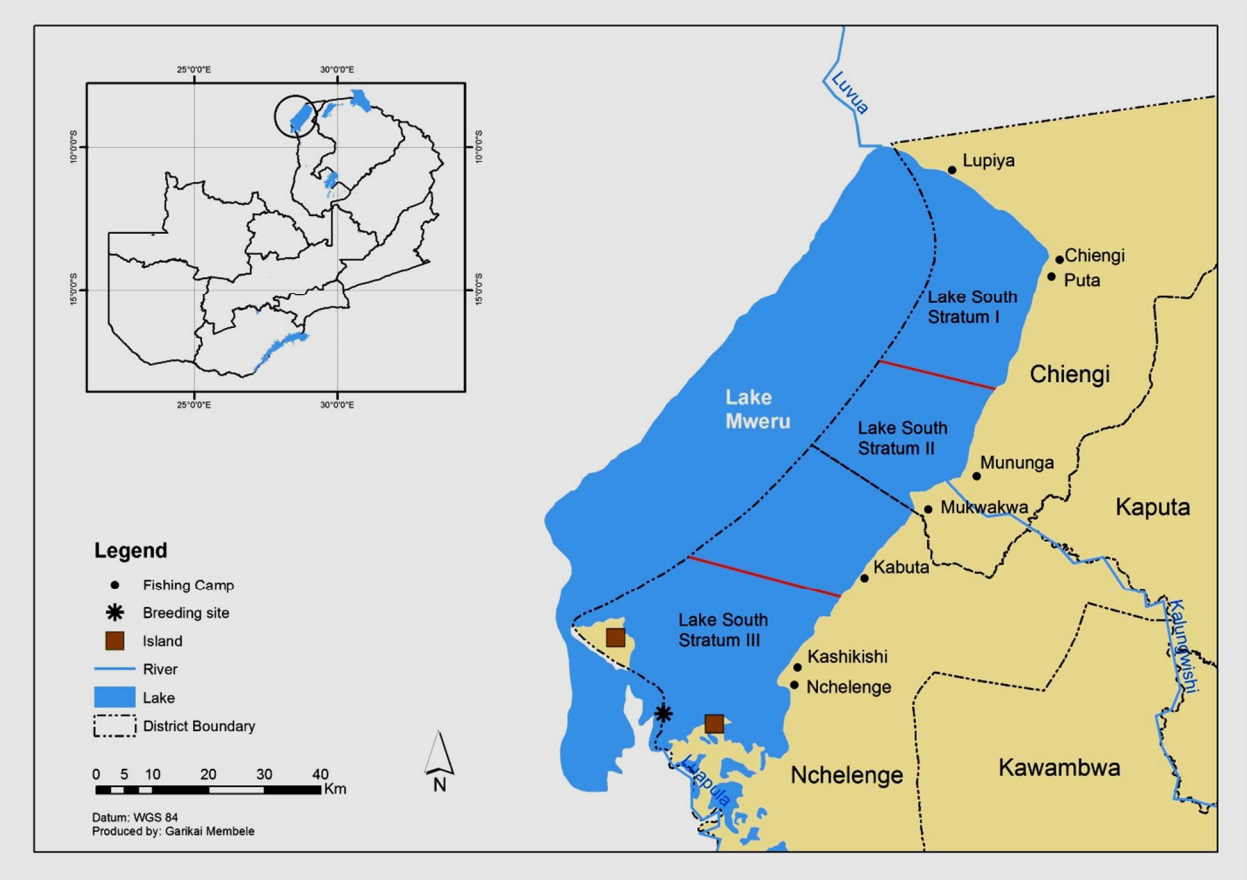

Figure 3.1 Location of Mweru- Luapula Fishery Source: Adapted from Annear, (2009)

3.3. Geology

Lake Mweru exists in the Katanga Super Group region which is known to have formed during the Neoproterozoic era (1,000 to 541 million years ago). This era occurred between the early microbial ôPrecambrianô life and the modern Phanerozoic biosphere made up of large multicellular organisms (Butterfield, 2015). The era is also symbolic of super- continental reconfigurations and the deepest glacial freeze.

This region comprises shale, sandstone, dolomites, quartzite, limestone and conglomerate (WARMA, 2019). The rocks are used for industrial and building materials.

3.4. Relief and Drainage

Lake Mweru is located in the Luapula catchment. It lies on a topography between 1000 m and 1700 m and forms part of the Central African Plateau (Tveintnes, 1983). The Lake is fed by Luapula and Kalungwishi Rivers in the Southern and Eastern region respectively while the Luvua River in the North provides an outflow into the Lualaba River (Bos et al., 2006). The Lake Mweru together with the Luapula River swamps and floodplains make up Mweru- Luapula fishery (van Zweiten and Aarnink, 1996).

3.5. Soils and Vegetation

Severely leached sandy loam soils of acidic reaction between pH4 and pH5 dominate the catchment. The leached soils due to high rainfall have low levels of plant available nutrients (Tveintnes, 1983). However, with application of fertilizers and lime they do support late maturing crops such as rice (*Oryza sativa*), beans (*Phaseolus vulgaris*), cassava (*Manihot esculenta*) and groundnuts (*Arachis hypogea*) are grown (Jain, 2007; GRZ, 2014).

The vegetation is mostly grasslands, Miombo woodlands, Chipya and dry evergreen forests. Grassland vegetation is dominated by *Hyparrhenia/ Loudetia* with Digitaria, Setaria and Eragrostis species.

Dominant genera in the Miombo woodland are *Brachystegia, Julbernadia, Isoberlinia* and *Pterocarpus.* Among the *Brachystegia* genera, common species are B. floribunda and glaberrina

which occur in well drained soils while B. *Boehmii* and B. *Bussei* indicate shallow soils. Common species among the *Julbernadia* genera are J. *peniculata* and J. *globiflora*. Common Chipya vegetation species are *Pterocarpus angolensis, Erythropleum africanum* and *Parinari curatellifolia* while *Marquesia marcoura* dominate the dense evergreen ôMateshiô forests (WARMA, 2019; Tveintnes, 1983).

3.6. Climate

Lake Mweru is situated in Zambiaôs third agro- ecological region. Zambia has three main agro-ecological regions; AER I, AER II, and AER III. AER III receives the highest rainfall ranging between 1100mm and 1500mm annually. Rainfall occurs in the warm- wet season from November to April. Other seasons experienced in the region include; the cool- dry season from April to August and the hot- dry season between August and October (GRZ, 2014). The long-term mean temperature for the region is 21.4^{o}. The valley experiences hotter conditions with maximum of 35^{o} during the hot- dry season (WARMA, 2019).

3.7. Socio- Economic activities

Luapula province is predominantly rural with high poverty levels. Agriculture and fishing make up the major economic activities (GRZ, 2019). Commonly grown crops are maize (*Zea mays*), cassava (*Manihot esculenta*), sorghum (*Sorghum bicolor*), beans (*Phaseolus vulgaris*), sweet potatoes (*Ipomea batatas*) and millet (*Panicum miliaceum*). The province is also favourable for growing sugarcane, palm oil, bananas and citrus fruits (WARMA, 2019).

Fishing is mainly conducted in Lakes Bangweulu and Mweru, Luapula river and subsidiary swamps and lagoons. Common species are Tiger fish (*Hydrocynus Vittatus*), Silver fish (*Alestes macropthalmus*), Purple bream (*Serranochromis macrocephalus*), Mweru Sprat *(Microthrissa moeruensis)* among others (GRZ, 2019).

Kabuta is one of the fishing camps situated in Nchelenge district of Luapula province. The districtôs projected population for 2020 was 209, 824 persons (CSO, 2013), with an average household size of 5 persons per household (ZSA, 2020). Agricultural and fishing activities make up the major economic activities. Rain fed crop production is characterized by maize and cassava

(GRZ, 2019). Small ruminants such as goats are reared on a small scale for local trade while cattle herding is not a common practice.

