Fisher Folk Participation for Sustainable Fisheries: An Illusion or Reality for Lake Victoria (Kenya) Co-Management

Christine Adhiambo Etiegni

Propositions

1. Both formal and informal institutions are important for the outcome of natural resource governance (this thesis).
2. Balanced power relations among actors improve natural resource governance but do not ensure sustainable outcomes (this thesis).
3. Fisheries regulations are not effective in an open access fishery (this thesis).
4. Poverty is a governance issue.
5. Accountability is a measure of responsibility.
6. Economic growth reduces income inequalities between the rich and the poor.
7. Visionary leaders prepare themselves and their followers for the challenges of tomorrow.

Propositions belonging to the thesis, entitled

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Christine Adhiambo Etiegni

Delft, 28 January, 2022

**FISHER FOLK PARTICIPATION FOR SUSTAINABLE FISHERIES:
AN ILLUSION OR REALITY FOR LAKE VICTORIA (KENYA)
CO-MANAGEMENT**

Etiegni Christine Adhiambo

Thesis Committee

Promotor

Prof. Dr K.A. Irvine

Professor of Aquatic Ecosystems

IHE Delft Institute for Water Education, Professor of Aquatic Ecology and Water Quality Management, Wageningen University & Research

Co-Promotor

Prof. Dr M.E. Kooy

Associate Professor of Urban Water Governance

IHE Delft Institute for Water Education

University of Amsterdam, Institute for Social Science Research

Other members

Prof. Dr J.W.M. van Dijk, Wageningen University & Research

Prof. Dr A.J. Dietz, University of Leiden

Dr T. Lawrence, International Institute for Sustainable Development (IISD), University of Michigan, USA

Dr K. Obiero, Kenya Marine and Fisheries Research Institute, Sagana, Kenya

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Thesis

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**This thesis is dedicated to my husband Etiegni and
children Marc, Pauline and Mathews**

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Summary

Declines in fisheries resources have led to a shift in fisheries governance from a top-down approach to one of co-management. Co-management is a preferred approach for managing common pool resources such as fisheries as it provides better opportunities to include views of stakeholders, especially resource users, in management decisions. A key challenge facing the management of many fisheries resources is how to achieve sustainable resource management outcomes that are beneficial both to the environment and resource users. Effective fisheries management is achieved when the interplay of ecological systems and social systems is understood. This understanding requires matching ecological systems with institutions used to manage human-environment interactions. However, the influence of institutions on fisheries resource users' participation on resource management is often not well understood. This thesis explores how the interactions between formal and informal institutions influence fisher folk participation in co-management, and what this means for co-management. This research documents how institutions influence resource users' participation in co-management decision making and effectiveness of co-management process to enable sustainable fisheries. In particular, this thesis investigates how co-management was instigated in Lake Victoria (Kenya) and how it has been implemented. The thesis investigates: whether the local resource user organizations of Beach Management Units (BMUs) support and implement government fisheries regulations; discusses the process of decision making by analysing accountability in co-management institutions; and explores the outcomes of management responses following the adoption and implementation of co-management. A single embedded case study approach was used in which four selected BMUs formed the units of analysis. A mixture of data collection methods was employed including face to face interviews, focused group discussions, observations, participant observations and document review. The findings of this research show co-management was instigated from the top providing limited space for fisher folk to participate in its development and adoption. Its development was driven by external partners. Although the institutional focus within co-management has been on formal institutions, informal institutions have a major influence on fisher folk participation. The interactions between formal and informal institutions within co-management are often antagonistic, with informal institutions undermining and replacing formal ones at the local beach level. At the national level, formal institutions suppress and ignore informal ones. Power relations and cultural norms were found to be important in determining how fisher folk participate in co-management. Fishing practices are influenced by kinship, patron/ client relations and corruption, which shape the interpretation and application of formal government regulations. The shift in management approach from top-down to co-management coincided with an increase in the violation of government regulations. Regarding political equity within co-management, this thesis identifies how, where and for whom greater accountability can work to allow active participation of fisher folk who form a majority of participants within co-management. The findings of this research show that more institutions and centres of power have been created at the beach level following co-management adoption. The centres of power have created more elites who command a higher community status and fisheries management power, although lacking clear accountability to their constituents. As a result, fisher folk are left with limited influence on decision making that affect their livelihoods. This thesis finds the

current structure of L. Victoria (Kenya) co-management inappropriate as an instrument for sustainable fisheries. The lake's co-management does not conform to a truly bottom-up process, since space for fisher folk participation is limited. Development of co-management that can enable more power devolution to fisher folk is a suggested outcome of this research, requiring a re-think of the structure of L. Victoria (Kenya) co-management and how it enables power sharing and inclusive participation. This will reduce the vulnerability of fisher folk to both BMU elites and government, and improve their participation in fisheries management. More importantly, controlling access to the Nile perch fisheries of the lake is proposed as a first step to having outcomes that are sustainable and beneficial to the fisher folk and preservation of the lake's fisheries. Recognizing both formal and informal institutions and power relations across scales can help to improve natural resource governance, with more sustainable outcomes.

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Acronyms and abbreviations

BMU	Beach Management Units
BVCs	Beach Village Committees
CBNRM	Community Based Natural Resource Management
CI	Critical Institutionalism
CIAD	Critical Institutional Analysis Development Framework
CPUE	Catch per Unit Effort
FGD	Focused Group Discussion
IAD	Institutional Analysis Development
IFMP	Implementation of Fisheries Management Plan
LTA	Lake Tanganyika Authority
LVEMP	Lake Victoria environment Management Plan
LVFMP	Lake Victoria Fisheries Management Plan
LVFO	Lake Victoria Fisheries Organization
MCS	Monitoring Control and Surveillance
MI	Mainstream Institutionalism
NFP	Netherlands Fellowship Programme
NGO	Non-Governmental Organization
NPFMP	Nile Perch Fisheries Management Plan
NRM	Natural Resource Management
PFM	Participatory Fisheries Management
SDF	State Department for Fisheries

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Chapter 1

1.1 GENERAL INTRODUCTION

Governance of common-pool resources, including fisheries, has attracted increased attention in the past few decades. A major challenge facing the governance of natural resources is how to achieve outcomes that are sustainable, benefit the resource users and conserve the environment (Kareiva and Marvier, 2012). Effectiveness of natural resource governance is achieved when the scales of ecological processes are in tandem with institutions used to manage the interactions resource users have with the resource (Leslie et al., 2015). This is done by focusing on the interplay between the ecological and social systems in what Berkes et al. (2003) refer to as socio-ecological systems. A socio-ecological system consists of an ecosystem whose management involves many actors and institutions at different scales (Leslie et al., 2015; Lovett and Simon, 2004). These systems are complex in nature and understanding them requires thinking that combines natural and social sciences (Lovett and Simon, 2004). Fisheries are an example of such complex systems whose governance involves interactions among many actors at different scales, involving multiple institutions. Different approaches to fisheries management have been tested, from traditional fisheries management approaches to top-down and co-management, all providing varying outcomes (Ayers and Kittinger, 2014; Herrera-Racionero et al., 2015; Ho et al., 2016b; Opondo, 2011).

The fisheries of Lake Victoria have undergone similar transformation in governance approaches as many other fisheries. The lake provides an important source of protein to an estimated 30 million people. However, declining fish stocks promoted a shift in fisheries management from a government led top-down governance to one of co-management with fisher folk. The new regionally agreed fisheries management model of co-management is ostensibly linked to benefits that include sustainable and equitable use of the fisheries. Co-management is advocated as allowing for more co-operation between government and fisher folk in fisheries management decision making for sustainable outcomes (Ayers and Kittinger, 2014; Berkes, 2009). In this research, I investigate how co-management was instigated in Lake Victoria (Kenya), how fisher folk participate in co-management and how their participation is linked to co-management outcomes.

In Lake Victoria fisheries, co-management was introduced at the local level through the geographically defined local institutions of Beach Management Units (BMUs). Institutions in this thesis refer to rules, norms and organizations (Hodgson, 2006). In co-management, BMUs would work with the government, through the state department for fisheries to stem government defined illegal fishing practices. Illegal fishing entails the use of government outlawed fishing gears and methods whose potential outcome is unsustainable fishing. Participation of fisher folk through the BMUs allows for their involvement in fisheries management decision making.

Participatory approaches to natural resource governance, including co-management, have received increased attention as better alternatives, if certain conditions are met, to government led top-down management approaches, for benefits that include socially equitable and ecologically sustainable natural resources (Agrawal and Gibson, 1999; Agrawal and Gupta, 2005; Ansink and Bouma, 2013; Ayers and Kittinger, 2014). Other co-management benefits include increased exchange of information and resources between user communities and state, reduced risk in resource management by sharing management tasks, easy coordination of activities at different scales and synergistic approach to problem solving which also reduces conflicts among resource users (Carlsson and Berkes, 2005). For co-management to be a better alternative to top-down management, certain conditions need to be met at different scales.

Conditions for successful co-management include, at the government level, co-management supporting policies and support from external agents such as Non-Governmental Organizations (NGOs) and development partners (e.g. World Bank and European Union). At the local scale, there is need for well-defined boundaries, clear group membership, good local leadership, presence of community organizations, empowered resource users, property rights, and adequate financial resources to enable resource users to participate in co-management. At the individual level, incentives for resource users to participate are considered essential (Ostrom, 1990; Pomeroy et al., 2001). Co-management is linked to potential benefits that include empowerment of resource users (Ann Zanetell and Knuth, 2004; Nunan, 2006; Sen and Nielsen, 1996) and sharing of decision making powers (Chuenpagdee and Jentoft, 2007; Njaya et al., 2012). Co-management is also known to build legitimacy of management rules among resource users (Herrera-Racionero et al., 2015), allowing for synergistic problem solving approach compared with problem solving typical of top-down management where government is the only decision maker.

Co-management replaces the commonly established top-down government led management model which relinquishes responsibility of management from those who depend on resources (Ayers and Kittinger, 2014; Berkes, 2009; Richerson et al., 2002). The inherent diversity and nature of natural resources, and their tendency to be common pool resources (Bavinck et al., 2005) requires the sharing of power and responsibility for effective management of natural resources, enabled through both formal (written rules, laws and constitution) and informal (norms, imposed code of conduct) institutions. Power shapes participation and interactions among stakeholders and is important for influencing natural resource management decisions (Béné et al., 2009; Gaventa, 2006; Nunan et al., 2015). Co-management institutions crafted to enable resource user's participation in management are often formed at the lowest possible level consisting of resource users who govern their own and influence each other's practices.

Participation of resource users in natural resource governance has been suggested to have resulted in positive outcomes including sustainable use of natural resources, improved livelihoods, equity in the use of resources and inclusivity in decision making (Basurto et al., 2012; Cudney-Bueno and Basurto, 2009; Gelcich et al., 2010; Measham and Lumbasi, 2013). The efficacy of these approaches in ensuring sustainable use of natural resources has, however, been questioned. The main critiques of participatory approaches have focused on structural

inadequacies of institutions (Borowski et al., 2008; Francis and James, 2003; Kamoto et al., 2013; Nunan, 2006; Persha and Andersson, 2014; Schmidt and Theesfeld, 2012; Wong, 2010), where power and decision making are not equitably shared among co-management partners to promote social and ecological benefits such as sustainable livelihoods and resources (Quimby and Levine, 2018).

For fisheries resources, such benefits can, however, be better achieved when fisheries management is undertaken within the broader perspective of right based fisheries, whereby the rights of fisher folk to access and use fisheries resources are observed. This is because fisher folk are motivated to participate in fisheries management when they are more secure and less vulnerable (Allison et al., 2012). They, therefore, participate to ensure sustainable use of fisheries resources since they understand that their livelihoods depend on the fisheries. The ineffectiveness of government top-down or co-management approaches can, therefore, be replaced by one based on better defined fishing rights to fisher folk. This approach is aimed at ending the “rush for fish” whereby fishers harvest as much as they can in the shortest period possible so as to maximize their profits. Such fishing activities can result in unsustainable use of fisheries resources because fishers harvest fish juveniles by using government outlawed fishing gears and methods in their quest to maximize their returns (Christy, 1996; Etiegni et al., 2016; Hilborn et al., 2005).

In Lake Victoria (Kenya), the shift from a government led management to a co-management model occurred in the early 1990s. The design of the new management approach involved the creation of various formal institutions to enable fisher folk’s participation in fisheries management decision making, but there are also (socially embedded) informal institutions which undermine the implementation of formal ones. Formal institutions include rules of engagement and BMUs, and are created by formal declarations which include legislations. Informal institutions include norms that guide fishing practices that reflect social norms and obligations to kinship and oneself. They are typically emergent and are created by implicit collective recognition of authority of elected or traditional leaders (chiefs /village heads). The extent of fisher folk’s participation in decision making and influence in co-management initiation and crafting of co-management institutions has, however, remained unclear in literature. The fisheries of Lake Victoria (Kenya) provide a prime example of a major restructuring within natural resource governance designed to enable greater decision-making powers to resource users based on formalised local governance. Sustainable fisheries have not, however, been realized since adoption of co-management. Instead, there has been general increase in government outlawed fishing practices (Government of Kenya, 2014; Obiero et al., 2015) and a fall in fish biodiversity and Nile perch biomass (LVFO, 2011; Obiero et al., 2015; Van der Knaap, 2013b). The changes in fish biodiversity and biomass are also attributed to other factors. These include pollution, eutrophication, water hyacinth (*Eichhornia crassipes*) infestation, changes in species composition, and climate change (Balirwa et al., 2003; Hecky et al., 2010; Kolding et al., 2008; Lowe-McConnell, 2009; Marshall, 2018; Marshall et al., 2013; Ogutu-Ohwayo, 1994; Sitoki et al., 2010; Witte et al., 1991). Fisher folk, through informal institutions, also influence co-management socio-ecological outcomes (Njaya et al., 2012; Nunan et al., 2015).

Institutions have a major effect on resource use. They guide how power is shared (Franks et al., 2013; Fung, 2006b; Njaya et al., 2012; Nunan et al., 2015; Quimby and Levine, 2018; Snell et al., 2013; Wilson et al., 2010), who gets to sit at the decision making table (Gaventa, 2006; Nunan et al., 2012) and whose voice is heard in decision making (Nunan et al., 2015). Access and use of fisheries resources is also determined by institutions (Njaya, 2009; Opondo, 2011). The distribution of decision-making power and relations of power within institutions are important to the practice and outcome of co-management (Béné et al., 2009; Nunan et al., 2015). Through an analysis of co-management institutions in Lake Victoria (Kenya), this thesis investigates how institutions influence fisher folk participation in co-management decision making, how power is shared between the two main co-management partners (government and fisher folk) and co-management outcomes.