Fishing is practiced for subsistence as well as for local trade (GRZ, 2019). Three types of fisheries using different fishing techniques exist in the fishing camps. These are (i) the *Chisense* fishery, where fishers use plank boats, tilley lamps, fine meshed nets and floaters; (ii) Gill netting- which involves the use of gill nets, with sizes greater than two and half inches (>2 ½ inch); and (iii) Long line fishery where nets of greater than two and half (>2 ½ inch) are left overnight in the waters and collected after fish species have been trapped. Use of mechanized engines is prevalent while some fishers also use sail boats.

Seasonal migrations of fishers from one fishing camp to another during the fishing period are a common feature. These facilitate trade of commodities such as fish, cassava, caterpillars (edible Mopane worms), sweet potatoes, ground nuts and sorghum. Local smallholder farmers similarly migrate from their homesteads to camp in their agricultural fields where they remain until the cultivation activities are completed.

Charcoal and firewood are the major sources of energy used for cooking and other domestic activities. Few houses and shops are connected to the national power grid therefore solar energy is used for domestic use such as lighting, recharging radios and other electronic gadgets (GRZ, 2014). In addition, solar energy provides an energy source for fish preservation through the sun-drying technique.

The community is characterized by poor sanitation and use of latrines. However, water for domestic use is sourced from hand pumps and communal taps positioned centrally in various villages. Water from the Lake and nearby rivers is used to irrigate vegetable gardens and other domestic duties. The lack of adequate health care services, clean water, good sanitation and schools present high risks of transmission of communicable diseases such as cholera, HIV/STIs and results in high illiteracy especially among the young children (GRZ, 2014).

A dual system of leadership exists where chiefs preside over their subjects in their respective chiefdoms through village head persons. On the other hand, local government institutions in form of local councils have their roles in regulating the citizenry. Three traditional leaders have

chiefdoms situated along Lake Mweru namely; Chief Mununga who is located in the northern region, Chief Puta and the Mwata Kazembe of the Lunda people are situated in the southern region. This dual system presents its own challenges in form of contestations over natural resources governance by the traditional leaders and state representatives (Annear, 2009). However, it also reinforces adherence to regulations that promote good environmental stewardship (Verelst, 2013).

CHAPTER 4: RESEARCH METHODOLOGY

4.1. Introduction

This chapter provides a description of the secondary and primary data sources, the sampling technique employed for the study, instruments used for data collection and data analysis.

4.2. Sources of data

4.2.1. Secondary Data

Secondary data was obtained from the review of several archival sources.

4.2.2. Primary Data

The sources of primary data were; fishers from Kabuta fishing camp, key informants from the Department of Fisheries, a Traditional leader and executive members from the Fishing Association and Village Fisheries Management Committee. Data collection was conducted over a ten day period from 17th- 26th July 2019.

4.3. Sampling Techniques

Kabuta fishing camp was purposively selected as the study site due to the large population of fishers and the existence of leadership structures at the village level. The fishing camp consists of 16 villages situated along the Lake shoreline. The villages are grouped into catchments which are managed by a Fishing Association. At the time of fieldwork, three catchment areas were being managed by three Fishing Associations. These are Kabuta, Mulonda and Mutabwa. This study was restricted to Kabuta and Mulonda catchment, hereafter referred to as Kabuta Catchment and Mulonda Catchment. Mutabwa catchment area was not sampled due to logistical constraints encountered by the researcher.

Probability sampling techniques could not be used due to the non- availability of a sampling frame for fishers. Fishers were therefore conveniently selected based on their availability during the data collection period. Fishing Association committee members helped in identifying potential respondents who owned fishing gear and were practicing fishers. A total of 64 fishers

from 12 villages participated in the questionnaire survey. The traditional leader was purposively selected due to his position as the senior traditional leader in the fishing camp.

4.4. Data Collection methods

4.4.1. Focus Group Discussions

A total of five FGDs were conducted; two with FA executives, two with ordinary fishers and one with the VFMC leadership. Each of the five FGDs was held separately.

Fishing Association executive members were purposively selected due to their positions as local leaders at the village level. The two FGDs with Fishing Association leadership comprised of a three and four membership team from Kabuta and Mulonda catchment respectively. The low number of discussants was due to vacancy in the leadership positions during the data collection period.

Fishers were purposively selected from among the 64 respondents who had participated in the questionnaire survey based on the knowledge and unique opinions they expressed during the survey. Four fishers from Kabuta and six fishers from Mulonda catchment area participated in the FGDs.

Focus Group Discussants from the Village Fisheries Management Committees were selected through convenient sampling. A total of four executive members participated in the discussions.

Focus Group Discussions were recorded digitally using a digital device and notes were taken during the discussions to consolidate the recordings. The discussions lasted not more than an hour. Major themes in the FGDs were committee performance, participation and compliance to fishery regulations.

4.4.2. Key Informant Interviews

A total of two key informants were selected through purposive sampling, comprised of one government official from the Department of Fisheries and one traditional authority representative.

Interviews were conducted with key personnel from the Department of Fisheries in order to gain an understanding of the operations of the co- management system, to acquire information which could not be obtained through the document review as well as to obtain an expert view of the co-management opportunities. Other interviews were conducted with a senior traditional leader in the fishing camp. The aim was to gain understanding of the current roles, challenges and influence of the traditional leaders in the management of the fishery. Interview guides were used to facilitate an unstructured- type of discussion.

4.4.3. Structured Interviews

A questionnaire was developed and was used to interview fishers in the study site. The instrument was divided into four parts; Part A captured the respondentsô biographical- data such as age, marital status and education level. Part B queried the respondents over the performance of Fisheries Committees. Specific questions were asked to find out the respondentôs awareness of committee duties and what penalties they impose when a fisher errors. Part C was aimed at capturing fishersô views about the effects of community by- laws.

The interviews were conducted in the common dialect of *icibemba* which both the researcher and assistant were conversant with. A total of 64 interviews were successfully conducted.

4.4.4. Observations

Observations were made of various landing sites along the shoreline in Kabuta fishing camp determine the type of fishing gear and fishing methods used as well as the type of fish landed and its size. Observations of the homesteads were also made to determine fish drying techniques and trading system for *Chisense*.

4.5. Data Analysis

Data collected through structured interviews were analyzed. Completed questionnaires were entered into Microsoft Excel according to the date of data collection. Dichotomous questions were coded (Yes- 1, No- 2) and analyzed accordingly. Percentages, frequencies as well as means were then generated and displayed through bar and pie charts.

Thematic analysis was employed to analyze answers from open- ended questions from the structured interviews. The themes that guided the analysis where based on the study objectives.

Digital recordings from FGDs with fishers, Fishing Association and Village Fisheries Management Committee members were listened to several times and the discussantsô views written down. The content was analyzed and consolidated with the notes taken during the discussions.

Digital recordings from the key informant interviews were similarly transcribed and analyzed to gain more understanding.

Ostromôs Eight Design principles were reworded and used to analyze the performance of the VFMC as an institution. Prettyôs typology of participation was used to classify the type of participation existing among fishers. The Fisheries Act No. 22 of 2011 and the Fisheries Regulations of 2012 provided basis for analyzing fishersôcompliance to fisheries regulations.

Table 4.1 Data Analysis Tools Employed in the study

Study Objective	Data Analysis Tool
1. Assessing the performance of the VFMC 2. Evaluating Participation of fishers in Management activities 3. Assessing compliance of fishers to operational rules	1. Ostromôs Eight Design Principles (Reworded) 2. Prettyôs Typology of Participation 3. Fisheries Act No. 22 of 2011; Fisheries Regulations of 2012

4.6. Limitations of the Study

The researcher was unable to interview more than 64 fishers in the study area due to the inability to access them during the day. This was mitigated by conducting focus group discussions and informal interviews or chats with as many residents of the areas as possible.

4.7. Data Validity and Reliability

The researcher endeavoured to collect respondentsô views and realities by probing. Upon reaching a theoretical saturation point where new respondents were providing the same responses, the research opted to stop interviews and engage fishers through focus group discussions. The researcher conducted all the interviews herself. This minimized inconsistencies that result from having more than one interviewer as each interview may explain the questions differently.

4.8. Research Ethics

The researcher strove to introduce the research project to the respondents before seeking their consent to participate in the study. This ensured that the informed consent ethic was achieved. Respondents were assured of their anonymity and confidentiality during presentation and publication of research findings. Further respondents rights of expression were not hindered

during interviews and group discussions. The researcher made efforts to respect local culture so as not to offend research participants, e.g. by wearing a *chitenge* wrapper when moving around in public during her stay in the study site.

4.9. Philosophical Basis of the study

Pragmatism is an alternative philosophical foundation (or ópradigmô) to the conventional positivism and constructivism (Feilzer, 2009). Rather than committing to one system of philosophy or reality, pragmatists support the existence of single and multiple realities and embrace both subjectivity and objectivity in the conduct of research (Shannon- Baker, 2015; Mackenzie and Knipe, 2006). Therefore instead of applying a single scientific method to understand reality or truth about that reality, multiple methodologies are adopted during the research process (Mackenzie and Knipe, 2006). The researcher can combine qualitative methods such as interviews, observations and focus group discussions with quantitative methods such as experiments in view of addressing the research problem and achieving desired results (Biesta, 2010 cited by Shannon-Baker, 2015; Biddle and Schafft, 2015).

Pragmatism is regarded as problem- centered, and action- oriented, that is, the central focus being ówhatô the research problem is and óhowô best it can be investigated. The goal of the researcher therefore is to engage appropriate action that will facilitate problem solving (Feilzer, Mackenzie and Knipe, 2006; Kaushik and Walsh, 2019).

The researcher therefore identifies and applies appropriate data collection and analysis tools from various sources without focusing on the philosophical assumptions of the tools (Pansiri, 2005; Mackenzie and Knipe, 2006). In this regard, a research tool derives its definition from the purpose it helps to achieve rather than what it is commonly known for (Kaushik and Walsh, 2019). Pragmatism therefore enables a researcher to derive practical solutions to research problems without constraining them to commit to one philosophical paradigm against another (Shannon-Baker, 2015; Feilzer, 2009).

Therefore a pragmatic approach was adopted in this study. This researcher selected the most appropriate qualitative and quantitative research methods for data collection in order to interrogate the research problem.

CHAPTER 5: RESULTS AND DISCUSSION

5.1. Introduction

This chapter presents the results and discussion of the study. It begins with a brief description of the socio- economic characteristics of the respondents and then presents results and discussions for each of the three objectives of the study.

5.2. Fishers Socio- Economic characteristics

Of the 64 fishers interviewed through structured interviews, the majority (92 percent) were male while 8 percent were female. Observations revealed that generally, most women are engaged in fish processing and trading. Women that own fishing gear hire the men folk to fish on the Lake on their behalf. The absence of the women folk in the actual fishing activity is a result of old taboos and norms about gender roles and fishing (Mathews, 1993; Williams et al., 2001). This implies a lack of equity in access to fish resources and level of authority between men and women in the co- management system.

The age range of the respondents was between 23 and 65, with a mean age of 40 years. Most of the respondents (55 percent) had only attained primary level education (see Table 5.1). No respondent indicated to have attained tertiary level schooling. This suggests low levels of formal employment opportunities and a high dependence on natural resources for sustaining their livelihoods.

Table 5.1 Respondentôs Age and education levels, Mweru- Luapula fishery

Age	**Level of education**			
Age range (Years)	No formal education	Primary (Grades 1-7)	Junior Secondary (Grades 8-9)	Senior Secondary (Grades 10-12)
23- 33	1	8	2	4
34- 44	-	18	6	6
45- 55	-	7	2	5
Above 56	-	2	1	1
Total	1	35	11	16

Source: Field Data (2019)

A total of 96 percent of the respondents engaged in fishing both for business and household consumption, while 2 percent fished strictly for household consumption. The rest (2 percent) claimed to fish strictly for business. This indicates that fishing does not only help generate cash income but also provides nutritional benefits for the local residents. Alternative sources of income outside the fisheries sector were petty trade, bricklaying, transportation services and farming. None of the respondents was in formal employment. The low education level among respondents probably explains their low participation in formal employment.

The estimated monthly cash income from fishing activities ranged between ZMW 100 and ZMW 7, 000 with a mean of ZMW 1, 500 minus the two outliers; ZMW 50 and ZMW 40, 000. At the time of this study, the fisher with ZMW 50 monthly cash income had recently started trading part of his catch as a livelihood strategy and owned few nets while the fisher with the monthly cash income of ZMW 40, 000 was a gear owner whose numerous fishing nets and motorized boats as well as large fishing crew brought in high returns.

5.3. Performance of Village Fisheries Management Committees (VFMC)

The performance of the VFMC was assessed using Ostromôs eight design principles, although some principles are less applicable than others. Results and discussion are presented as follows.

Table 5.2 Presence of design principles in performance of the VFMC, Mweru- Luapula fishery

Ostrom's Eight Design Principles	Modified Design Principles	Presence of design Principle
Well defined boundaries	1. (a) Membership criteria of VFMCs: Criteria of becoming VFMC member is fair and well known by most resource users	Yes
	(b) VFMC duties are clearly stipulated and known to all committee members and fishery resource users	Yes
Congruence between appropriation and provision rules and local conditions	2. Benefits received by VFMC members match their duties	VFMCs lack monetary incentives for members
Collective choice arrangements	3. VFMCs can engage in collective action on behalf of the community	Yes
Monitoring	4. (a) VFMCs monitor rule compliance through frequent patrols	Few patrols conducted
	(b) VFMC operations are upward and downwardly accountable	No downward accountability
Graduated sanctions	5. (a) Sanctions imposed by the VFMC on erring members and ordinary resource users are legitimate	Lack of standardized penalty system
	(b) Penalties are known to all	No

	resource users	
Conflict resolution mechanism	6. VFMC conflict resolution mechanisms are swift, inexpensive and known to resource users	No conflict resolution strategies
Minimum recognition of rights to organize	7. VFMCs craft local rules that are respected by state and non- state actors, e.g. traditional authorities	No
Nested enterprises	8. VFMC operations, rules feed into state district and provincial activities	Partially well- organized)

Source: Ostrom, 1990, p. 69

The results based on the eight principles are discussed in detail below.

5.3.1. Membership criteria of VFMCs

The system of installing VFMC membership is well defined and well known by all stakeholders in the fishery. Members who are nominated through consultations with fishers in respective villages along the fishery are interviewed, trained and eventually installed by the Department of Fisheries as Village Fisheries Management Committees (VFMCs).

However, according to a key informant from the Department of Fisheries, low financial support to the Ministry of Fisheries and Livestock has hindered the DoF from holding elections to install new VFMC leadership. Despite the committee operating under expired tenure, 95 percent of respondents still acknowledged them as the official VFMC leadership.

This failure by local residents to change local leadership even after their three- year tenure has expired suggests that leadership positions have been captured by the ólocal elitesô. Failure by a resource community to directly select their leaders demotivates them from adhering to the resource regulations because the leadersô legitimacy is not recognized (Jentoft, 2000).

Low literacy levels among respondents (Table 5.1) therefore support this assertion of elite capture in the local leadership. Due to the nature of the roles of VFMC positions e.g. writing

minutes during meetings, and keeping records, residents that can read and write are invariably selected as committee members. Platteau et al., (2014) revealed that elite capture occurs mostly in communities with high poverty levels where local leaders hold onto their positions for personal gain and the local citizenry are unable to challenge them due to lack of alternative sources of livelihood. The scholars further showed that local elites capture local benefits when majority of resource users are unable to engage in dialogue with government or other stakeholders due to low literacy levels. Failure to read, write and communicate with state agencies or project organizers makes them depend on those with such abilities, who, in some instances may take advantage and work for personal interests.