In this chapter, I provide the background information on Lake Victoria fisheries, research questions and the methods used to undertake the study. I also address the concepts used in the study to provide an understanding of how fisher folk participate in co-management, and how their participation influences co-management social and ecological outcomes. The study area is described and the structure of the thesis is outlined.

1.1 CO-MANAGEMENT

Co-management has been employed in the management of various resources including water, forests, irrigation systems, wildlife protected areas and fisheries (Basu and Main, 2001; Leach et al., 1999; Onyango and Jentoft, 2007; Saravanan, 2010; Secco et al., 2011). In fisheries, failure to include fisher folk in decision making is viewed to be among the leading causes of crisis in world fisheries and weakness of management processes (Chuenpagdee and Jentoft, 2007; Cochrane, 1999; Jentoft, 1989; Ratner et al., 2012). Co-management is, therefore, viewed as a way of bringing responsibilities closer to those who exploit fisheries resources for sustainable and equitable management outcomes. Improved fisheries management outcomes are linked to the understanding that fisher folk are more willing to comply with regulations they were involved in crafting.

In co-management arrangements (Figure 1.1), the government, resource users and other stakeholders collaborate in governance activities since no single actor has all the information, knowledge and resources required to solve fisheries problems. Although different forms of co-management arrangements exist (Allison and Ellis, 2001; Pomeroy and Berkes, 1997), the nature of co-management model in place will depend on the scale of the fishery, stakeholders involved, existing institutions, availability of resources for management and capabilities and willingness of stakeholders to share responsibility and authority (Arthur, 2005). More importantly, to genuinely involve resource users in governance, both power and responsibility should be devolved (Agrawal and Ribot, 1999; Meinzen-Dick and Knox, 1991). Devolving responsibility without power may result in a situation known as "*instrumental co-management*" which is not better than the top-down management model in involving fisher folk in fisheries management (Arthur, 2005). In this type of co-management, power to make management

decisions is not devolved to resource users but remains with the government. This means that the approach to resource management has not changed, but only the name has changed because decisions are solely made by the government as in the case of top-down management. Instrumental co-management does not, therefore, change much in the way resource users participate in management decisions, or contribute to sustainable use of resources. This is because resource users do not have the power to influence decisions concerning resource use. When power is devolved to resource users, they are enabled to make management decisions and implement what they have been mandated to do within the co-management arrangement for improved Natural Resource Management (NRM).

Figure 1. 1: Co-management as a partnership in fisheries modified from (Pomeroy et al., 2005)

In fisheries co-management, the arrangement may be one that allows minimal exchange of information between fisher folk and government, or advisory in which fisher folk advise the government on decisions to be taken. Other forms of co-management include *informative* in which the government only informs fisher folk of the decisions it has made. Although this approach to fisheries management may not seem to fit the cooperation between the government and resource users required for co-management, it is nonetheless considered co-management because the government, at least, informs resource users about decisions taken instead of ignoring them completely. Consultative co-management is one in which the government decides to engage fisher folk before making decisions. There could also be cooperation between the government and fisher folk working together. Through cooperation, both

government and fisher folk should have a say in decision making. Co-operation among stakeholders in decision making is identified as depicting what co-management should be (Jentoft and McCay, 1995; Pomeroy and Berkes, 1997; Sen and Nielsen, 1996). However, the degree of power sharing among co-management partners determines who influences decision making and how co-management partners cooperate. Power within co-management arrangements is not only used to influence decision making, but can also be used to limit the space and opportunity for participation for other co-management partners, especially resource users (Etiegni et al., 2020; Ho et al., 2015; Hodge, 2005; May, 2013; Nunan et al., 2012; Pansardi, 2012; Quimby and Levine, 2018). When the government controls the space for participation and uses power to influence decisions, this results in top-down implementation of co-management which is not different from hierarchical top-down management. This is what Beem (2007) refers to as co-management from the top. The space for participation can also be infiltrated by local elites who are not there to promote the interests of resource users, but to safeguard their own interests.

The process of co-management development is context specific and there is no one type of co-management arrangement that fits all situations. Nonetheless, certain co-management elements are common in most co-management arrangements. These include drivers for co-management development and adoption, co-management initiation, representation within co-management, cross-scale linkages and degree of co-management (Pomeroy et al., 2005). In most cases, co-management development is a result of the recognition of a resource management problem that cannot be addressed adequately by the government or resource users working in isolation (Pomeroy and Berkes, 1997). For instance, the government may not have the resources to enforce fisheries management rules, but is in a position to provide legal backing for co-management which resource users may lack. When they work together in co-management, they are likely to complement each other for better co-management outcomes. Co-management initiation may take a bottom-up or top-down approach. From the top, co-management is initiated by government or development partners and from the bottom by resource users. A majority of participatory approaches to governance, however, lack genuine resource users' engagement (Measham and Lumbasi, 2013). Most of these arrangements are instructive, such that resource users are only involved in the implementation of decisions that are made without their involvement. This, according to Degnbol (2004) is pseudo involvement of resource users in governance to create a sense of legitimacy within the governance process, while maintaining control of decision making since decision making power within co-management is still with the government.

Legitimacy within co-management arrangements requires co-operation among stakeholders at different scales. At the local scale, the involvement of resource users in crafting institutions for co-management builds legitimacy required for co-management success (Herrera-Racionero et al., 2015). Equally important is the presence of conditions deemed necessary for co-management success (Pomeroy et al., 2001). At the national level, government support is required, and this may be through the development of policies that support co-management. External agents such as Non-Governmental Organizations (NGOs) work with resource users at the local level, providing them with financial or organizational support. At the local scale,

there is a need for some or all of the requirements: well-defined boundaries; clear group membership; homogeneous groups; good local leadership; empowerment of resource users; presence of community organization; government financial support for co-management activities; property rights; and adequate financial resources for group activities (Ostrom, 1990). At the individual level, the overriding condition is the presence of incentives for resource users to be involved in co-management (Ostrom, 1990; Pomeroy et al., 2001). It is, however, appreciated that not all factors need to be present to ensure the success of co-management. However, government support for co-management and incentives for resource users' participation are key requirements for co-management success because these are the key partners involved in the implementation of co-management.

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Many early co-management arrangements suggest widespread failures. For example, co-management in the Mkabati nature reserve in Eastern Cape's Wild Coast, South Africa was used in the management of wildlife and protected areas. However, conflicts over resource use were still evident even though local communities were involved in decision making (Leach et al., 1999). The conflicts were as a result of different livelihoods activities practiced by local communities, with some activities interfering with others. Other authors link co-management failures to the wrong assumptions made concerning communities. These assumptions are that communities are homogeneous, they are made up of small units and that they share the same norms (Agrawal and Gibson, 1999; Allison and Ellis, 2001; Nunan, 2006). Issues of lack of democracy, inadequate capacity, poor representation of the locals and lack of downward accountability also feature among critiques of co-management (Francis and James, 2003; Ribot, 2003).

Co-management power may be captured by local elites and used to marginalize poor stakeholders. In some cases, it re-enforces state control (Berkes, 2009; Wilson et al., 2006). These factors impact negatively on social equity and community welfare (Wilson et al., 2006), with co-management outcomes that do not benefit the resource users. Conflicts among resource users have also been registered in Lake Victoria (Glaser et al., 2019; Were, 2016). At the regional level, conflicts are mainly over fishing grounds among fishers from states riparian to Lake Victoria (Kenya, Uganda and Tanzania). Within Kenya, conflicts are mainly among different fishing gear users. For example, beach seining may result in the destruction of set gill nets when being hauled to the lake shore thereby causing conflicts. Such conflicts illustrate the importance of bringing co-management stakeholders into decision making, especially in situations whereby the resource is used for different livelihood activities.

Success stories of co-management have also been highlighted in literature. Co-management success is attributed to the presence of bridging organizations that bring together science and local ecological knowledge. These organizations are used mainly as an arena for trust building, collaboration, conflict resolution and knowledge sharing (Cash and Moser, 2000). Through the organizations, multi-faceted networks are built and coordinators offer leadership to link various stakeholders. Leadership is therefore a factor crucial for ensuring success of co-management (Olsson et al., 2007). For instance, in the Philippines, an aquaculture project involving local community members was able to grow through networking with other stakeholders enabled by the presence of bridging organizations (Wilson et al., 2006). The support that the group got from the government and NGOs at different levels ensured success of the group. Lobster fishery co-management in Maine also succeeded due to the presence of a bridging organization (Maine Fishermen's Forum) and effective leadership (Beem, 2007). However, the general attributes of a fishery, whether single or multi-species, determines co-management success. A single species fishery provides less management challenge since limited management rules need to be enforced and stocks can be monitored more easily compared with a multi-species fishery where there are several management aspects to be monitored, most of which are species specific.

1.2.1 Participation, power and equity in co-management

A number of participatory processes used in the management of natural resources have been identified, depending on the management goals and power dynamics (Puente Rodriguez, 2014). There are different definitions of participation. Here, I mean an active process where management of natural resources enhance the livelihoods and food security of resource users (Tiller et al., 2015). Participation models stem from the earlier description of participation based on the analogy of the ladder by Arnstein (1969), who described increasing levels of participation. The lower rungs of the ladder, manipulation and therapy, depict non-participation. At these levels, the government plays the role of training resource users on what is expected of them. The next three rungs which include informing, consultation and placation enable minimal consultations between the government and resource users. At these levels, the views of resource users are considered, but whether these views influence decision making

depends on what the government wants. The upper rungs consisting of partnership, delegated power and citizen control allow resource users to exercise more power.

Other participation typologies include the participatory cube that consists of three participation dimensions including direct individual participation, information sharing for decision making and the link between the decisions made and action taken (Fung, 2006b). A seven level participation typology is presented by Pretty (1995). The author describes manipulation in which unelected and powerless leaders participate, to self-mobilization in which resource users take initiative and make decisions. White (1996) describes a typology that depicts stakeholders who use participation to drive their interests. The participation typologies described indicate that participation is about power and control, meaning that the more powerful control decision making.

Power sharing is an important element of co-management (Béné et al., 2009; Borrini-Feyerabend et al., 2004; Etiegni et al., 2020; Njaya et al., 2012; Pansardi, 2012; Putzel et al., 2015; Quimby and Levine, 2018). Power relations occur within institutions, shaping the interactions among stakeholders and influence the socio-ecological outcomes of co-management (Jentoft, 2007a; Nunan et al., 2012; Quimby and Levine, 2018; Van Hecken et al., 2015). Power is continuously negotiated, and as this negotiation takes place, new forms of power are created (Berkes, 2009; Carlsson and Berkes, 2005; Nunan et al., 2015; Quimby and Levine, 2018). Unequal power relations impede participation of resource users in co-management (Ballou et al., 2016; Quimby and Levine, 2018).

Another important co-management principle is equity (Pomeroy et al., 2005). The meaning of equity is varied and may include economic, gender or political equity. In this thesis, I focus on political equity which refers to how resource users have their concerns raised and heard by their elected leaders and co-management partners (Jacobs, 1989). Equity is considered key to sustainable use of natural resources, since equitable co-management outcomes are considered a measure of legitimate co-management arrangements (Turner et al., 2016). As such, equity is seen as a way of improving livelihoods and reducing poverty among resource users (Barnett and Eakin, 2015; Kittinger, 2013), and is considered to be important to the social well-being of resource users (Barnett and Eakin, 2015). These are concepts that are discussed in detail in this thesis, and form various chapters of the thesis.

1.3 INSTITUTIONS FOR FISHERIES GOVERNANCE

The term institution is used with varying meanings in different bodies of literature. North (1991) refers to institutions as, “humanly devised constraints that structure political, economic and social interactions. They consist of both informal constraints (sanctions, taboos, customs, traditions and code of conduct) and formal rules (constitution, laws and property rights).” Institutions are defined by Hodgson (2006) as rules, norms and organizations (used in this thesis), while Searle (2005) refers to institutions as a collection of accepted system of rules which include procedures and practices that are used to influence human behaviour. Institutions

are also defined as "self-sustaining, salient patterns of social interactions, as represented by meaningful rules that every agent knows and are incorporated as agents' shared beliefs about how a game is played" (Aoki, 2007).

Both formal and informal institutions play an important role in determining who can access natural resources, and practices related to natural resource use (Barrett et al., 2001; Cleaver, 2002; Nunan et al., 2015; Ostrom, 1986, 1990, 1992; Schnegg and Linke, 2015; Sokile and Koppen, 2004). Informal institutions, also known as socially embedded institutions, shape the interpretation and application of formal government rules or bureaucratic institutions (Cleaver, 2002). In the fisheries of Lake Victoria (Kenya), both formal and informal institutions influence how fisher folk participate in co-management decision making, the choices they make in the fishery and co-management outcomes. For instance, corruption as a socially embedded institution determines whether rules for fisheries management will be adhered to or not. There are fisher folk who break the rules for personal gain, while there are those who break the rules since what the government has outlawed is an accepted norm geared towards earning a livelihood. Fisher folk may decide to pay a bribe to rule enforcers to be allowed to engage in outlawed fisheries practices with outcomes that are ecologically unsustainable.

The contribution of informal institutions to natural resource management has been widely recognised (Berkes, 1999; Berkes et al., 2000; Charnley et al., 2007; Opondo, 2011). These institutions have been used to manage natural resources and some of the informal institutions inform science (Juanwen et al., 2012; Uprety et al., 2012). The contribution of these institutions to sustainable use of natural resources was officially acknowledged by the Brundtland Commission in the Conservation of Biological Diversity and Agenda 21 (Uprety et al., 2012). However, not all informal institutions are ecologically wise. Some lose meaning over time, leading to unsustainable use of natural resources (Berkes et al., 2000; Charnley et al., 2007). For the fisheries of Lake Victoria (Kenya), informal institutions commonly known as *chike lupo* were developed by local communities (Opondo, 2011). The fishing communities had their traditional and territorial rules which were aimed at ensuring sustainable use of fisheries resources (Bokea and Ikiara, 2000). Fisher folk were regulated on how and when to fish, and access was limited to certain areas and species. Although some informal institutions were lost following development of formal institutions, some have persisted to date and play a critical role in determining fisheries management outcomes. As such, informal institutions cannot be ignored when discussing sustainable fisheries because they are an inherent feature of fishing communities, now as in the past. Institutions, both formal and informal, bring together stakeholders involved in the governance of natural resources (Ananda and Proctor, 2013) and have the capability to generate a wide range of results which may be behavioural and environmental (Mitchell, 2008). Exiting institutions can restrict the collaborative initiatives of natural resource management (Ananda and Proctor, 2013). They may constrain action by different resource user groups at local and national levels within the structures where they are observed (Ostrom, 1986). Action by certain stakeholders is restricted mostly within structures where power asymmetries exist (Njaya et al., 2012). Power differences in a nested institutional hierarchy may be between those who initiate and implement co-management such as

government and development partners, and those who are viewed as recipients of co-management (resource users) who in most cases are limited in resources.