5.3.2. Knowledge of VFMC duties

The VFMCs in Mweru- Luapula fishery have been delegated authority to function as an extension of the Department of Fisheries throughout fishing villages along the fishery. Committee members stated their mandate as;

Conservation of fish resources for current and future generations and provision of extension services to fishers on fish conservation and utilization.

Their mandate is achieved by conducting patrols during the closed fishing period from December 1st to February 28th/ 29th (in a lunar year) the following year. Workshops and extension trainings are also intended to sensitize the fishers on sustainable fishing practices. However, the Fisheries Act No. 22 has not prescribed VFMC mandate, duties or powers. Instead the Department of Fisheries acts as the source of VFMC guidelines and operations using subsidiary legislation. This entails that even with the local leadership in place, the decentralization process has not fully been implemented.

The ability of local institutions such as the VFMCs to influence the decision- making processes has not been established. Therefore the Department of Fisheries still delegates duties and management tasks. This indicates the existence of an *'instructive'* type of co- management, where ómechanisms for dialogue with resource users exist but the co- management process involves government informing users on the decisions it plans to makeô (Sen and Nielsen, 1996).

The lack of legally stipulated roles and powers of the VFMC means local resource users cannot hold their local leaders accountable through the court system when they act outside their duties. However, on the ground, the local institutions have limit- less powers and can engage in illegalities such as bribes when conducting patrols because their duties have not been well documented to the local users.

5.3.3. Balance between Benefits and Functions

VFMCs in Mweru- Luapula fishery work on a óvoluntary basisô with no monetary benefits. Instead they receive allowances from donor- funded projects. These findings reflect a common trend in similar small- scale fisheries co- management on Lake Tanganyika (Banda et al., 2015) and Lake Victoria (Nunan et al., 2018), where Village Conservation and Development Committees (VCDCs) and Beach Management Units (BMUs) respectively are not considered government workers but operate as volunteers. On the other hand, they benefit by being recognized as local leaders.

Notwithstanding, Platteau et al., (2014) suggest that local leaders, who are often local elites, benefit by influencing the decision- making process to their favour as they represent resource users. This entails that they can influence the type of regulations to be designed which may benefit them more than the entire resource community, thereby distorting the intensions of the decentralization process.

This form of imbalance between the benefits and functions of local leadership has the potential to retain a top- down management system disguised as co- management.

An executive member lamented the lack of tangible benefits as follows;

pantu pano pali ifwe fwebaupa, uile pa mumana zero three elo wa bwela ne fyakufwala nafibomba umukashi alakumona shani?

translated as follows; ñsome of us here are married. You go to the Lake at 3: 00 AM *(to patrol)* only to come back with soaked cloths. How will your wife understand?ò This lack of tangible benefits thereby forces VFMC committee members to engage in alternative livelihood activities such as crop production or fish trade at the expense of patrolling the fishery. It was narrated

during focus group discussions that instead of conducting patrols concurrently on the Lake within the three- month period, they end up patrolling only four times. As a result, the fishery is left open to illegal and unsustainable fishing practices.

The lack of tangible benefits also encourages the VFMCs to modify fisheries regulations by soliciting or accepting bribes in an effort to sustain their livelihoods. One respondent alleged that the VFMCs work for their pocket.

A Study by Etiegni et al., (2016) on Lake Victoria (on the Kenyan jurisdiction) agrees with these findings where the Beach Management Unit activities are not funded by the government. Instead Beach management units are required to generate revenue for conducting patrols and for allowances through membership fees, penalties for by- law violations and fish landing fees.

This mismatch between the benefits they derive and the role they play incentivizes enforcement agencies to engage in various illegalities such as requesting or accepting bribes, or using prohibited fishing gear. It also arguably provides a justification for them to be involved in such illegalities.

Nunan et al., (2018) noted how corruption- ñ the misuse of public power for personal gain in government authoritiesò- (Sundström, 2016), on Lake Victoria is prevalent at all levels of the co-management structure, i.e. among Beach management unit committee members, the police, judiciary and local politicians.

5.3.4. Rights to Adapt *(modify)* State Regulations

VFMCs in Lake Mweru Luapula have the right to modify some state regulations in order to suite the local conditions and meet the needs of users. Regulations such as destroying confiscated gear and prosecuting offenders through the court system have equally been modified. Fishers can repossess their confiscated gear at a fee and pay fines to avoid being prosecuted through the courts. Through this system, the VFMCs generate revenue which is channeled towards securing resources such as fuel for conducting patrols while the rest is shared as allowances. Respondents highlighted during focus group discussions how this system negatively affects co- management in the fishery. They alleged that fishers are not deterred from engaging in illegalities such as

using prohibited gear or fishing without a license because they are able to pay the fines meted on them by the enforcement officers.

5.3.5. Execution of patrols

5.3.5.1. Trans boundary Conflicts

Lake Mweru is managed by independent co- management systems on both sides of the Lake, that is, on the Zambia and the Congolese sides. Despite having a clearly defined boundary marked by the Luapula River (see Figure 3.1), fishers from both sides of the Lake still encroach into neighbouring fishing grounds to conduct fishing activities. This often results in violent confrontations. For example, Zambian fishers have in the past been abducted by Congolese soldiers for allegedly crossing over into Congolese territory but have been rescued after intervention by the Government of Zambia (Lusaka Times, 2012).

During FGDs, respondents alleged that marine soldiers and ordinary fishers from the Congolese side attack Zambian fishers and confiscate their gear, catch and other valuable items in the fisherôs possession. The majority (81 percent) of respondents acknowledged the prevalence of such trans- boundary disputes with their neighbouring counterparts while 19 percent did not acknowledge any problems. Those that did further identified confiscation of fishing gear and catch and abduction of fishers as the main form of disputes and attributed these conflicts to differences in fishing techniques and boundary encroachment.

Respondents identified the Fishing Association (40 percent), VFMC (28 percent), Department of Fisheries (24 percent) and Marine soldiers (14 percent) as responsible institutions for resolving such disputes. However, the lack of authority, formal military training and necessary skills incapacitates the Fishing Association and VFMCs from engaging in conflict resolution. As a result, serious cases are handed over to the Department of Fisheries, local police or Marine soldiers.

A member of the VFMCs lamented that wildlife guards have been equipped with guns and receive remunerations while the fisheries sector remains neglected. He therefore suggested the reintroduction of fish guards to take up the role of the VFMC in the fishery.

Disputes relating to differences in fishing techniques and gear arise when different fish species are exploited on either side of a shared water body. For instance, artisanal gill net fishers on the Zambian side of Lake Kariba who commercially exploit species such as the Nile Tilapia, *(Oreochromis niloticus)*, Tiger fish *(Hydrocynus vittatus)* and the Eastern bottlenose *(Mormyrus longirostris)* are required to use 3 inch[1] (76 mm) nets. On the Zimbabwean side however, the artisanal fishery exploits Redbreast tilapia *(Tilapia rendalli)*, Nile Tilapia, Rednose labeo *(Labeo altivelis)*, Tiger fish and the African Catfish *(Clarius gariepinus)* inter alia using a minimum mesh size of 102 mm. Zimbabwean artisanal fishers therefore allege that when Zambian fishers encroach into their fishing grounds, they catch more fish due to the smaller mesh- sized nets they use (Mhlanga and Nyikahadzoi, 2016). These disputes however, are resolved through the Protocol on the Management and Development of the Fisheries on Lake Kariba.

Lake Mweru-Luapula fishery lacks such a Joint Fisheries Management Committee or conflict resolution institution to oversee policy formulation and decision- making activities on behalf of the two countries. According to a key informant, a separate co- management system is in operation on the Congolese side. This lack of a bilateral agreement entails that conflicts are resolved independently; regulations are passed without consultations with fellow fishing counterparts and different entry systems are being applied on either side of the Lake. As a result, the fishery may be experiencing different fishing pressures on both sides of the Lake. The lack of collaboration means research to determine the ecological status of the fishery is not being conducted.

5.3.5.2. Intra- fishery Disputes

Intra- fishery disputes are common in Mweru- Luapula fishery especially between gill net and *Chisense* fishers. Gill net fishers complained of having their nets removed or torn by motorized boats used by *Chisense* fishers. These conflicts however, are amicably resolved among fishers and with the intervention of the Fishing Association and VFMC.

[1] Conversion factors: 1millimeter Equals 0.039 inches

Similar disputes have been reported between gill- netters and pelagic *(Kapenta)* fishers on Lake Kariba fishery and are handled by the Village Management Committee and Lake Kariba Inter-Zonal Fisheries Management Association (Mhlanga and Nyikahadzoi, 2016).

5.3.6. Accountability of VFMCs

5.3.6.1. Upward Accountability

VFMCs are held accountable at provincial and village level. The Department of Fisheries facilitates VFMC elections and trains the newly elected leadership on enforcement of the Fisheries Act and subsidiary legislation in their respective catchment areas. The new leadership is also trained on how to provide extension services to fishers on fish conservation and sustainable utilization of the fishery.

However, the Department of Fisheries is unable to provide these trainings regularly to VFMCs who in turn are unable to transfer new knowledge and technology to fishers through extension trainings. This implies that fishers have no direct access to new knowledge on sustainable fisheries management and therefore cannot adopt new technologies but continue to use the same gear and practice unsustainable fishing methods.

The Department of Fisheries also has the role of monitoring VFMC operations. However, the lack of physical presence of Department of Fisheriesô officials in fishing camps due to limited fisheries personnel restricts them from performing this role. Instead other modes of communication are used to accomplish management tasks. It is due to this reason that fishers and VFMC leadership bemoaned the lack of prompt response to complaints by fisheries officials. As a result, the Department of Fisheries is constrained from ensuring that VFMC operations are in tandem with the legally stipulated guidelines of the Fisheries Act.

5.3.6.2. Downward Accountability

At the village level, Traditional Authorities that is, village head persons are considered overseers or overall boss over VFMCs. According to a key informant, Traditional Authorities are responsible for facilitating VFMC elections by organizing fishers and receiving nominations.

However, a key informant lamented how their role as overall boss ceases once the VFMC leadership has been installed by narrating as follows;

Most times, they say that we the village leaders[2] are the overseers, that we are the overall boss. But when we want to get involved in a matter they say no, we are not supposed to be involved. Now they don't know that things can go wrong. Because if they allow us to be part of the VFMCs, we would know how things are moving. Now most times they like telling us we are the overseer, we are the overall boss. But when the overall boss wants to exercise the authority as a boss, they are not allowed.

He further complained about how the Traditional Authorities are rarely considered by the VFMC when deciding how to dispose confiscated fish or gear from patrols.

The VFMCs do not call the village leader so that they work together. Even when they go on patrols on the Lake and confiscate fish, what they confiscate is theirs to dispose. There is nothing like calling the village leader to be present, no…They do not even consider distributing the confiscated fish to the clinic or hospital, no. It is as though the village leader is on their own.

The occurrence of such power struggles has consequently resulted in rivalry between the two groups. The prevalence of power struggles in co- management of common pool resources is because the system involves the integration of customary and civic leadership. Therefore, when the role of Traditional Authorities is not clearly defined in state legislation, state agencies, traditional leaders and other local institutions fail to cooperate.

5.3.7. Penalty System

The Fisheries Act No. 22 of 2011 has not stipulated specific penalties to impose when VFMC members contravene the Law. It does however, give a general penalty of a fine not exceeding one hundred penalty units or imprisonment for a period not exceeding one year or to both *(GRZ, 2011)* which applies even on VFMC members. According to a key informant, when a VFMC member contravenes the Law, he/ she is óinvestigatedô by the Department of Fisheries and when found answerable the member is órelievedôof their duties.

[2] Village leader also means village headman/ woman. The local term used from the Bemba dialect is *mwine mushi* which means owner or custodian of the village.

There is no institutional body or organization to oversee and impose sanctions on erring VFMC members besides the Department of Fisheries. During FGDs, executive members explained that at the village level, executive members are sanctioned when found committing offences such as using prohibited gear. Sanctions include verbal or written warnings, penalty charges, suspension and in some instances expulsion from the committee. There is however no legally recognized local constitution that guides VFMC interactions or provides accompanying standardized sanctions when regulations are broken. Sanctions are arrived upon through consensus among fellow committee members.

The absence of clearly defined VFMC guidelines entails that artisanal fishers are unaware of possible sanctions that can be imposed on VFMC leaders who violate fishery regulations. As a result, resource users do not participate in regulating VFMC operations.

5.3.8. Conflict resolution mechanisms

According to VFMC members, internal disputes among executive members are locally resolved. There is no legally stipulated strategy for conflict resolution among the committee members. However, depending on the severity of the matter, the Department of Fisheries is the appropriate authority responsible for resolving issues among the VFMC members.

Members of the VFMC lamented on the slow response that they receive whenever they report matters to the Department of Fisheries. The absence of Department of Fisheriesô officers at the village level entails that complaints and other matters have to be reported to the District office in Nchelenge. As a result there is no quick and cheap access to conflict resolution among committee members.

5.3.9. Rights to formulate institutions

Fisheries Laws similar to other state Laws, are formulated through a legislative process that involves consultations with various stakeholders and are enacted by Parliament. A key informant asserted that fishers are consulted through their local leaders on matters of fisheries Laws. On the contrary, the Department of Fisheries was identified by over a third of the respondents as the leading institution responsible for formulating fisheries Laws. See Figure 5.1

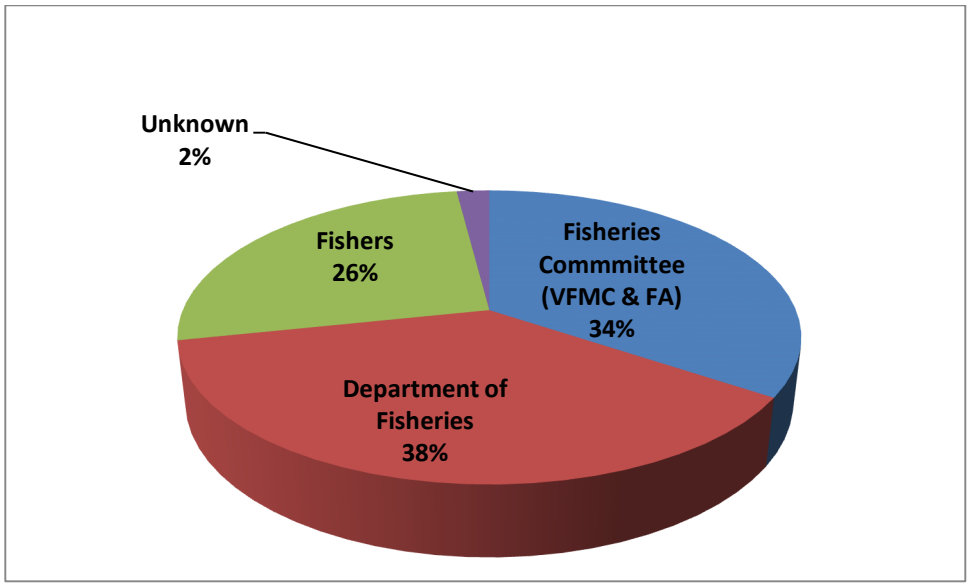

Figure 5.1: Percentage share of institutions responsible for formulating fisheries Laws

Source: Field data 2019

Conflicting views over the extent of participation of VFMCs in formulating state fisheries Laws were expressed by fishers and VFMC executive members.