The scales at which institutions operate range from household to international, with various vertical and horizontal linkages. Vertical linkages involve institutions at the local level with those at the national or regional levels. Horizontal linkages are built from institutions that are used for managing resources that are multi-user such as fisheries, water and wildlife (Pascaul-Fernández et al., 2005). Such institutions may be formal in terms of written rules or informal based on accepted community norms, which are sometimes hard to identify but are important for decision making. Formal institutions for fisheries governance are divided into local, national and international. For fisheries governance, these institutions operate at the local level where communities are the main actors (Pascaul-Fernández. et al., 2005). This is because control of and access to resources is determined by a set of institutions which are firmly rooted within the socio-political lives of stakeholders involved (Leach et al., 1999). At the national level, the state is the key actor (Jentoft et al., 2005); while international institutions play the role of influencing national and international policies (Suárez de Vivero et al., 2005). Such policies include the co-management policy which was instigated by development partners and was to be implemented in the fisheries of Lake Victoria by the government in collaboration with fisher communities.

International Development agencies and partners (eg. World Bank, European Union and NGOs) have often played important roles in the development and implementation of co-management (Pomeroy and Ahmed, 2006). They may play the role of initiators, facilitators and provide technical and financial assistance to resource users and the government with the aim of ensuring sustainable use of natural resources. In some instances, like in the case of Nile perch fishery of Lake Victoria, development partners work towards ensuring that fish, of which they provide a major market, is handled in a manner that meet their set hygienic standards (Medard, 2015). The partners can also evaluate co-management at post implementation stage. They may act as bridging organizations, bringing together resource users, the government and scientists to form cross-scale networks to enable knowledge and information sharing (Hauck and Sowman, 2001; Ho et al., 2016a). While development partners play an important role in the development of co-management through building capacity of government officers/ resource users and financial support, there is potential for a move to unsustainability of co-management and resource use when they withdraw support (Ho et al., 2016a). Unsustainability of co-management may lead to unsustainable resource use since the benefits of co-managing, one of which is sustainable resources, may not be sustained as resource users revert to their old ways of using or managing the resources. In most cases, the time for co-management support by development partners is often limited to project time, and resources are also limited. When the project time elapses, support from development partners is also withdrawn and the government is expected to continue supporting the projects. Unfortunately, in most cases, such projects stall because the government may not have resources to continue supporting them, or the projects may not have been in the list of government priorities for financial support, but were only being implemented because development partners agreed to finance them.

1.4 RESEARCH RATIONALE AND OBJECTIVES OF THE STUDY

Institutions for natural resource governance have been widely studied. However, there is still some paucity within fisheries governance literature in relation to how institutions influence resource users' participation in co-management decision making and effectiveness of co-management. Most of fisheries co-management literature focuses on co-management arrangements which are diverse in terms of co-management partners, scales of operation, institutions involved, natural resources managed and different roles played by those involved in co-management. The implementation of co-management has also been shown to be varied since co-management is context specific-meaning that co-management that works well in one area may not necessarily fit in another. The outcomes associated with co-management are also diverse. Some outcomes reflect on the resources and include their ecological sustainability, while other outcomes concern resource users such as improved livelihoods and better nutrition (Berkes, 2009, 2012; Ho et al., 2016c; Jentoft, 2000, 2005, 2007b; Jentoft and Bavinck, 2014; Njaya, 2009; Pomeroy and Berkes, 1997). Lately, though, more focus has been on the influence of institutions on resource users' participation and how their participation is shaped by the relations between formal and informal institutions, and power dynamics within the institutions (Ballou et al., 2016; Cleaver and Whaley, 2018; de Koning, 2014; Ho et al., 2015; Njaya et al., 2012; Nunan et al., 2015; Nunan et al., 2012; Puente-Rodríguez, 2014; Quimby and Levine, 2018). In fisheries co-management development and implementation, external partners and governments have been involved and the roles they have played widely discussed in literature (Hauck and Sowman, 2001; Ho et al., 2016a; Njaya et al., 2012; Pomeroy et al., 2001; Pomeroy et al., 2005; Pomeroy and Williams, 1996). Nonetheless, the participation of fisher folk in co-management and what their participation is aimed at achieving is not well addressed, although their involvement in fisheries management is viewed as important.

This thesis contributes to the understanding of how formal and informal institutions influence fisher folks' participation in co-management decision making and how these influence fisheries catches and their sustainable use. Lake Victoria (Kenya) was selected to undertake this research because the adoption of co-management model of management necessitated adjustments in the lake's institutional arrangements. The lake is also a complex socio-ecological system involving many actors, with varied interests, at the local, national, regional and international levels. There are also institutions that operate at different scales. Formal institutions for co-management have been developed including BMU structures, regulations, guidelines and by-laws, mainly aimed at enabling fisher folk participation in co-management decision making and fisheries management for sustainable fisheries. Informal institutions are an inherent feature of fisheries exploitation. However, how these institutions influence fisher folk participation in co-management decision making and the effectiveness of these institutions in supporting or promoting sustainable Nile perch fisheries remains unclear.

1.4.1 Research objectives and questions

This research had four objectives which focused on how institutions influence fisher folk participation in co-management decision making and the effectiveness of co-management.

Objective 1: To investigate how co-management was instigated and implemented in Lake Victoria (Kenya) and how this determines co-management outcomes.

Research questions:

1. What institutions were/ are involved in Lake Victoria co-management initiation and implementation?
2. What were the drivers for co-management adoption in Lake Victoria (Kenya)?
3. How does power and interpersonal relations within co-management institutions determine how fisher folk participate and influence co-management outcomes?

Objective 2: To investigate whether the local fisher folk organizations of BMUs support government mandated fisheries regulations.

Research questions:

1. How do formal and informal institutions interact and what is the outcome of this interaction to fisheries management?
2. How are decisions made at the beach level influenced by kinship and corruption?

Objective 3: To discuss the process of decision making in co-management through analysis of accountability in institutions.

Research questions:

1. Who are the actors who exercise powers devolved by the government?
2. What powers are devolved by the government?
3. What mechanisms have been put in place to ensure downward accountability?

Objective 4: To explore the trends in fish catches in the Great African Lakes and the outcomes of management responses on catches.

Research questions:

1. What management measures are used in the African Great Lakes?
2. How appropriate are the management responses?
3. What needs to be done to ensure long-term sustainable fisheries?

1.5 THE STUDY AREA (LAKE VICTORIA)

Lake Victoria, the second largest (in surface area) fresh water lake in the world, covers an area of 68,800km² with a shoreline of 3450 km. The lake is shared among three East African countries: Uganda (43%), Tanzania (51%) and Kenya (6%), with the Kenyan side covering 4,100 km² (Figure 1.2). The lake has a catchment area of 193,000 km² that extends to Rwanda and Burundi (LVFO, 2001). Human population within the basin is estimated at around 30 million, with around 3.5 million basin inhabitants depending on the lake's fishery either directly or indirectly for their livelihoods (LVFO, 2008b). Lake Victoria was known as one of the species rich lakes in the world, having supported a fishery with over 500 species most of which were haplochromine species (Balirwa et al., 2003). The highest annual fish production from the lake has been estimated at around one million tonnes (Kolding et al., 2008), with Nile perch producing the bulk of fish landed.

Figure 1. 2: Map of Lake Victoria. Source: Adapted from www.d-maps.com

Both the total fish produced from the lake and species diversity have declined. For instance, the disappearance of many haplochromine species (Balirwa et al., 2003) and around 40 non-haplochromine species (Marshall, 2018) has reduced the fishery to one supported by three major species namely Nile perch (*Lates niloticus*), dagaa (*Rastrineobola argentea*) and Nile tilapia (*Oreochromis niloticus*) (Cowx. et al., 2003; Kaufman, 1992; Ogutu-Ohwayo, 1994). The change in the lake's resource base is, however, attributed to many stressors including the introduction of the carnivorous Nile Perch (carnivorous) and Tilapia in the 1950s and 1960s,

respectively. Nile perch is believed to have contributed to the disappearance of endemic haplochromine species through predation (Balirwa et al., 2003; Marshall, 2018; Muhoozi, 2000; Njiru et al., 2005; Witte et al., 1991); while Nile tilapia is thought to have contributed to the disappearance of native Tilapia species such as *Oreochromis variabilis* and *Oreochromis esculentus* through hybridization (Lowe-McConnell, 2009; Njiru et al., 2005). Nonetheless, increased fishing pressure and unsustainable fishing practices may have contributed more to the disappearance of these species. Other drivers of change in the lake's fishery include increased eutrophication and, likely related, infestation from water hyacinth (*Eichhornia crassipes*) (Kayombo and Jorgensen, 2006), population growth, lack of alternative livelihoods, increased demand for fish in global markets, over-fishing and increased poverty especially among Lake Victoria fisher folk (Geheb et al., 2008; Johnson, 2010; Kirema-Mukasa and Abura, 2013; Mkumbo and Marshall, 2015; Njiru et al., 2014; Onyango, 2009; van der Knaap and Ligtvoet, 2010).

Of the three major species in Lake Victoria, Nile perch is the most important economically, and the focus in this thesis. Nile perch contributes to the Gross Domestic Products (GDPs) of the three riparian states through fish exports, while also providing employment and a source of protein to local populations (Mkumbo and Marshall, 2015; Njiru et al., 2005). Around 1 million people are employed in the fishery, and export earnings from the lake are estimated at US\$300 million (LVFO, 2016a). Despite the importance of Nile perch to the economies of the countries and nutrition to the people, a steady fall in the Nile perch biomass has been reported, with most Nile perch landed falling below the lower limit of the recommended slot size (50cm-85cm TL) for Nile perch management (Njiru et al., 2009). The slot size regulation is mainly aimed at protecting Nile perch juveniles and the larger females for recruitment. The fall in Nile perch biomass is attributed to anthropogenic factors including over-fishing enabled by the use of outlawed fishing gears and methods that target Nile perch juveniles (Mkumbo and Marshall, 2015). An increase in the use of outlawed fishing gears and methods in the lake has been reported (Government of Kenya, 2014). How fishing practices are shaped by informal institutions is discussed in this thesis. Similar issues across the other two African Great Lakes of Malawi and Tanganyika that impact fisheries management are explored and what needs to be done to ensure long term sustainable fisheries in the lakes suggested. Some examples of outlawed fishing gears and methods in use in Lake Victoria (Kenya) and fish harvested using prohibited fishing gears and methods are shown in figures 1.3-1.8.

Figure 1. 3: Beach seining, a non-selective fishing method that destroys fish breeding areas

Figure 1. 4: Monofilament gill net, a very efficient fishing gear made from a single fibre of plastic/nylon. Associated with "ghost "fishing.

Figure 1. 5: Hooks ready for Nile perch fishing although the hooks are size 12 (undersize). The recommended size is 9-4. Note, the bigger the hook size the smaller the hook.

Figure 1. 6: A club used to disturb fish in breeding areas. The noise produced by the club scares the fish away and into the nets cast in the breeding area. The bottom of the club is dug out for more noise production.

Figure 1. 7: Small seine used for harvesting Omena. The recommended mesh size is 10mm.

Figure 1. 8: Nile perch juveniles harvested using outlawed fishing gears and methods.

1.5.1 Development of fisheries governance in Lake Victoria (Kenya)

Fisheries governance in Lake Victoria (Kenya) has undergone major transformations from the pre-colonial period (before 1900) to present day. Before Kenya was colonized, local communities had their own traditional ways of limiting access and promoting sustainable use of fisheries resources (Bokea and Ikiara, 2000; Opondo, 2011). Although there was open access to the lake, fishing communities had rules they used to regulate the fisheries. They could determine who could fish, which areas to fish in, the type of fishing gear to be used and the type of fish to be caught (Ogutu-Ohwayo, 1994). Fisheries governance was therefore left in the hands of local communities in what Bavinck et al. (2005) term “*self-regulation*.” Fisher folk may have been able to self-regulate during that period because fishing gears used were limited in scope and the demand for fish was low owing to the low population at the time. However, there were signs of over-fishing even during this period (Graham, 1929)

New technologies for fishing were developed during the colonial period (Opondo, 2011). The improved technologies increased the amount of fish landed and fish markets were diversified as the number of fishers and the demand for fish increased (Geheb, 1997). Local markets were sidelined when the demand for fish increased in the international markets (Schuurhuizen et al., 2005). However, the increase in the amount of fish landed did not last for long as the fishery soon started showing signs of decline and this change was attributed to over-exploitation, predation, competition and hybridization with species introduced (Njiru et al., 2005). To catch enough fish, fishers engage in what the government has identified as illegal fishing activities which include the use of undersize nets, beach seining, fishing using prohibited methods such as fish poisoning, fishing in prohibited areas which include river mouths and along the beaches and fishing for *dagaa* during the closed season (1st April-31st July) (Government of Kenya, 2014).

The colonial period (1901-1962) coincided with many changes within Lake Victoria fisheries. Human habitation of the basin increased and this is also the period that coincided with the introductions of Nile tilapia and Nile perch. The introductions are believed to have caused major social and economic changes within the lake's ecology and the basin in general. For example, fish annual production from the lake rose from around 100,000 tons in the 1980s to 1,000,000 tons in the 2000s, with over 60% of the total fish biomass comprising of Nile perch (Mkumbo and Marshall, 2015). The dominance of Nile perch catches during this period is believed to have upset the haplochromine population and even caused subsequent disappearance of some haplochromine species (Lowe-McConnell, 2009). However, of late reported *dagaa* production from the lake has surpassed that of Nile perch, although economically, Nile perch is still the most important fish (Mkumbo and Marshall, 2015).