A key informant however narrated that fishers and their local leadership (VFMCs, Fishing Association and Traditional Authorities) in Mweru- Luapula fishery have designed local operational rules which guide their interactions with one another and with the resource. These rules do not apply in other fishing camps. An executive member of the VFMC explained that *Chisense* fishers are not allowed to land and sell *Chisense* in the night, instead they are required to do so in the mornings. Fishers are also prohibited from engaging in fights, taking intoxicating substances, or using vulgar language while conducting their fishing activities on the Lake. Some respondents however, could not acknowledge participating in the design of these local rules.

Similar studies on Lake Tanganyika (Banda et al., 2015) showed that majority (79 percent) of respondents viewed fishery stakeholders, including Village Conservation and Development Committees (VCDCs), as having no powers to formulate fishery Laws. Another 67 percent of respondents alluded that their local leadership were lacking the authority to formulate fishery by-laws.

These findings show a weak decentralization process where fishery stakeholders and local leadership have no delegated authority to influence how the fishery should be managed but instead are operating under laws that are imposed. According to Jentoft (2000), such a co-management arrangement is not viewed as legitimate because it fails to incorporate the participation of the resource users in decision- making thus the different views and interests of resource users are not heard or met.

5.3.10. Nested governance

The different layers that form the co- management system, that is, criteria of selecting VFMC leaders, functions and incentives, collective action and accountability, penalty system and internal conflict resolution mechanism and recognition of rights to organize lack cohesion. This arises from the disparity of óinterestsô among stakeholders.

5.4. Participation of fishers in management activities

5.4.1. Selection of local leadership

The majority (63 percent) of respondents identified elections as the selection criteria for the local leadership. Only 28 percent participated in electing committee members for the Fishing Association. No fisher acknowledged to have participated in elections for the Village Fisheries Management Committees. According to a key informant, the last installation of Village Fisheries Management Committees occurred during the Program for Luapula Agriculture and Rural Development (I), a donor funded project in 2011.

During Focus Group Discussions, fishers alleged that ólocal leaders choose themselvesô. This indicates that participation in selection of local leaders takes the form of a manipulative type where, ñ*participation is simply a pretense, with 'people's representatives on official boards but who are unelected and have no power"* (Pretty 1995).

Failure to engage local resource users in management decisions has potential to encourage resentment towards leaders, encourages acts of defiance and fails to facilitate legitimate representation of fishersô interests. A study by Benjaminsen and Svarstad (2010) showed how

Maasai herdsmen in Tanzania were spearing elephants in acts of protest against the increase in protected areas and reserves.

5.4.2. Involvement in patrolling activities

A key informant from the Department of Fisheries identified the Village Fisheries Management Committees, Fishing Association, marine soldiers and the Department of Fisheries as the main institutions responsible for conducting patrols in the fishery. Fishers have no role in conducting patrols or monitoring the compliance of fellow fishers to fisheries regulations. Therefore when the Village Fisheries Management Committee and Fishing Association are not conducting patrols, fishers are unrestrained from engaging in illegal fishing practices. This scenario was observed by the researcher during observations on the Lake shore.

During a FGD, fishers acknowledged that reporting a fellow fisher who is engaged in illegal fishing practices can be detrimental to the fisherôs livelihood. Similarly, Banda et al., (2015) reported a lack of involvement of local fishers in monitoring and surveillance activities on Lake Tanganyika. Therefore the persistence of this trend compromises co- management.

5.4.3. Involvement in formulating regulations

A passive type of participation of fishers exists in Mweru- Luapula fishery as only 11 percent of respondents identified the Department of Fisheries and fishers as participants in the process of formulating fisheries regulations. This form of participation entails that people (the fishers) participate by being told what has been decided or has already happened.

A key informant from the Department of Fisheries noted otherwise. The informant stated that formulation of fisheries regulations is a consultative process which involves fishers. Weak involvement of fishers in the legislative process suggests the persistence of a top- down management system where ólienôregulations are formulated.

Fisherôs low awareness and participation in the legislative process indicates a lack of consensus between the stakeholders. Neglecting the role of fishers in decision- making reduces the legitimacy and effectiveness of the co- management process (Jentoft and McCay, 1996; Njaya,

2007). Jentoft et al., (1998) further posits that the quality of regulations is refined by engaging resource users in the management process.

5.5. Compliance of fishers to fisheries institutions

Lake Mweru comprises three categories of fisheries namely; *Chisense* fishery, Gill net and Long line fishery. Currently the commonly exploited fish species include; Lake Mweru Sprat (*Microthrissa moeruensis*) (*Chisense*), Tiger fish, Silver fish (*Alestes macropthalmus*) (misebele) and Purple bream (*Serranochromis macrocephalus*) (makobo).

Nonetheless, respondents have reportedly observed fish stock decline of species such as the Blunt- toothed catfish, (*Clarias ngamensis*) (bongwe), Humped- backed Bream (*Tylochromis mylodon*) (ntembwa), Green- headed Bream (*Oreochromis macrochir*) (pale), catfish (*Chrysichthys mabusi*) (monde), Tiger fish, Silver fish and Dogfish, (*Auchenoglanis occidentalis*) (mbowa).

Excessive commercial exploitation and export to the copper mines of Zambia and the DRC led to the exhaustion of the commercially valuable species such as the Red- nose mudsucker, (*Labeo altivelis*) (mpumbu) or Luapula salmon. Failure to manage the species with its óshort breedingô season and ómass migration habitô resulted in diminished stocks and consequently its disappearance in the late 1960s.

Three management tools have been instituted in the fishery to regulate fishing activities and help to conserve fish species. These are; sanctuary areas, closed season (fish ban) and prohibited fishing gear and methods. The Fisheries Act No. 22 of 2011 and Fisheries Regulations No. 24 of 2012 provide specific guidelines for implementing the management tools.

5.5.1. Sanctuary areas

Fish breeding sites were designed to allow fish to breed in specific breeding areas. Fishing in these breeding sites is strictly prohibited throughout the year. A total of 95 percent of respondents identified Kalungwishi, Mwatishi and Mifimbo as restricted fishing areas within the fishery.

Mifimbo fish breeding area, also referred to as ñthe motherò or the ñwombò of the fishery provides a rich breeding ground for several fish species in the fishery. It was established in 1948 as a permanently closed fishing site to the communities surrounding it (Annear, 2009). However, a key informant explained that villages have been established on Kanakashi Island, one of the main lands within the Mifimbo.

Despite being identified as a major cause of increased fish stock declines, residents on this island have insisted on their role as ócological conservatorsô (van Zwieten and Aarnink, 1996). Efforts by the Department of Fisheries to evacuate these settlers failed. According to a key informant, this issue has remained unresolved till date.

According to Banda et al., (2015), the failure by government agencies to consult riparian communities when developing breeding sites often leads to such disputes.

5.5.2. Closed fishing season

According to the Fisheries Regulations SI No. 24 of 2012, First Schedule, óthe whole of Lake Mweruô is closed to fishing activities beginning 1st December to the last day of February. Compliance to the fish ban is low due to inconsistent patrols carried out by the VFMCs. In addition, the weak penalty system fails to deter offenders from re-engaging in illegal fishing.

VFMCs do not use the court system when prosecuting offenders, instead a fisher is charged a penalty fee in order to repossess the confiscated gear. The penalties are agreed upon through consensus among VFMC members.

A respondent strongly expressed his disapproval of this system through the following statements;

> *So, nga chakwebaati umushila bamulipilisha mulenjeba kuti alaleka kuya pamumana? Bamusanga nefyabindwa filya bamulipilisha, alaleka kuya pamumana? Tetialeke pantu naiishiba kuti namailo nkesa chita shani, nkesalipila. Mailo bamulipilisha bamweba bomba abomba bomba, namailo akaya muku bomba, as a result ifintu kuya file onaikilako fye.*

This is interpreted as; ñso if it happens that a fisher is made to pay *(a penalty fee)*, will he stop going to the Lake to fish? They catch him using prohibited gear and charge him, will he stop going to the Lake? No he cannot stop, because he knows that even tomorrow I will pay *(penalty fee)*. The following day they charge him again and tell him to continue fishing and he continues,

even the day after that he will go to fish. As a result things *(the fishery)* continue to get destroyedò.