It is also during the colonial era that traditional regulatory mechanisms were done away with and new legislations for fisheries management drafted by the colonial government emerged. One such legislation was the Fish Protection Ordinance of 1908 (Cap. 163 of the laws of Kenya) that prohibited the use of nets with mesh sizes less than one square inch. The same legislation also introduced licensing and registration of boats, and determined time when fishing could be done (Dobbs, 1927). Trawling was restricted near the shores of the lake (Dobbs, 1927; Opondo, 2011), although it was later outlawed in 2000. The colonial government was successful in enforcing fishing legislations until the introduction of new and more efficient fishing gears which included seine nets, trawls and flax gill nets. The gill nets had 5 inch, 3 inch, 2.5 inch and 1 inch mesh sizes. The amount of fish caught by these new methods led local fishermen to abandon their traditional fishing methods and embrace the new methods because of their efficiency (Opondo, 2011). The colonial government also introduced the Fisheries Act Cap 378 of the laws of Kenya in 1949, which would later form the backbone of fisheries regulations used in Kenya currently. The Act provided for a top-down government led mode of governance, whereby government gave directives to regulate fishing activities and fisher folk had to comply, or risk sanctions in case of non-compliance.

The top-down mode of governance was later found to have many shortcomings such as the state lacking sufficient knowledge about the fishery, lacking capacity to implement management measures and inadequate financial resources for enforcement. Participation of other stakeholders and especially that of fisher folk in governance was, therefore, deemed necessary for better fisheries management outcomes (Carlsson and Berkes, 2005; Pomeroy, 1995). The understanding of benefits attributed to inclusion of other stakeholders in fisheries governance informed the shift in governance approach in Lake Victoria (Kenya) from government led top-down approach to participatory approach (co-management). Participatory governance is aimed at providing a process through which fisher folk and other stakeholders are involved in decision making on the best alternatives for purposes of achieving certain objectives which include equitable and sustainable fisheries (Jentoft, 1989; Pomeroy and Berkes, 1997).

Sustainable fisheries in Lake Victoria (Kenya) have been unachievable. This is due to more fishing pressure being put on the lake especially during the “Nile perch boom” of the 1990s (Geheb et al., 2008; Medard, 2015) when Nile perch landing grew from 335T in 1975 to 380,776T (Geheb et al., 2008). More people were attracted to the fishery due to the boom and more efficient gears, both legal and illegal, were used to harvest Nile perch to maximize profits. During this time, the demand for fish from export markets also increased although Nile perch was later to suffer three export bans between 1997 and 1999 from European Union which was a major market. The ban was as a result of fish contamination from poor post-harvest handling. Nile perch exported to the EU market were found to be contaminated with salmonella. (Geheb et al., 2008; Medard, 2015). Although the ban was lifted in 2000, the market became more restrictive with more structures being built at the beach level to improve fish post-harvest handling in order to meet standards that were laid down by the European market. Mandatory tests for salmonella on Nile perch imports from Lake Victoria were undertaken by the EU when the market re-opened.

1.6 RESEARCH METHODOLOGY

The four main chapters have methods sections described. However, this section provides a description of methods used in more detail than was possible in the main chapters, based on publications.

1.6.1 Conceptual framework

Institutions within natural resource governance can be investigated from multiple theoretical backgrounds which can be broadly classified into two categories: Mainstream Institutionalism (MI) informed by common property (collective action) scholarship and Critical Institutionalism (CI). MI is based on the view that institutions provide information and incentives to resource users to behave in a certain way for the collective good (Blaikie, 2006; Hall et al., 2014; North, 1991; Ostrom, 1990, 1992; Saunders, 2014; van Laerhoven and Ostrom, 2007). MI focuses mainly on formalized institutional arrangements (bureaucratic institutions) including legislative frameworks and policy aimed at achieving resource users’ optimum resource use

(Ostrom, 1990). The assumption within MI has been that institutions are crafted for a specific purpose, overlooking the fact that there are socially embedded institutions, interwoven with existing customs, traditions, norms and beliefs, that play a key role in influencing participation in natural resource management (Cleaver, 2002; de Koning, 2011). In addition, MI does not take into account the local specific situations in which power asymmetries occur (de Koning, 2011; Hall et al., 2014; Quimby and Levine, 2018), and how local dynamics are shaped by interactions at multiple scales (Blaikie, 2006). Informal institutions may become an inherent part of formal institutions depending on factors within a specific context (Sokile et al., 2005) and as such cannot be ignored since they are likely to play a great role in influencing natural resource management.

Critical institutionalism questions the assumptions made by MI about communities being homogeneous, the avoidance of politics (ideational politics and local empowerment politics) and limited engagement with institutions within particular resource contexts (Cleaver, 2002; Hall et al., 2014). CI further emphasizes three areas of importance to the analysis of institutions in natural resource management: understanding how institutions are intertwined with everyday life activities; the historical formation of institutions; and the interplay between formal and informal institutions (Hall et al., 2014), all of which are important to the understanding of co-management initiation, implementation and co-management socio-ecological outcomes, a focus in this thesis.

CI engages institutional bricolage- a concept used to describe how resource users consider institutional arrangements available to them, either consciously or unconsciously (Cleaver, 2002). The process of considering institutions by resource users often happen when new formal institutions are introduced within a local context where informal institutions are already in existence (Cleaver, 2002; de Koning, 2014). While studying forest practices in the Amazon, de Koning (2011) identified three process of institutional bricolage as aggregation, alteration and articulation. Aggregation involves considering introduced formal institutions together with informal ones that are already in operation at the local level, giving rise to institutions that meet the present natural resource management needs. Alteration involves the changing of both formal and informal institutions to make them adaptable to the local context. Articulation involves processes that are used to resist the introduced formal institutions, and through these processes, traditions and norms are made more visible and adapted for natural resource management.

I am adapting an institutional approach to evaluating how institutions influence fisher folk participation in co-management decision making and effectiveness of co-management. To achieve my institutional analysis, I adapt the Critical Institutional Analysis and Development (CIAD) framework (Whaley, 2018), modified from Institutional Analysis and Development (IAD) Framework (Ostrom, 1990). The CIAD framework enables the understanding of institutions entwined in everyday practices within the commons. The practices are imbued with power relations and cultural meaning (Whaley, 2018). The foregrounding of power and meaning to understand commons governance arrangements are revealed through the concept of institutional bricolage whereby new institutions for resource governance and collective

action are crafted from existing ones (Cleaver, 2002; de Koning, 2011). Institutional bricolage allows for the examination of institutions beyond the formalized setting by engaging with both formal (bureaucratic) and informal (socially embedded) institutions. In this thesis, bureaucratic institutions entail both government and BMU agencies and regulations while socially embedded institutions are bonds of kinship and accepted norms among fisher folk.

The CIAD framework consists of three components: i) rules and resources; ii) the social situation; and iii) outcomes (Figure 1.9). The rules and resources component represent the structural features of both natural and social worlds. These represent the outcome of human actions in natural resource governance since actors repeatedly draw on them in the social situation (Whaley, 2018). The rules and resources component is composed of five categories: i) the biophysical and material category that concerns the resource attributes and conditions in an action situation that determine actions that are possible and outcomes that may be realized (Whaley and Weatherhead, 2014); ii) political category that captures power and interests that influence the behaviour of actors (Clement, 2010; Whaley and Weatherhead, 2014); iii) the social attributes that captures issues like gender, kinship and wealth; iv) discourse category brings attention to social life by enabling the understanding of power and position held by actors and how these limit their actions (Whaley and Weatherhead, 2014); and V) the rules and norms category provides the understanding of institutions as both rules and norms of behaviour (Whaley, 2018). In this thesis, I use the adapted CIAD framework (Figure 1.9) to cover the topic of my research. The evaluation variable in the original CIAD framework is not relevant to this study and therefore it has been left out. The three components of the study are linked to the research objectives of the study as shown in Figure 1.9.

Figure 1. 9: Conceptual framework

1.6.2 Research approach

A case study of four BMUs on the Kenyan side of Lake Victoria was undertaken. To maintain confidentiality, the four BMUs were labelled as A, B, C and D. A case study is defined as "an empirical enquiry that investigates an empirical phenomenon within its real life context, especially when the boundaries between the phenomenon and the context are not clearly evident" (Yin, 2003). Case study is a research approach which is known to provide better understanding of issues being studied when experimental events cannot be controlled by the researcher and the research questions begin with "why", "what" and "how". It can be used to get the level of description of a phenomenon a researcher is looking for within a given context.

This research is concerned with many "how" and "what" questions: What institutions in Lake Victoria (Kenya) are involved in co-management implementation? How does power and interpersonal relations within co-management institutions determine how fisher folk participate and influence co-management outcomes? How do formal and informal institutions interact and what is the outcome of this interaction to fisheries management? How are decisions made at the beach level influenced by kinship and corruption? What mechanisms have been put in place to ensure downward accountability? Answering such questions require a research approach, such as a case study, that is sensitive to the context within which a study is being undertaken. The aim of this research was to explore and understand fisher folk participation in co-management decision making and the effectiveness of co-management in ensuring sustainable Nile perch fisheries. I chose Lake Victoria (Kenya) as my case study because the fisheries governance approach is designed as participatory (co-management) and the lake has a well-established network of BMUs. The case study approach allowed for "thick" descriptions of participation of actors in the lake's co-management through a combination of different data collection methods used in the study. The approach provided an understanding of co-management socio-ecological outcomes witnessed in Lake Victoria as depicted in Figure 1.9.

This study is a single embedded case study in which Lake Victoria (Kenya) is the case study and four embedded units (BMUs) formed the units of analysis. The identities of respondents were not revealed but they were identified using BMU labels and numbers. Mixed methods of data collection were used in this study. The total number of BMUs on the Kenyan side of Lake Victoria are 283. The four BMUs I included in the study were selected based on the following criteria:

1. Willingness of fisher folk to participate in the study.
2. Beach accessibility.
3. Existence of multiple species fisheries to allow for the inclusion of different fishing interests and allow for the understanding of the interactions among the different fishing actors.
4. Beaches with high infestation by water hyacinth (*Eichhornia crassipes*) were excluded as the weed inhibits fishing practices, reducing the number of actors in a beach.

The above criteria guided my selection of the beaches, although more beaches would have qualified to be included in the study using the criteria. However, due to time and financial constraints, and the need to have an in-depth understanding of the research questions, only four beaches were included in the study. I used my preliminary visits to the beaches and a review of government and BMU documents to identify two BMUs that were ranked at the top and two ranked at the bottom based on their daily running of beach activities. The four BMUs may therefore not reflect all aspects of fisher folk participation in the lake's co-management.

1.6.3 Data collection methods

Data collection for this study was done from June 2013 to August 2014 using a combination of data collection methods. Combining data collection methods served the purpose of triangulation to provide a mixture of perceptions on the questions asked. Data collection methods including a review of government policy documents, BMU documents, semi-structured interviews, focus group discussions (FGDs) and observations (participant and direct) were used. The different sources of data collection methods used ensured reliability and validity of the data collected. Validity was also ensured by inviting key informants to review reports and manuscripts before submission to journals.

Both random and expert sampling techniques were employed in this study. Expert sampling, which is a type of purposive sampling technique and a non-probability sampling method, was used to capture information from experts. In this thesis, experts are defined as categories of people such as the BMU executive members, government officials, fisher folk aged above 50 years and local leaders. These are people who due to their position in society/ institutions and experience in the fishery have information that others may not have and therefore needed to be included deliberately in the study.

1.7 THESIS OUTLINE

Following the introductory chapter above, the following four chapters present the main chapters of my thesis. **Chapter 2** analyses how institutions, formal and informal, influence fisher folk participation in co-management. **Chapter 3** discusses institutions that influence fishing practices and shape the interpretation and application of formal government rules. **Chapter 4** analyses political equity within user organizations of BMUs. In **chapter 5**, the fisheries of three African Great lakes of Victoria, Tanganyika and Malawi are discussed and a reflection is made on the overall success of fisheries governance of the three great lakes. Part of data collected during this study was used to write the section on Lake Victoria in this chapter. The last chapter (**Chapter 6**) reflects on the four study chapters, draws conclusions and provides policy recommendations.

Chapter 2

Participatory governance in Lake Victoria (Kenya) fisheries: Whose voices are heard?

Publication to be based on this chapter:

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Abstract

Co-management is advocated as a means to improve human equity and the ecological sustainability of common pool resources. The promotion of co-management of fisheries often assumes the participation of resource users in decision making ensures more ecologically sustainable outcomes than top-down management approaches, while improving livelihoods and food security. However, in fisheries co-management approaches, participation is often poorly defined and measured by co-management proponents. For resource users, it may not be clear what their participation in co-management entails, and what such participation might involve or achieve. For the fisheries of Lake Victoria (Kenya), the introduction of co-management established Beach Management Units (BMUs) on a model of participatory decision making. Unsurprisingly, given global experiences of institutions for resource users' participation in co-management, the structures established across Lake Victoria (Kenya) have not resulted in effective participation of fisher folk. We examine why this is so. Specifically, we examine the influence of institutions on fisher folks' participation in co-management, using critical institutionalism to explain how participation of resource users is shaped by the relation between formal government institutions and informal social norms. We take four BMUs as case studies to investigate how historical administrative structures shape the development of co-management, how power relationships within co-management are negotiated at the local beach level, and fisher folks' understanding of their participation in co-management. We document how informal institutions undermine and replace formal institutions at the local beach level, while formal institutions suppress and ignore informal ones at the national and regional levels. From this, we argue power sharing between the government and fisher folk is key for fisher folk participation in fisheries co-management, capable of addressing both social and ecological challenges facing fisheries management.

Keywords: BMUs, co-management, critical institutionalism, fisheries, Lake Victoria, participation

2.1 INTRODUCTION

Co-management has been widely promoted as a preferred approach for managing common pool resources such as fisheries, moving away from top-down government control, and providing greater opportunities to integrate views of stakeholders in decision making (Armitage et al., 2009; Ayers and Kittinger, 2014; Pomeroy and Berkes, 1997). A powerful drive towards co-managed resources are the claims that it improves resource yields, ecological sustainability and legitimacy of governance (Herrera-Racionero et al., 2015; Measham and Lumbasi, 2013). A co-managed resource implicitly involves greater participation among resource users. There are different typologies and definitions of participation. Here we mean an active process through which resource users influence the management of natural resources to enhance their livelihoods and improve food security (Tiller et al., 2015). A fundamental necessity for a move from traditional top-down to co-management arrangements is that government must be willing to share power and involve resource users in decision making (Pinkerton et al., 2014). This might involve creation by government of appropriate facilitation

and logistics for participation, including provision of resources to support the process. At the local level, cultural values and practices, leadership by resource users' leaders and attention to the influence of power dynamics among stakeholders are important to foster participation and equity (Ho et al., 2016c; Ostrom, 1990) .

A number of approaches to participation have been identified depending on the management goals and power dynamics (Puente-Rodríguez, 2014). Arnstein (1969) described increasing levels of participation, using the analogy of a ladder. The lower rungs, manipulation and therapy, coincide with non-participation. At these levels, the government is expected to train resource users on what they are expected to do. The next three rungs-informing, consultation and placation- allow for limited consultations among resource users and government. The views of resource users may be invited, but these may have limited influence on the actions of more powerful stakeholders. The last three upper rungs- partnership, delegated power and citizen control- allow for more decision-making power to be vested in resource user communities, who are better empowered to make decisions on the management of resources. In the recent past, other participation typologies have been described. For instance, Fung (2006a) participatory cube consists of three participation dimensions, namely direct participation by those who participate, how information is shared by stakeholders for decision making, and the link between what is decided and action taken. The cube consists of three axes that focus on interactive communication, access to space for participation and power for decision making. Pretty (1995) presents a seven-level participation typology, from manipulation in which unelected and powerless representatives participate, to self-mobilization in which participation consists of people taking initiatives. Another typology by White (1996) provides some insights into how various stakeholders use participation to drive their interests. The typologies highlighted above indicate that participation is about power and control (Cornwall, 2008).

Introduction of co-management often involves the development of new institutions at the local level to enable resource users' participation in management decisions. Co-management integrates institutions- understood as rules, norms and organizations (Hodgson, 2006)- and stakeholders at different scales, providing linkages among resource users, government and other stakeholders (Nielsen et al., 2004). The linkages may be horizontal or vertical, enabling collaboration among stakeholders (Pomeroy and Berkes, 1997). The vertical linkages involve institutions at the local level with those at the national and regional levels. Horizontal linkages involve institutions for managing natural resources that involve multiple uses such as fisheries and other economic activities like tourism, aquaculture and wildlife management (Pascaul-Fernández. et al., 2005). The development of new institutions to encourage resource users' participation (Islam et al., 2017), includes Beach Village Committees (BVCs) in the fisheries of Lake Malawi (Njaya et al., 2012), forest committees established in the Amazon to manage timber and other forest products' use (de Koning, 2011), Gippsland Plains Tree Health Group (GPTHG) to conserve and manage remnant vegetation in the threatened grassy woodland in Australia (Measham and Lumbasi, 2013) and fishers' organizations called *van*, in the Tam Giang Lagoon in Vietnam, involved in the management of fisheries in collaboration with government (Ho et al., 2016a). For Lake Victoria, Africa, community-based institutions known

as Beach Management Units (BMUs) were formed in 2007, with networks at the regional, national and beach levels, to enable fisher folk participation in co-management. Despite the widespread emphasis on the development of these local institutions, there is limited discussion in literature about how power is negotiated among the co-management partners, and how this influences participation of resource users.

Power sharing is an important element of co-management (Béné et al., 2009; Njaya et al., 2012). However, discussions of power within co-management often centre on power sharing within formal institutions, with limited attention to power exercised among resource users and within informal arrangements (Quimby and Levine, 2018). Formal institutions include government and resource users' regulations, rules and organizations, while informal institutions are socially embedded and include accepted norms and bonds of kinship (Etiegni et al., 2016; Etiegni et al., 2019; Nunan et al., 2015). These institutions play a key role in guiding practice and interactions among resource users. Power relations are inseparable from institutions and inevitably shape interactions among stakeholders (Berger and Luckmann, 1967; Chuenpagdee and Jentoft, 2007; Van Hecken et al., 2015). This applies to both formal and informal institutions (Agrawal and Gibson, 1999; Ho et al., 2015; Lwenya et al., 2009; Njaya et al., 2012; Nunan et al., 2015). More understanding is needed on how formal and informal institutions influence resource users' participation in co-management. Other factors identified in literature that influence participation include logistical, relational and trust issues (Ballou et al., 2016).

Within co-management, institutions can be political, administrative or social in nature, and are the mechanisms through which power and authority are held and exercised (May, 2012). Power is continuously negotiated (Berkes, 2009; Njaya et al., 2012; Nunan et al., 2015; Quimby and Levine, 2018), creating new forms of power (Carlsson and Berkes, 2005). Participation in co-management involves power sharing among resource users and external agents such as government (Borrini-Feyerabend et al., 2004; Cleaver and Whaley, 2018; Nunan et al., 2015; Quimby and Levine, 2018). Unequal power relations have been shown to impede participation of resource users (Ballou et al., 2016; Nunan et al., 2015), while poorly crafted co-management simply redistribute power among co-management partners, disadvantaging categories of resource users (Béné et al., 2009). Power influences who gets to participate, where to participate (space for participation), what can be put on the agenda and decisions to be made (Gaventa, 2006). Limited participation happens more often within invited spaces (Gaventa, 2006; Nunan et al., 2012), meaning that those who invite have the opportunity to control what goes on within those spaces. Power redistribution in co-management happens within institutions and, therefore, understanding co-management requires an understanding of institutions, including those operating within local communities (Agrawal and Gibson, 1999; Borrini-Feyerabend et al., 2004; Nunan, 2006; Nunan et al., 2015).

Literature on institutions for resource users' participation in co-management is divided into two distinct groups: mainstream institutionalism and critical institutionalism. The analysis of institutions for natural resource management under mainstream institutionalism, has focused mostly on formalized institutional arrangements (bureaucratic institutions), including

legislative frameworks and policy processes aimed at achieving optimum resource use (Ostrom, 1990). The assumption has been that institutions are crafted for a specific purpose. This assumption overlooks the fact that there are socially embedded institutions that play a key role in determining participation in natural resource management (Cleaver, 2002; de Koning, 2011). Mainstream institutionalism does not take into account the local specific situations in which power asymmetries occur, with varied interests among stakeholders (de Koning, 2011).

Critical institutionalism recognizes both social and historical contexts in which institutions are embedded, with more focus on local institutions and practices (de Koning, 2014; Etiegni et al., 2016; Nunan et al., 2015). It draws on a critical realism in that decisions are shaped not by rules and regulations, but through human actions determined by formal and informal institutions (Cleaver and Koning, 2015). This approach to institutional analysis views institutional influence in natural resource governance as a non-linear process (de Koning, 2011), away from the formal-informal dichotomy. Critical institutionalism emphasizes: i) “the complexity of institutions entwined in every day social life; ii) their historical formation; and iii) the interplay between traditional and modern, formal and informal arrangements” (Hall et al., 2014). Specifically, critical institutionalism provides the conceptual lens through which governance arrangements are understood, how power is shared (benefiting some and not others) and how these arrangements have meaning and legitimacy among stakeholders (Cleaver and Whaley, 2018). It recognises that institutions are entrenched within specific social, political and economic structures (Mosse, 1997), providing insights on processes, power and meaning within co-management (Cleaver and Whaley, 2018). Attempts, therefore, to introduce new institutions at the local level, without regard to existing social relations and cultural practices, often lead to unintended outcomes (de Koning, 2011; Russell and Dobson, 2011). A critical institutionalism perspective also avoids a more normative approach, assessing deviation from compliance and views of “good” or “bad” practice.

A good deal of critical institutionalism engages institutional bricolage- a concept that describes the way resource users consciously and unconsciously piece together institutional arrangements from social and cultural resources available to them (Cleaver, 2002). This is a process that occurs when new formal institutions are introduced within a local context where socially embedded institutions already exist (Cleaver, 2002; de Koning, 2014). In her research of forest practices within the Amazon, de Koning (2011) identified three processes of institutional bricolage as aggregation, alteration and articulation. Aggregation involves recombining introduced institutions with existing ones in order to come up with institutions that are practical to the prevailing circumstances at the local level. Alteration involves changing both formal and informal institutions in order to adapt them to the local context. Articulation entails making traditions and norms visible in resistance to introduced formal institutions.

For Lake Victoria, the BMUs were created to follow co-management principles. BMUs comprise registered members engaged in all the fish value chains of the lake’s fisheries, primarily the Nile perch (*Lates niloticus*), Nile tilapia (*Oreochromis niloticus*), a high economic value cichlid, and a small cyprinid omena (*Rastrineobola argentea*), also known in the lake as dagaa. The fisheries of the three main species provide a major source of food and

support for livelihoods. This paper focuses on the Nile perch fishery because of its dominance in influencing the structure of the fishery and its economic importance as a high value fish for international markets.

Three decades after its introduction to the lake in the 1950s, the Nile perch had proliferated to an extent that it both supported an industrial fishery and, through its predation on other fish species, led to the decimation of endemic haplochromines and the traditional fishery they supported (Marshall, 2018). Landings of Nile perch had grown from 335 tonnes in 1975 (Geheb et al. 2008) to 340,000 tonnes in 1990 (LVFO, 2016a), although fluctuations in reported landings were later noted (Indian Ocean Commission, 2015). By that time there were also clear signs of overfishing, with a reduction of mean size of landed perch and reductions of catch per unit effort (CPUE). Reduced catch of Nile perch has continued, attributed mainly to the use of outlawed fishing gears, eutrophication, proliferation of the invasive water hyacinth (*Eichhornia crassipes*) in some areas, and destruction of fish breeding areas (Aura et al., 2019). The decline of the Nile perch coincided with increases of the much smaller omena, used mainly as local food for humans. Omena contributes to food security, nutritional requirements and socio-economic development of the riparian communities, and is also an important raw material in the fish meal industry. The third main commercial species, the introduced Nile tilapia (*Oreochromis niloticus*), currently comprises about 9.5 % of the commercial catch (Mkumbo and Marshall, 2015).

As the nature of the fishery changed, with increasing concerns over sustainable yields of the Nile perch as well as quality of fish to meet health standards required for the EU market (Geheb et al. 2008; Medard 2015), the governance of the fishery moved from top-down to co-management. This shift in governance reflects a global trend over the last few decades away from “command and control”, designed and implemented by governments and their agencies, to greater empowerment in decision making of local communities (Ann Zanetell and Knuth, 2004; May, 2012; Sen and Nielsen, 1996). An underlying assumption is that sustainable yields of local resources are best managed by local communities, involving local governance structures and processes that have legitimacy (Ayers and Kittinger, 2014; Pomeroy and Berkes, 1997). In L. Victoria, agreement among the riparian governments (Kenya, Uganda and Tanzania), development partners (European Union and World Bank) and the regional L. Victoria Fisheries Organization (LVFO) led to the production of government guidelines for the establishment and operations of the locally organised Beach Management Units (BMUs) (Nunan et al., 2015; Obiero et al., 2015). The guidelines define roles and responsibilities, and the standardization of fisheries operations and governance structures (Government of Kenya, 2006). Each BMU forms an Assembly of stakeholders including boat owners, fishers, fish traders, fish gear dealers and ice sellers.

The changes in fisheries governance in L. Victoria has been a major undertaking. In Kenya, this created 283 BMUs comprising over 40,000 crew and other stakeholders (Government of Kenya 2014). The BMUs were designed to enable participation of fisher folk in management decisions through local democratic structures. The former fisheries institution mandated through the Fisheries Act of 1989 (Government of Kenya, 1989) was managed by local

fisheries officers, with powers of enforcement for breaches of fishery regulations. This has been replaced by the Fisheries Management and Development Act, 2016 (Government of Kenya, 2016) that devolves fisheries compliance and enforcement to the BMUs. The shift in governance raises important questions on the extent that resource users are included in decision making and co-management (OECD, 2015), the process of participation and, especially, the extent power and decision making is devolved from upper tiers of governance to local levels. This is not dependent on how a certain management structure is created or imagined, but how government actors, resources users and other stakeholders are actually involved in the process of governance, and the extent that co-management includes collective decision making within and among heterogeneous groups of stakeholders. These move from high level government to fisher folk, with stakeholder participation occurring within hierarchies that are embedded within formally stated settings, as well as the rules, norms and practices of informal ones (Nelson, 2010; Robinson and Makupa, 2015).

For the participation of fisher folk within the newly created L. Victoria (Kenya) BMUs, how participation was designed and occurs within the new fisheries institutions, and whether they can afford to abide by the new rules are of critical importance for acceptance by fisher folk of the new order. All institutions are human constructs bounded by “humanly devised constraints that shape interaction” (North, 1990) and elusive to predictions of how they may in practice shape/determine use of natural resources (Nunan et al., 2015) and, hence, the actions of fisher folk. Motivations of actors and the social relations among them shape/determine who participates, in what, how, when and for whose benefits (Béné et al., 2009; Ho et al., 2015). In the BMUs of L. Victoria (Kenya), this can include restriction to decision making for the less powerful or, through cultural biases such as clanship, even to the fishery itself.

Seen from a social ontology perspective, an institution needs more than a formal declaration to ‘exist’. Only if the status and authority of the BMUs is collectively recognized and accepted by stakeholders, and the shift of power relations is reflected in their actions, does an institution, and its structure, become a ‘reality’ with relevance and meaning (Searle, 2010). For the BMUs, this can determine compliance of local users (fishers, boat owners, traders etc) with the new regulations and participation in governance procedures. This requires fisher folks’ recognition of BMUs as an authority through which the State Department for Fisheries operates, enabling BMUs to fulfil their intended (status) functions. Collective acceptance that maintains the authority of the formal institution¹ of the BMU is demonstrated and re-affirmed by participants in their actions and speech, and in documents expressing collective intent. The formal institutions of the BMUs are different from informal institutions, which are typically emergent phenomena that do not require any formal declaration of status by a central authority. Rather, they manifest implicit collective recognition of an authority.

The formal and informal institutions can be connected in the sense that they both work to shape practices, and can be fully or partially supportive of, or against, each other. For the fisheries of

¹ Formal institution is an institution invested with authority through a formal act of legislation or regulation.