The respondents also contended that observing the fish ban on the Zambian side of the Lake while fishing on the DRC is ongoing can be challenging. For example, the 2019 fish ban was not observed on the DRC side of the Lake due to the presidential elections they held (Key informant, pers.com. July 24th 2019). Inadequate resources hinder effective enforcement of the fish ban and consequently conservation of fish.

5.5.3. Prohibited fishing gear and methods

In order to conserve fish resources in the Lake, the Fisheries Act of 2011 and the Fisheries Regulations of 2012 prohibits the use of the following fishing equipment shown in Table 5.3.

Table 5.3 Prohibited fishing equipment

Prohibited fishing equipment	In Use	Not in Use
Explosive or firearm		√
Trawl or bottom drag net	√	
Poisonous, Chemical or Noxious substances	Data not available	
Electrical device		√
Mosquito nets	√	
Draw/ Beach seine nets (*except for Chisense*)	√	
Gill net of a mesh size less than 63 mm	√	
Monofilament net of a mesh size less than 127mm	√	

Source: Fisheries Act No. 22 of 2011 and Fisheries Regulations SI. No. 24 of 2012

A total of 92 percent of respondents were aware of the prescribed gear outlined as: plank boats of sizes between 5 m and 7 m in length; Monofilament (Gill) nets of 5 inch and above (see Figure 5.2), Multifilament nets of 2.5 inch to 5 inch, mesh less sized *Chisense* nets and tilley lamps (see Figure 5.3). Motorized engines and sails are used to propel the plank boats.

Figure 5.2 Monofilament nets Source: Field data (2019)

Figure 5.3 *Chisense* fishing gear (plank boat, mesh- less sized net, wooden floaters and tilley lamps

The use of beach seine nets, locally known as *chosa* or *mukwau* is common in the fishery especially in the northern tip of the fishery. Nets of prohibited sizes are locally made by fishers themselves in various sizes and are used as beach seines on shallow waters. They have an effect of harvesting immature fish.

Mosquito nets are also rampantly used for fishing. These are sown together and used as drag nets to harvest various types of fish.

Monofilament nets of mesh size less than 127 mm are prohibited fishing equipment on Lake Mweru. However, these nets are currently in use. Respondents attributed the wide use of these prohibited gear to easy availability and accessibility by fishers compared to the prescribed type of nets. These fishing equipment have destructive consequences on the Mweru- Luapula ecosystem as small fish and other aquatic species such as snails are harvested.

Despite 92 percent of respondents indicating awareness of the prescribed gear, low penalty charges imposed on offenders fail to deter fishers from using illegal fishing gear. This is exacerbated by the lack of involvement of fishers in monitoring fellow fishersô activities and high dependence on VFMCs and Department of Fisheries to impose sanctions.

The Fisheries Act of 2011 prohibits *Kutumpula*, fish poisoning, use of explosives and beach seining as fishing methods. The methods are deemed to be destructive to the fish species.

According to the Fisheries Regulations of 2012, *Kutumpula* refers to ñany fishing method whereby fish are driven into a stationary net or monofilament net or trapò. It is a form of gill netting which involves setting up nets of small mesh size (50 mm and 75 mm) around vegetation then thumping the water to drive out fish that is later caught in the nets.

A respondent during a group discussion stated that ófor them to catch any fish, the water needs to be agitatedô. However, the respondents were quick to acknowledge the severity of the punishment that accompanies the violation of this regulation.

A similar method to *Kutumpula* known as Kasenswa was formerly practiced in the fishery. Jin-Bee (1983) described *Kasenswa* as another type of gill netting that is practiced on the rivers which flow into Lake Mweru, for example Kalungwishi river. It involves setting up nets across the river to catch fish as they migrate upstream to spawn (Jin- Bee, 1983). The method is destructive and does not allow fish to breed.

Fish poisoning was a commonly practiced method of fishing among artisanal fishers during the pre- colonial era. In the Bangweulu swamps for example, a plant known as Tephrosia, (*Ububa*) was ground and spread on the water body to poison fish. Men would then catch the fish using

spears while women used baskets. However, no information was available on similar methods being practiced in Mweru- Luapula fishery.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1. Conclusion

Results show that the performance of the Village Fisheries Management Committees is weak due to the absence of key principles discussed by Ostrom (1990). These are; balance between benefits and functions, collective action, upward and downward accountability, standardized sanctioning system and swift conflict resolution strategies. The absence of these principles tends to undermine co- management efforts.

The passive type of participation evident in the fishery means fishers are unable to express their interests, grievances or create solutions through dialogue with the Department of Fisheries. Weak interaction among the stakeholders therefore shows that the core principle of co management which is, sharing of decision- making authority and privileges has been neglected.

And finally, the interplay between a weak sanctioning system and inconsistent patrols by the VFMCs fails to deter fishers from engaging in unsustainable fishing practices that compromise the state of the fishery, to the detriment of the entire fishing community.

6.2. Recommendations

Despite the co- management system being supported by a legal framework in form of the Fisheries Act No. 22 of 2011, the provisions of the Act have not been implemented, resulting in the persistence of the *de facto* open access system. The lack of success in implementing the co-management system in Mweru- Luapula fishery is not the weakness of the system itself, but lack of capacity by the instituting bodies to enforce the provisions of the fisheries legislation. Many scholars have argued that the success of a management system in one locale does not guarantee its success elsewhere. This might be the case with co- management system in Zambia. Therefore this study provides policy makers and state agencies an opportunity to redefine the provisions of the Fisheries Act by providing a clear strategy on how the provisions of the Fisheries Act can be localized and enforced to ensure sustainable fisheries management.

This study therefore proposes the following recommendations to the Department of Fisheries.

i. Provide salaries and military training to empower VFMCs. Salaries will reaffirm the status of the Village Fisheries Management Committees as government workers and improve their work culture.

ii. Create fishing areas with separate management teams for the three categories of fishing, that is, *Chisense*, Gill net and Long line fishing. This will help create boundaries for each fishing activity and provide access to a limited number of members to reduce free riding and encourage participation.

iii. Introduce a taxing system to generate revenue for fisheries activities within the Ministry of Fisheries and Livestock. Introducing a tax regime on fishers will reduce dependence on government funding and enable the Department to implement various projects. Unlike the licensing system where money is channeled to the Ministry, the taxes can be locally managed by separately.

iv. Delegate management responsibilities to Traditional leaders (such as Chiefs) and fishers. Involving traditional leaders in co- management can promote local- based decision- making and reduce the persistence of power struggles that often occur with state agencies.

This study further proposes the following to policy makers.

i. Provide unique strategies for implementing co- management in each fishery. This can be accomplished by understanding the local conditions of fisheries in Zambia and designing unique strategies for each fishery.

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6.3. APPENDICES

6.3.1. Appendix A

RESEARCH QUESTIONNAIRE

QUESTIONNAIRE CODE …… DATE: …../…../19 VILLAGE NAME: ……..

ENUMERATOR: ……

PART A: BIO DATA

1. Gender: Male ☐ Female ☐

Age: ……

2. Education level
   i. None ☐ ii. Primary ☐ iii. Secondary ☐
   iv. Tertiary ☐
3. Marital status
   i. Single ☐ ii. Married ☐ iii. Widowed ☐
   ii. Divorced ☐
4. Income generating activities

   ……

   ……
5. Estimated monthly income (ZMW)

   ……

PART B: PERFORMANCE OF FISHERIES COMMITTEE

1. How long have you been fishing?
   i. Less than three months ☐
   ii. Between 3 months and 1 year ☐
   iii. More than a year ☐

iv. Other

2. In what capacity are you engaged in fishing?

   i. For Business only ☐ ii. For household consumption only ☐

   iii. For business and consumption ☐ iv. Other ☐

   (Specify)…….