L. Victoria, participatory governance processes would be expected to include: 1) formalized mechanisms of stakeholder engagement; 2) processes that promote collective acceptance of the new authority of the BMU demonstrated through compliance of rules; and 3) mechanisms to maintain the new institution, with stakeholders demonstrating and re-affirming their acceptance through on-going participation. For participation in co-management, it is also necessary that upper tier government stakeholders (in this case the State Department for Fisheries) recognise the authority and status of lower tiers (in this case the BMUs). It too has to demonstrate and re-affirm its recognition of the BMUs *deontic* power (that which is exercised in human institutions formed from social relations) just like any other stakeholder. If the State Department for Fisheries demonstrates in its actions that the BMUs have incomplete power, or will not receive support and backup, it can send a powerful negative signal to fisher folk (Ribot et al., 2006).

Participation within the BMUs is therefore a “two-way street”. A critical institutionalism approach helps in understanding how stakeholder participation is influenced by traditions of fishing practice, local social order and power dynamics, and the expectation of whether decision making powers devolved to the BMUs lead to better management outcomes. For this study, a critical institutionalism approach seeks to understand participation within three key aspects of the co-management of the L. Victoria (Kenya) Nile perch fishery. First, how did historical administrative structures shape the process for stakeholder participation in co-management institutions? Second, how did the ostensible shift in the Mainstream Institution from top-down control to co-management affect power constellations at the beach level? Third, to what extent is participation understood and has meaning for fisher folk? This work focuses particularly on the role of individual participation in design and practice of co-management of the fishery of the lake, and contributes empirical evidence on participation to the broader examination of the interactions between institutions and co-management provided by Nunan et al (2015), who drew on experience of working in L. Victoria (Uganda) and in L. Malawi.

2.2 METHODS AND RESEARCH AREA

My analysis of co-management in L. Victoria used four selected BMUs, labelled A, B, C and D to retain confidentiality. In consultations with fisheries officials, the BMUs were chosen based on a) willingness of fisher folk to participate and b) beach accessibility. The number of BMUs included were constrained by time and finances, and the need to build familiarity and trust of the communities with the researcher. On the advice of local fisheries department personnel, the selected BMUs were those viewed as two with a good and two with poor reputation for record and account keeping based on quarterly inspections of the BMUs. An implicit assumption was that record keeping would reflect operational legitimacy of the BMUs. A case-study approach was used to provide an in-depth understanding of fisher folks’ involvement in the implementation of co-management. Information collected through individual interviews and document review were followed up with focus group discussions in each BMU with BMU executives, fisher folk, fisheries officials and local leaders. Forty nine (49) individual interviews concentrated on identifying institutions involved in the creation and

operation of co-management structure, the stakeholders involved and how they participated. The questions asked started with “how” to enable the respondent to talk at length while choosing their own words. Further probing was done using questions beginning with “what” to understand further what was being explained by the respondent. In group meetings, questions were chosen to generate a discussion without fisher folk feeling intimidated by their leaders or government officials. Data collected from May 2013 to June 2014 from different methods were triangulated, such that findings generated for the research questions from the different methods used, were cross checked for consistency (Yin, 2003).

I asked fisher folk to recall activities that involved participation during and following the drafting of BMU guidelines and regulations in 2006 and 2007, respectively. Questions asked of participants required them to remember past events. To mitigate recall bias, a number of measures were put in place including: 1) ensuring the questions were well articulated in a language the respondent understands best; 2) employing interview techniques like probing to get more and better understanding of information given by the respondent; and 3) giving the respondent ample time to reflect on questions before answering them. The term “participation” used the Kiswahili *kuhusishwa* and the Luo- *tio kanyakla*, followed by a description of what was being drafted. Prompting and probing were used to help respondents’ recall (Beegle et al., 2012), while guarding against leading questions which could lead to biased answers. Individual confidentiality was central to the study design to avoid any personal repercussions from other fisher folk, their leaders or fisheries officials. Questioning was both at individual level, as well as use of open questions during the focus group discussions. Confidentiality was maintained at the individual level interview to avoid identification of illegal activities at specific locations, and to encourage respondents to speak in confidence and avoid the concern of repercussion for engaging in illegal activities. Conclusions made are based only on the four BMUs studied, with any wider interpretation a matter of conjecture.

To better understand the emerging BMU formal institutional structure following the shift from previous government directed top-down management to a local participatory approach, a review of government policy and BMU documents was done. This was supplemented through the interviews of fisher folk, fisheries officials, and local leaders using pre-determined semi-structured questions. The 49 interviews included 38 fisher folks, and stratified according to BMU membership categories (crew, boat owners, traders, processors, fishing gear makers and repairers and other members registered with the BMU, and 9 BMU elected executives). Interviewees were selected by approaching anyone who was willing to participate in the interview from each stratum. In addition, four fisheries officials, three chiefs and four village heads were interviewed. The chiefs and village heads provide a link between the government and local population, and provide important perspectives of what took place when co-management was introduced. The total number of interviews was deemed sufficient after reaching a point of saturation where it was considered that inclusion of more respondents in the study was unlikely to provide additional insights. Interviews were undertaken in Luo (local) and Kiswahili (national) languages both of which are spoken at the beaches, and in which the researcher and an assistant were fluent. Notes were taken during the interviews and data organized using ATLAS.ti software and analysed using a thematic content analysis approach.

2.3 RESULTS

2.3.1 Historical formation of institutions for fisheries governance in Lake Victoria (Kenya)

The review of literature on fisheries governance in L. Victoria (Kenya) and interviews constructed the historical development of the fisheries institutions from pre-colonial traditional management to current co-management. Before colonization, predating 1900, clan elders and local leaders (chiefs, sub-chiefs and village heads) controlled access to and use of fisheries by decree, determining when fishing could be done, where it was allowed and who could do it. The local leaders were very influential in fisheries management then (Opondo, 2011). Following adoption of the co-management model in L. Victoria, the local leaders seem to have lost this influence. From a review of co-management documents (BMU guidelines, regulations and the Fisheries Act), it was noted that local leaders have not been allocated any roles in co-management. Overall demand for fish during the pre-colonial period was limited by low density of the riparian population, and fishing gears comprising mainly inshore deployment of nets and baskets, although this could have localised impact on stocks (Kudhongania and Chitamweba, 1995; Marshall, 2018).

The colonial period (1901-1962) coincided with increase in human population, with documented signs of over-fishing on some species (Graham, 1929). The demand for fish, both for consumption and export increased following growth in local population, immigration to the lake region and expansion of fish export markets (Geheb et al., 2008; Kirema-Mukasa and Abura, 2013; Mkumbo and Marshall, 2015). These changes altered the process of participation in the lake as demand for fish grew and more efficient gears were used to harvest fish. The increase in fish demand coincided with an upsurge in unsustainable fishing practices (Etiegni et al., 2016).

The first Fisheries Act to manage the fisheries was the Cap 378 of the laws of Kenya of 1945, prohibiting fishing in certain areas and limiting certain fishing gears and sizes of fish caught. A major shift in the ecological state of the lake came from the introduction in the 1950s of the Nile perch and later that of the Nile tilapia (Marshall, 2018). The impacts of, especially, the Nile perch took two decades to be clearly realised and coincided with a second major ecological impact from nutrient enrichment (Hecky et al., 1994). In the meanwhile, fisheries governance after independence in 1963 retained the structure from the colonial period while the fishery adapted from one based largely on species of endemic haplochromines to high-value Nile perch and Nile tilapia. The increasing profitability of the Nile perch fishery led to industrial scale offshore fishing by trawlers and hook-and-line (Medard, 2015) and value-chain that increasingly relied on an international export market (Schuurhuizen et al., 2005). By the mid-1990s, total catch and mean size of Nile perch was in decline, with an increasing catch of the smaller *omena* suggesting changes in trophic structure in the lake (Irvine et al., 2019).

A transition from state led fishery control towards participatory co-management was instigated and financed by development partners (World Bank and European Union) as a higher level

government and regional initiative through the Lake Victoria Environment Management Programme 1 (LVEMP1) from 1997-2002, and the Implementation of Fisheries Management Plan (IFMP) project from 2003-2010. LVFO developed harmonized guidelines for BMUs at the regional level (Government of Kenya, 2006). This included addressing procedures for establishing BMUs, and defining their role, financing and election of BMU leaders. During this period preceding implementation of co-management, fisher folk involvement was confined to fisher folk representatives and other stakeholders (including government officials and NGOs) attending LVFO workshops to comment on drafts of BMU guidelines. Most fisher folk representatives at these workshops worked as beach leaders, appointed by local chiefs before adoption of co-management. They continued working as the first BMU leaders following formal adoption of co-management, raising doubts if the primary needs of fisher folk were fully represented in the workshops since they were not elected leaders. The draft of the BMU guidelines were further developed by a team of three co-management specialists appointed from ministries in-charge of fisheries in riparian states, one from each state. During this period, between 1997 and 1999, Nile perch was subject to three export bans from the European Union because of bacterial contamination (Geheb et al., 2008; Medard, 2015), that accentuated the need for improved management of the fishery, and even providing a motivation for the creation of the BMUs.

A fisheries official at beach C considered that *“the bans were as a result of salmonella detection in fish, cholera outbreaks along the shores of L. Victoria which were linked to fish contamination and unacceptable fishing methods including use of toxic substances to capture fish. The ban affected livelihoods of many fisher folk.”* To add to this, a fisheries official at beach D said, *“The ban did not only affect livelihood activities around the lake, but the economy of the country too, due to loss of revenue from fish exports. However, to lift the ban, co-management was one of the conditions from the European Union.”* This placed a particular focus on the creation of BMUs on landing sites to improve post-harvest handling of fish. Infrastructure to support this including toilets, potable water supply and fish handling equipment (gloves and boots) was noted from a review of co-management documents and interviews with fisher folk, fisheries officials, local leaders and BMU leaders. Although co-management was initiated in the late 1990s, it would take around seven years for its implementation to begin.

From the harmonized regional guidelines, Kenya developed country specific BMU guidelines and development of co-management (Fig. 2.1). A team of fisheries officers was mandated to design draft country BMU guidelines, subject to consultation through government organised meetings and workshops at which fisher folk representatives and other actors (NGOs, local leaders and research institutes) were invited. This led to the development of country-specific BMU regulations by another team of fisheries officers. The regulations, were crafted from the BMU guidelines and they provided legal backing for the BMUs (Government of Kenya, 2007). The BMU regulations were first presented to the L. Victoria (Kenya) riparian fisheries officers and later to fisher folk representatives (BMU chairpersons and secretaries), local leaders, researchers and local and national NGOs at workshops organized by the government.

Government organised training of extension staff, NGOs, faith-based organizations (FBOs) and Community Based Organizations (CBOs) on co-management principles. The NGOs and FBOs have a history of working with fisher folk by providing training, credit and development of alternative income generating activities.

Figure 2. 1: The process of co-management institutions' development in L. Victoria (Kenya) that occurred from 2004-2009

It is clear that the creation of the BMUs was a process driven by the riparian governments in consultation with, and possibly driven by, powerful external actors, also representing economic and consumer interests beyond the region. The new formal structures and implementing institutions were directly influenced by existing and historical government-led fisheries management. At best, information was conveyed from government of how BMUs should organise fisher folk participation at the local level.

2.3.2 Interactions between formal and informal institutions within Lake Victoria (Kenya) co-management

Following the formal process in creating the BMUs, development of their structures and governance at the local level required the participation of fisher folk. For instance, part III of the BMU regulations stipulates that fisher folk need to participate in the election of their BMU leaders. In part IV of the regulations, fisher folk need to fund the operations of the BMUs from fees they pay to undertake various activities on the beach. BMU development also involved establishing the boundaries of the BMU, its organizational structure for registration of assembly members, and financing through payment of membership and fishing gear registration fees. The BMU boundaries were delineated by the Director of Fisheries in consultation with local chiefs (Government of Kenya, 2006). The beach area was surveyed and boundaries marked to form the BMU areas of jurisdiction and this required participation of fisher folk in various activities (Table 2.1). Co-management implementation determined who could earn their livelihood from the fishery, in contrast to informal institutional arrangements where clan membership was required. With co-management, fisher folk need to register through payment of a fee to become a member of a BMU and be allowed to participate in the fishery. Before co-management adoption, being a member of a clan was enough to earn entry to the fishery. In the development of BMU structures at the beach level, fisher folk participated personally rather than represented by their leaders. The space for participation was at the local level where most registered BMU members could access and participate. Participation at national and regional level required resources that most members did not have and spaces for participation were located far from the beach. At the national and regional levels, participation was through beach leaders who had served before adoption of co-management.

Table 2.1: Lake Victoria (Kenya) BMU structures and institutions developed for fisher folk participation in co-management.

BMU structures / Institutions	Participation level	Who participated	Area of participation
Structures			
BMU assembly	Beach level	Individual fisher folk	Membership registration
BMU executive	Beach level	Individual fisher folk	Election/ removal of leaders
BMU sub-committees members	Beach level	Individual fisher folk	Election/ removal of
BMU networks	All levels	Fisher folk/ representatives	Election of network leaders
Institutions			
BMU revenue	Beach level	Individual fisher folk	BMU funding
BMU regulations	National level	Representatives	Development of regulations
BMU guidelines	Regional/national level	Representatives	Development of guidelines
BMU by-laws	Beach level	Fisher folk/ representatives	By-laws development

Each BMU developed by-laws, based on government guidelines, for day to day running of BMU activities. A review of the by-laws from the four BMUs studied showed no major differences among them, with all adhering to government guidelines. BMU assembly members were allowed to suggest ways for revenue generation to pay for the day to day running of activities (Table 2.2), and to be approved as by-laws by the Director of Fisheries.

Table 2.2: Examples of possible sources of BMU revenue generation identified in the study

1. Membership fee as prescribed in the by-laws
2. Annual registration fee for members based on member categories
3. Fish landing fees
4. Support from development partners
5. Use of BMU assets charges
6. Income from projects
7. Other ways stipulated in the by-laws and approved by assembly such as fines and penalties
8. Occasional support from the government

The sources of revenue generation for the BMUs are based on BMU regulations. The regulations set out that BMUs are at liberty to identify any means through which they can generate revenue for their activities. Thus, co-management implementation introduced payment of fees, identified by respondents as an assured source of BMU revenue, and as a compliance to BMU rules. Out of 38 fisher folks interviewed, the vast majority (95%) were

registered members of the BMUs where they operate, indicating they had paid their annual membership; as described by a fisherman from beach C:

In this place you cannot fish if you are not registered. Where will you land your fish because the leaders here cannot allow you to land if you are not registered? Also, if you try to land in areas not allowed for fish landing and they find you, you will be fined a lot of money. More than the registration fee you would have paid and they can also make your life difficult by making sure you do not fish at all. If they do that to me or my friends here, where shall we get our "ugali"² from? Look at our area here. Can you farm anything in this rocky place? This is why I am careful and I must register with the BMU. I do not want problems.

Payment of an annual membership fee at the beginning of every calendar year, or through periodic instalments, is an outcome of formal institutional structure of the BMU. This illustrates power relations based on authority of government over the BMUs, which is later reflected as power of BMU leaders over fisher folk. Non-payment is an observed reason within the formal BMU institution to exclude individuals from fishing and, hence, not only from their livelihood but capacity to participate in elections of BMU assembly members. As such, informal institutions based on clan membership to access the fisheries appear lost or weakened. A BMU leader in beach A stated *"it is only through member registration that we can have an assembly and some of us can be elected. If you do not have a membership card, you cannot vote."* A fishery official from beach D added:

For one to undertake fisheries activities in this lake, they must register with a BMU. They are free to choose which BMU they want to register with, but the point is, they must be registered. That is what the law says, and we are doing well in this because the BMU leaders are on the spot to ensure this rule is implemented.

For at least some BMU members, it was possible to circumvent the formal institutional requirement to register, as illustrated by a trader from beach A:

Currently I am not registered because I noted there are some traders who come from outside and they are not registered but they are allowed to buy fish from this beach. I used to register but for the last 2 years I have not because I do not see the point of registering if outsiders can come and compete with me for fish. The leaders know I have not registered but there is nothing they can do to me because they know I am aware of what they are doing.

Despite not paying the registration fee, BMU leaders did not stop the trader from engaging in his livelihood, but it does prevent the trader from voting in BMU assembly elections, for which a registration card is needed. Such a view was contrary to that of fisheries officials that registration was mandatory. However, because registration is related to voting it is in the interest of more influential candidates at election time for fisher folk to be registered. It is not

² Ugali is a dish made of maize, sorghum, millet or cassava flour mixed in boiling water and cooked to a dough-like consistency. It is considered a staple food for a majority of Kenyans and also consumed in some other parts of Africa.

possible to know the motivation that allowed this particular trader to continue business without registering (and in contrast to the example of the fisher not being allowed to fish given above), but there was evidence more generally that inter-personal relationships can play an important role in the informal institutional aspects that allows BMU leaders to exert power selectively based on kinship, marriage or friendship. The importance of interpersonal relations between BMU leaders and their associates in determining participation of users in formal institutions was corroborated by a fisherman from beach D who noted “*a BMU chairman may find a relative using an illegal gear and he will do nothing, but if he finds someone who is not a friend or relative, he will confiscate his gear.*”

2.3.3 Institutions and fisher folk participation in co-management

To gauge the extent to which institutions developed for co-management involved fisher folk participation, we considered: a) the extent to which fisher folks' views were considered for decision making; b) their knowledge of BMU guidelines, regulations and by-laws; c) who represented them in situations where individual participation was not possible; and d) the powers devolved to them by the government within the co-management arrangement. Fisher folk were involved in various activities and steps during the development of co-management institutions (Table 2.3).

Table 2.3: Response of fisher folk (N=38) relating to their participation in the development of the co-management institutions for the L. Victoria (Kenya) BMUs.

Fisher folk in co-management	Activity	No. of respondents	
Fisher folk's' views for BMU development	Views collected by fisheries officials and BMU leaders	11	
		5	
	Views included in the by-laws	27	
	Views not collected		
Knowledge of co-management documents	Knowledge of BMU guidelines	Yes 14	No 24
	Knowledge of BMU regulations	Yes 6	No 32
	Knowledge of BMU by-laws	Yes 24	No 14
Fisher folk's representation in document's drafting process	Represented by BMU leaders	21	
	Group category leaders	7	
	Do not know	10	

Fisher folk considered that participation in developing co-management institutions was through representation by BMU executives (55% of respondents). At that time, these representatives,

who were not elected but had been serving as beach leaders selected by chiefs, assumed BMU leadership during the transition from top-down to co-management, and were considered as group category³ leaders (19% of respondents). However, 26% of fisher folk interviewed were not aware of who participated or represented them in developing BMU guidelines and regulations. Although a majority of fisher folk were of the opinion, they were represented by BMU chairpersons, these leaders were mainly the wealthier and more powerful boat owners. Boat owners may have championed their interests over those of other fisher folk categories (fishers, traders, fishing gears repairers etc) within decision making space where they represent others as members of BMU executive. BMU regulations specify each BMU executive committee should comprise at least three women (Government of Kenya, 2007), but none of the chairpersons were women, although there were women registered as members of BMUs. Most of the women were fish traders, although a few owned boats.

In the four beaches sampled, 71% of fisher folk considered their views were not collected for the initial drafting of BMU guidelines and regulations. A fish trader from beach B, who had witnessed the BMU development, stated, *"I was not consulted when the BMU regulations and guidelines were being drafted. These are things that were done by our leaders and I do not know what their contents are."* A fisherman from beach A, who was not consulted, stated *"only a few people were selected from the beach to attend the meetings."* A boat owner from beach D added, *"I was not involved, but some of my colleagues were consulted."* A fish trader from beach A, who reported having participated in the development of BMU guidelines (Fig. 2.1, tier 3) stated, *"I was involved in the development of BMU guidelines though the document had already been drafted and we went to Kisumu (a city on the shores of L. Victoria) to familiarize ourselves with it and we even made amendments to sections we were not happy with."* He added there was a clause in the BMU guidelines that required all BMU leaders to have primary level certificates, but they were able to change the requirement to apply only to beach secretaries and treasurers. Similarly, a fish trader from beach B indicated, *"the regulations and guidelines were complete by the time we got to hear about them. However, little has been done to let us know what they contain. Some of us have not even seen those documents. We need to be trained on these things."*

Of the 11 (29% of the sample) fisher folk who reported their views were collected, only five indicated that any of their proposals were included, mainly in the development of by-laws. A fisherman from beach C claimed, *"what we proposed to be paid as allowances for the BMU leaders was maintained"*, and a fish trader from beach B stated, *"the fines we proposed for those who do not follow the by-laws are the way we passed them as an assembly"*. Referring to a reduction of an annual membership fees from Ksh 500 (US \$5) to Ksh 200 (US \$2), a boat owner from beach C said, *"I was involved in that the BMU executives drafted the by-laws after which they called an assembly meeting and the draft laws were discussed. We were able to*

³ Fisher folk are registered in various groups based on activities they undertake in the beach eg. fishermen, traders, boat owners, fishing gear repairers etc. and each group has its elected leader

remove some of the proposed laws through the assembly and we also added some." In reference to being involved in the drafting of beach by-laws, a boat owner from beach D stated:

Yes, I was involved but some of the issues we gave were not fully included. We discussed as assembly members and proposed in our by-laws we should use money collected from licenses sold to crew, boat owners and traders as part of BMU revenue, but this was rejected by the government.

The influence of fisher folk in crafting fisheries management rules seems to have been minor. There was no evidence that the management rules included any degree of co-design with users of the resource, but a firm depiction of government as the higher authority and adjudicator of what was included in fisheries management rules. This influences the way the rules are viewed by fisher folk, although they are required to comply with fisheries regulations of the Fisheries Act (Government of Kenya, 2016). Nonetheless, fisher folk seemed to have a larger influence on whether fisheries rules would be implemented or not, and outcome of co-management. From observations at the four beaches studied, it was evident that although the government expected fisher folk to implement fisheries rules, observed practice in all four BMUs were contravening government fisheries rules, most clearly seen through the increased use of illegal fishing gears and methods.

Fisher folk, however, were able to craft various rules for managing beach activities and fines to be administered in case of violation of BMU rules, and included in specific by-laws. For example, an ice seller from beach C described how they took part in developing the by-laws by demonstrating his understanding of the laws by stating "*by-laws are used to ensure members work in a secure environment. They are also used to solve problems that occur among members. We are also able to propose conditions under which work should be done such as the type of uniform to be worn while on duty.*"

A boat owner from beach A described how conflicts at the beach were resolved using by-laws, stating "*we (complainant and the accused) go to the BMU office to have our case heard. We both first pay Ksh 200 (approximately US\$2) each for taking the case to the BMU office. The case is heard and determined using our by-laws.*" Nevertheless, limited types of cases could be resolved using the by-laws, as described by a fish trader in beach C, "*BMU office also solves problems that emanate from family issues. What they cannot resolve is referred to the chiefs.*" The limit to the cases that could be heard and determined using the by-laws was further confirmed by a fisheries officer in-charge of beach C who indicated:

The by-laws basically contain rules used to run the beaches by the BMU executives and resolve minor problems in the beach. There are also fines in the by-laws administered by the BMU executives. However, that goes as far as beach running is concerned, but fisheries rule violations are handled by courts. When fisheries rules are violated, the BMU executives report the same to fisheries officials who take the matter to court.

The capacity of the BMU executives to levy fines under the by-laws, suggest a leverage of power and influence over other fisher folk, with possible consequences on fisher folk participation in the BMU.

Fisher folk participated in the crafting of by-laws and they have a good awareness of them, but less so on the meaning of co-management. Enabling fisher folk participation in co-management, capacity building through training and raising awareness was reported by respondents as activities undertaken to prepare fisher folk for participation. BMU leaders, trained at the national and regional levels, were expected to create awareness of other fisher folk on co-management and how to structure BMUs and develop institutions (by-laws) at the beach level. Fisheries officials and local leaders (chiefs and village elders) were also involved in the awareness creation on co-management and the crafting of by-laws at the beach level. A majority (63%) of fisher folk interviewed agreed there were attempts to create awareness on co-management by BMU leaders during assembly meetings. This comprised stating the importance of co-management, composition of BMU committees, and procedures such as electing and removing their leaders from office, most of which seemed to involve them in the formation of BMU structures at the local level. Only 13% of respondents reported having undergone training in co-management. Local leaders used “*barazas*”⁴ to create awareness on co-management among fisher folk and local beach inhabitants who may not be involved in active fisheries. However, interviews eliciting fisher folk’s views of co-management demonstrated little understanding of co-management principle of involvement of fisher folk and the state in fisheries management decision making, what is required of them and how they are supposed to benefit from co-management. For instance, when asked about their understanding of co-management, a majority (90%) of fisher folk linked co-management to government rules, suggesting government’s dominance in co-management.

Only in BMUs A and C were some leaders conversant with the meaning of co-management as some form of collaboration among stakeholders. A leader from beach A defined co-management as “*collaboration between fishers and government in the management of L. Victoria fisheries*”, while a leader from beach C defined co-management as, “*collaboration of stakeholders in fisheries management*”. A leader from BMU D attributed his lack of understanding of co-management by “*I was just elected 2 years ago and I was not in office when BMUs were being established*”, while a leader from BMU B linked his low knowledge of co-management to absence of training since elected to office. Limited knowledge of co-management was also evident among some fisheries officials. For instance, a fishery official from beach C understood co-management as “*the drafting of new laws by government to improve fisheries management*”, while a fishery official from beach B defined co-management as “*implementation of fisheries rules.*” In addition, there were three fisheries officials who could not attempt to define co-management during the interviews, indicating their own low level of awareness.

⁴ Village gatherings convened by local leaders (chiefs and village heads) to share information and discuss matters that concern the community.

To understand power sharing between the two main co-management stakeholders (government and fisher folk) involved in fisheries governance, I examined the powers held by the government before co-management and powers devolved afterwards to fisher folk through the institutions of BMUs (Table 2.4). My results indicate the government still holds most of the formal decision-making powers within co-management except for power of enforcement of fisheries rules, which have been fully devolved to BMUs. Fisher folk found violating fisheries rules by BMU executives are handed over to fisheries officials for onward transmission to the courts. In the previous order, it was the duty of fisheries officials to enforce fisheries rules, a task that they did not have the human capacity to perform. The power to levy fines under by-laws for non-compliance with rules, although described as a minor operational issue, was found to be a lucrative source of income for the BMU executives. The real power and influence stems from the national regulations.

Table 2.4: A summary of powers held by the key stakeholders involved in fisheries governance identified from interviews with respondents involved in L. Victoria co-management.

Powers held by government before co-management	Power held by government after co-management adoption	Powers devolved to BMUs by government	Extent of power devolution to BMUs
Create rules or modify old ones (legislative)	Create fisheries rules or modify old ones	Craft by-laws for managing internal BMU activities	Limited to by-laws
Power to make decisions on fisheries resource use held by the government	Power to make decisions on fisheries resource use remained with the government	No power devolved to the BMUs by the government	No resource use decision making powers devolved to BMUs. They implement fisheries rules contained in the Fisheries Act.
Government the main enforcer of fisheries rules	Government still involved in fisheries rule enforcement	Power to enforce fisheries rules	Power to enforce fisheries rules fully devolved to BMUs. Both government and BMU institutions involved in fisheries rule enforcement
Conflict resolution (judicial)	Powers to resolve conflicts from rule enforcement held by the judicial arm of the government (courts)	Power to adjudicate social disputes among BMU members	Limited-only power to resolve conflicts among BMU members devolved

2.4 DISCUSSION

Resource users' participation has long been considered as an important part of natural resource governance (Ansink and Bouma, 2013; Ayers and Kittinger, 2014) for benefits that include

inclusive decision making (Armitage, 2005) and empowerment of resource users (Ho et al., 2015; Nunan, 2006). These elements are linked to sustainable resource management outcomes (Ann Zanetell and Knuth, 2004). This study used the case of L. Victoria (Kenya) to explore how fisher folk participate in co-management decision making.

In the introduction of this paper, we posed three questions, which we re-visit here:

1) How did historical administrative structures shape the process for stakeholder participation in co-management institutions?

From the findings, it was established that the historical administrative structures at the local level consisting of chiefs, sub-chiefs and village heads played a key role in determining how fisher folk participated in the development of co-management local institutions. The local leaders were powerful and influential in fisheries management prior to co-management, and in most cases, they were obeyed without questioning. They determined who, when, where, and how fishing was done (Opondo, 2011). The local administrative structures provided a link between the government and fisher folk during co-management development. However, during co-management implementation, the local administration seems to have lost fisheries management power. Instead, implementation of fisheries rules within co-management at the beach level is undertaken by the BMUs, while local leaders handle social disputes within their locations.