3. Are you aware of a fisheries committee in this village? Yes ☐ No ☐

   i. If Yes, how did you come to know about it?

……

……

   ii. If No, who manages fishing activities?

……

4. How are the fisheries committee members selected?

……..

   a. When was the last election held?

……

   b. Did you participate in these elections? Yes ☐ No ☐

      i. If your answer to Q4 (b) is No, give a reason for non- participation

……

5. Who constitutes the membership of the fisheries committee?

……

……

6. To the best of your knowledge, what are the duties of the committee?

……

……

……

7. Does the fisheries committee hold meetings? Yes ☐ No ☐ I am not sure ☐

   a. Have you ever attended a committee meeting? Yes ☐ No ☐

      i. If your answer to Q7(a) is No, give a reason

……

b. How often are these meetings held in a year?

……

c. Does the fisheries committee publicize the meeting resolutions to all village members? Yes ☐ No ☐ I am not sure ☐

8. How do you benefit from the existence of a fisheries committee in your area?

……

……

9. What form of contributions are fishers required to make to the fisheries committee?

i. Monetary (indicate the amount) ZMW ……..

ii. Other (specify) ……..

……

a. What penalty is there for failing to make contributions?

……

……

PART C. EFFECT OF COMMUNITY BY- LAWS

1. Is fishing open to all community members in your village? Yes ☐ No ☐

i. If your answer to Q1 is No, what makes one eligible to become a fisher?

……

……

a. Is fishing open to non- community members? Yes ☐ No ☐

i. If your answer to 1(a) is Yes, what makes them eligible to become fishers?

……

……

2. Are fishers required to obtain a license before fishing? Yes ☐ No ☐

a. What are the qualifications for obtaining licenses?

……

……

3. What fishing gear (boats, nets or hooks) are permitted for fishing?

……

……

4. What are the penalties for using the wrong fishing gear?

……

……

……

   a. Who imposes those penalties?

……

……

5. What is the role of the local police in enforcing these penalties?

……

……

6. Who formulates by- laws? (*Tick all that apply*)

   i. The fisheries committee ☐

   ii. The DoF ☐

   iii. The fishers ☐

   iv. I do not know ☐

7. Have you ever participated in formulation of by- laws? Yes ☐ No ☐

   i. If your answer to Q7 is Yes, how did you participate?

……

……

   ii. If your answer to Q7 is No, state your reason(s) for non-participation

……

……

……

8. Are you prohibited from fishing in some parts of the river? Yes ☐ No ☐

   i. If your answer to Q8 is Yes, what are the reasons for this prohibition?

……

……

9. Since you started fishing, has there been a decline or increase in fish catch?

Decline ☐ Increase ☐

a. What do you attribute the decline/ increase to?

……

……

10. Are there any fish species which were abundant in the past but have become scarce?

Yes ☐ No ☐ I am not sure ☐

i. List these species

……

……

11. Are there fish species that have become more abundant in recent years?

Yes ☐ No ☐ I am not sure ☐

i. List these species

……

……

a. What do you attribute the abundance of these species to?

……

……

12. What are the most common disputes between resident and immigrant fishers?

……

……

……

a. Who is responsible for settling these disputes?

……

……

b. What is the role of the fisheries committee in settling disputes?

……..

……..

Thank you for your participation

6.3.2. Appendix B

Table 2.1 Case study locations of small-scale fisheries co- management

Location	Number of Case Studies
North America	9
Central America	7
Southern America	16
Europe	6
Central Asia	9
Oceania	15
Oriental Asia	17
Africa	12

6.3.3. Appendix C

Table 3.1 Sample size of survey participants and FGDs

Category	Catchment A (Kabuta)	Catchment B (Mulonda)	
Survey participants	30	34	64
Focus Group Discussions			
• Fishers	4	6	10
• Fishing Associations	3	4	7
• VFMCs	3	1	4
Total	**40**	**45**	**85**

6.3.4. Appendix D

Table 3.2: Interview guide for Focus Group Discussions

Category	FGD questions	
	Fishers	**Committee**
Committee Performance	1. What are the roles of the committee?	What are the roles of the committee?
	2. What are the successes of the committee?	What successes has the committee scored in meeting its roles?
	3. In what areas or aspects could the committee improve its performance?	What challenges has the committee encountered in performing its roles?
	4. How does one become a committee member?	How could the challenges be addressed?
	5. What are your expectations of the committee?	How do you think your performance can be improved?
	6. What areas do you think the committee can improve its performance?	
Participation:		
Meetings & Management	7. How often are meetings called by the fisheries committee?	When you intend to hold a meeting, how do you communicate with fishers?
	8. What kinds of issues are discussed at these meetings?	Apart from meetings, what other avenues do you engage fishers?
	9. What mechanisms are used to agree at decisions made?	What strategies do you use to inform fishers of fishery by-laws?

Monitoring		
	10. What are the roles of fishers in monitoring fishing activities?	Are fisheries boundaries known and respected?
	11. How successful have monitoring exercises been?	What are the roles of different stakeholders in monitoring fishing activities?
	12. How is this success determined?	How successful have the different stakeholders been in monitoring fishing activities?
	13. What challenges do the different stakeholders encounter in monitoring activities?	
Sanctioning		
	14. What sanctioning methods exist in the fishery?	What by- laws have been instituted in the area?
	15. How successful do you think the sanctioning methods have been in controlling fishing activities?	What sanctions are given for breaking by- laws? Specify
	16. What roles do different stakeholders perform in sanctioning?	
Compliance to fishery by- laws		
	17. How do you participate in design of fishery by-laws?	How are the fishery by- laws formulated? What is the process? Who is involved in this process? What is the role of different stakeholders in this process?
	18. What is the role of fishers in ensuring by-laws are upheld?	How are the fishers made aware of fishery by- laws?

	19. What fishery by- laws do you think are unfeasible/ unachievable on your part?	How do you ensure fishers comply with fishery by- laws?

6.3.5. Appendix E

Table 3.3 Key informant Interview Guide for Government Official

Knowledge of co- management
1. What do you know about co- management in Mweru- Luapula fishery? 2. Who are the key players in this management system? 3. What is your role in this management system/ co- management?
Institutions and compliance
4. What institutions/ fishery by- laws govern fishery activities? 5. What is the process of formulating fishery by- laws? How are you involved in this process? 6. Who is involved in the formulation process of by- laws? 7. How is enforcement of by- laws carried out? What is you role? 8. What by- laws have been formulated to sanction offenders? 9. What is your role in sanctioning by-law offenders? 10. What role has co- management played in conflict resolution?
Effects of co- management
11. What tangible benefits are derived from co- management? 12. What problems/ issues has it resolved? 13. What has resulted from these tangible benefits? 14. What challenges have been encountered in the implementation of the co- management system? 15. How can these challenges be overcome? 16. What problems/ issues have arisen as a result of the co- management system? 17. How can these issues be resolved? 18. In what ways can the co- management system be sustained?

6.3.6. Appendix F

Table 3.4 Key informant Interview Guide for Traditional Authorities (TAs)

Interview Questions
1. What do you know about how the fishery is managed? 2. What is your role in this management system/ co- management? 3. What institutions govern fishing activities? 4. How are these institutions formulated? 5. What is your role in ensuring that the rules are adhered to? 6. What problems/ issues has co- management resolved? 7. What has resulted from the tangible benefits that are derived? 8. What challenges have been encountered in the implementation of the co- management system in Lake Mweru? 9. In what ways can the co- management system be sustained?

6.3.7. Appendix G

Figure 6.1: *Chisense* drying technique

Source: Field data (2019)

6.3.8. Appendix H

Figure 6.2: *Chisense* trade

Source: Field data (2019)