Formal institutions including Fisheries Act, BMU regulations, guidelines and by-laws, do not include the roles played by local leaders in fisheries management (Government of Kenya, 2007, 2016). This has largely removed the participation of those leaders in fisheries management. This is contrary to what has been reported in the fisheries of L. Malawi, where chiefs have an influential and important role in fisheries co-management (Njaya et al., 2012; Russell and Dobson, 2011). The local leaders have power to make fisheries management decisions, although these can be motivated primarily by self-interest rather than improving fisheries management (Njaya et al., 2012). The powers exercised by local leaders, who are not elected in L. Malawi, is used to marginalize fishers further, suggesting that co-management does not guarantee fisher folk participation. In some instances, poorly designed co-management merely re-enforces control by the more powerful stakeholders (Béné et al., 2009).

Co-management in L. Victoria was instigated and implemented from the highest tiers of government (Beem, 2007; Herrera-Racionero et al., 2015; Njaya et al., 2012), influenced by donors and external partners over international food safety concerns of exported Nile perch (Medard, 2015). This drove a process that relied on existing formal institutional structures as provided by the Fisheries Act and associated regulations. The process appeared to have largely ignored the realities of the informal institutions of fishing. Such an approach can have little effect on informal institutions (Pejovich, 2006), leading to an undermining of formal structures and ambitions for sustainable resource use (Etiegni et al., 2016; Nunan et al., 2018). While co-management theory acknowledges the influence of institutions on the participation of fisher

folk in co-management (Agrawal and Gibson, 1999; Rahman et al., 2012; Snell et al., 2013), the interaction between formal and informal institutions are important to co-management.

2) How did the ostensible shift in the Mainstream Institution from top-down control to co-management affect power constellations at the beach level?

Power is key to participation in co-management (Njaya et al., 2012; Nunan et al., 2012; Quimby and Levine, 2018). Power devolved to fisher folk in L. Victoria by the government to enable their participation in co-management is limited and, therefore, does not enable meaningful resource users' participation (Béné et al., 2009). The ostensible shift from top-down management to co-management has not changed substantially the way power is distributed and exercised within the fisheries of L. Victoria (Kenya). Only limited powers to enforce/ implement fisheries regulations are fully devolved by the government to fisher folk, while the government still controls the more important fisheries management powers, including power to craft and modify fisheries regulations and power to make decisions on fisheries resource use. Limited power devolution from the government to fisher folk is a barrier to fisher folk participation. This impedes them from having a voice in fisheries management decision making. However, that does not mean that they implement what the government prescribes for them. They implement what they perceive as acceptable to them based on their accepted norms and practices, influenced by informal institutions, and the need to earn a livelihood. Such approach to participation by resource users is mainly due to lack of involvement in the initial stages of co-management planning and development, which are needed for building legitimacy of co-management institutions. A similar outcome was discussed by Herrera-Racionero et al. (2015) among fishermen operating in the Spanish Mediterranean port of Gandia, who lost legitimacy of co-management institutions due to lack of their involvement in the development of those institutions.

Among the different fisher folk categories, the limited powers that were devolved by government are held and exercised by a few wealthier and more powerful boat owners who determine how co-management is implemented and, therefore, how fisher folk participate. More centres of power were developed within BMUs with co-management, giving rise to more fisheries elites at the local level (Etiegni et al., 2019). Power to implement fisheries rules is devolved to the BMUs, which in practice are extremely limited in their role to craft fisheries management rules. However, informal rules operating within the BMUs determine what rules are implemented at beach level. As such, BMUs may not have been influential in the planning and structuring of L. Victoria co-management institutions, but they determine to a larger extent the effect of co-management on the fishery. Within the BMUs, our work concurs with Nunan et al. (2012; 2015) in Uganda that BMU chairperson and executive positions are dominated by the wealthier and more powerful boat owners who champion their interests, and not the interests of the people they represent. While BMU regulations stipulate that at least three of the executive committee positions should be reserved for women and 30% of positions should go to crew, it is unusual, although not impossible, for women, traders or crew to be elected to the more powerful position of the BMU chairperson. Relations of power are critical to the outcome of co-management (Quimby and Levine, 2018). These relations, however, should not only be

considered between the government and the recipients of devolved powers (resource users), but also among resource users. The findings of this research have shown that power relations/sharing among fisher folk was not considered during the design and shift to co-management. The domination of boat owners in the BMU executive provide unequal power relations among fisher folk, leading to interference and inefficiencies in fisheries management.

3) To what extent is participation understood and has meaning for fisher folk?

Co-management is implemented in many countries and in different contexts, and focuses on increasing resource users' participation in management for improved ecological sustainability and livelihoods (Ayers and Kittinger, 2014; Measham and Lumbasi, 2013; Quimby and Levine, 2018). To understand the extent to which participation is understood and has meaning for resource users, we first determined fisher folks' understanding of co-management, since participation is a key principle of co-management (May, 2012; Quimby and Levine, 2018). The general understanding of co-management by fisher folk, and even fisheries officials, weaken the likelihood of fisher folks' understanding of participation or, more importantly, the benefits of participating (Ostrom, 1990; Pomeroy et al., 2001). Among the fisher folk of the four Kenyan BMUs involved in the study, co-management is viewed as a government project they implement or, at least, need to conform to. To them, participation is some sort of government support which they can give or fail to give, instead of being active partners in co-management. This appears to fit the reality of "*what does happen*" as opposed to "*what should happen*" (Blackstock et al., 2012). Overall, the disconnect between the stated rationale for a devolution to co-management has hardly translated to a serious engagement of fisher folk to support the process, risking a lack of institutional legitimacy of fisheries policies, perceived as made by far away decision centres (Herrera-Racionero et al., 2015).

Our research suggests many fisher folks seem not to have understood the problems that co-management aims to solve and, by extension, why they should be part of the process. The approach given to co-management development process is equally important. The top-down approach to co-management, provides less incentives to fisher folk to participate (Islam et al., 2017). Similarly, when what seems to be benefits that accrue from co-management, in this case money from licensing, goes only to the government, this acts as a disincentive to fisher folk participation. That they view co-management as external to them suggest a lack of institutional legitimacy. It can also be a consequent of low-level engagement during the initial stages of co-management development. So, while there may be a good to reasonable comprehension of co-management, the meaning of participation to fisher folk as indicated by extent of non-compliance seems deficient. Broader meaning of wider rationale of participation in co-management for sustainable resource use can, at best, be theoretical as, in reality, the BMUs do not, and cannot, lead to sustainable yields. As all institutions require legitimacy and meaning (Cleaver and Whaley, 2018), the BMUs face a number of serious challenges.

For the four BMUs that were the topic of this research, there is little evidence that there was any meaningful engagement of fisher folk in the design of the government mandated fishing regulations. Documented participation of fisher folk leaders in the development of the BMU

institutions appear to comprise informing them of decisions already made, and supported by government payment for transport and accommodation fees to attend workshops. Fisher folk participation was primarily informative, thus corresponding to Arnstein (1969) lower rungs. Decisions had already been made at the regional and national levels, and fisher folks' inputs were only considered if they supported what had already been decided at those levels. Participation occurred mainly within invited spaces (Gaventa, 2006), and the regional agenda, which was also the national agenda, prevailed. This corresponds to what was later discussed by Pretty (1995) as manipulation of stakeholders, in which participation is by those who have not been elected and are powerless. For the BMUs, fisher folk leaders who participated in the development of co-management, and in the initial implementation, were not elected and they did not have power to influence decisions. They did not understand what was expected of their participation. However, the election of BMU leaders in the later years has not changed the way co-management is implemented in L. Victoria (Kenya). How fisher folk are to participate is decided externally, although the participation cube developed by Fung (2006a) advocates direct participation, information sharing for decision making and understanding the link between decisions made and action taken. For L. Victoria (Kenya) co-management, communication between fisher folk and the government is not interactive, but informative. Power is not devolved from the government to fisher folk in a way that encourages meaningful participation in co-management. Government, as the more powerful stakeholder at the national level, uses participation to drive her interests, while at the beach level, the more powerful boat owners' interests are advanced. This approach to participation is, therefore, determined by power and interests (White, 1996). As such, information sharing and linking of fisheries management decisions to actions are unlikely to play any role in improving fisheries management.

The government exercised hidden power, used by some actors due to their positions to achieve their objectives (Njaya et al., 2012), to decide on who to invite to the workshop and also control the nature of discussions taking place by determining the agenda (Cleaver and Whaley, 2018). This conforms with "*instrumental*" co-management (Arthur, 2005; Nielsen et al., 2004) that restricts resource users' participation in decisions. Since the government facilitated fisher folk participation, it very much controlled the space for participation (Gaventa, 2006). The review of the by-laws of the four BMUs showed these simply adhered to government guidelines and the Fisheries Act (Government of Kenya, 2016). This was seen with the similarities of the sources of revenue suggested by the four BMUs, and what the revenue was to be used for. Again, the government decided on who should license and what license fee is to be used for, indicating fisher folk participation had no meaning since government interests prevailed.

The stated formal ambition to establish a sustainable fishery as an outcome of co-management has very little substance in the face of the maintenance of an open-access fishery (Irvine et al., 2019), the realities of the informal institutions that subvert compliance of rules (Etiegni et al., 2016) as a result of a governance structure of co-management providing limited space for fisher folk participation in the crafting of the fisheries management rules. Participation of fisher folk at the four BMUs is largely limited to co-management implementation, with only minor capacity to influence matters of governance. Nunan (2010), investigating co-management on L. Victoria in 2007, also concluded a general lack of participation perceived by BMU members.

This concurs with our findings that participation among most of the BMU members remains restricted, with power very much invested in the BMU executives. See also Etiegni et al. (2019). The persistence and even increase in illegal fishing practice (Irvine et al., 2019) provide a strong signal that the formal institutional structure of a regulated fishery is not aligned with the informal institutions, where clan and kinship relationships foster local corruption (Etiegni et al., 2016; Nunan et al., 2015; Obiero et al., 2015). This could be viewed as aspects of institutional bricolage in which fisher folk ignore or bend formal government rules as they participate in the fishery (de Koning, 2011). This they do with the sole aim of earning a livelihood. BMU leaders use interpersonal relations to selectively enforce formal regulations that require fisher folk registration to participate. They use their power to determine who can participate without registering, and who must register to participate. As such, the formal regulation is not fully implemented, but subverted through power and interpersonal relations that exist between the BMU executives and other fisher folk.

The categories of fisher folk laid out in the BMU regulations comprise a heterogeneous mix, and the extent that each category participates, or influences co-management of the fishery is debatable. For many fisher folk, participation is dominated by picking their way through the formal and informal institutions, including payment of bribes and fines to continue fishing (Nunan et al., 2015). At the very least, this provides a particular flavour to the concept of participation. For others, it may be about the next sliver of income. In the fishery of L. Victoria many crews are low-skilled transient workers (pers com. BMU Chairperson) in the employ of a boat owner, but nevertheless crew are required to register with the BMU. While a noble ideal, especially for collective action, boat crew have limited space for participation in co-management (Nunan et al., 2012), other than providing a cohort of votes for BMU executives. It is, therefore, a contestable point why they should be required to participate in the payment of membership fees to a BMU. This seems to be recognised in Malawi, where a fisher is defined as a gear owner, restricting any role a crew member has in formal co-management structures, even though it is those who actively fish that effect compliant fishing or not (Hara, 2006).

2.5 CONCLUSIONS

This paper used the case of L. Victoria (Kenya) to explore the nature of resource users' participation in the development and implementation of co-management. As currently constituted, government still holds most decision making powers that structure co-management, with fisheries management retaining the character of a traditional top-down approach. Fisher folk's participation is largely a formalised action aimed at implementing externally crafted rules (Nielsen et al., 2004). However, from the evidence, it can be concluded that institutions and the interactions between them are important for the social-ecological structure of that co-management. The formal and informal institutions interact in ways that are not complementary, undermining the ambitions of fisheries co-management. Informal rules shape fisheries practices at the beach level. For instance, corruption undermines enforcement of fisheries rules with outcomes that are socially and ecologically damaging (Etiegni et al., 2016). As such, a greater level of understanding of how formal and informal institutions

interact can help develop more meaningful participation of stakeholders to better align fisheries management objectives with fishing practice. This would also improve accountability of BMU leaders to their local constituents as well as to government.

Our study suggests that to have meaningful participation of fisher folk in co-management, there is need for greater devolution of power. Considering both hidden and open sources of power, taking into account the realities of inter-personal relations at different scales, and from the earliest stages of co-management design, will promote better outcomes. For the L. Victoria BMUs this was not done, and revising the now established governance structures, with their current power dynamics, will be extremely difficult. At the beach level this would require an effort to open spaces for participation to less powerful fisher folk for their better involvement in decision making on fishing practice. It would necessitate an enabling environment supported by local fisheries officers, including addressing local instances of criminality and corrupt practices (Etiegni et al., 2016), and an extension service that provides better awareness of the benefits of sustainable resource use. Enhancing fisher folks' understanding of the goals of co-management, and their role in that, can also help identify misuse of power by their leaders. This will enable participation of fisher folk that goes beyond being advised by more powerful actors within co-management, to one that they participate on a more equal basis.

To make co-management more inclusive (Armitage, 2005), emphasis should be on resource users' empowerment that also facilitates the empowerment of marginalized resource users. Co-management structures that provide more space, vertically and horizontally, for fisher folk participation fosters meaningful participation at all levels. Ceded powers to resource users within co-management is a general principle that can lead to more meaningful participation in fisheries management, and for participants to claim their space in fisheries management (Béné et al., 2009; Borrini-Feyerabend et al., 2004). Such development does not negate the role of informal institutions, but likely moves closer the where processes of bricolage work to reduce rather than increase potential management conflicts.

The example of how fisher folk participate in co-management discussed in this study, suggests that research on co-management should give greater attention to factors that impede and facilitate resource users' participation in co-management. This view is supported by Ballou et al. (2016) who, while acknowledging the importance of resource users' participation in resource management, suggests a focus on barriers to participation, which may be logistical or relational, to boost participation. For the current structure of fisheries governance in L. Victoria (Kenya), it is hard not to conclude that this is not a simple denial of reality, driven by a top-down management philosophy, inevitably resulting in non-compliance of fisheries regulations (Etiegni et al., 2016); which themselves fall short of the fundamental challenge presented by an over exploited open-access resource. The critical institutionalism perspective shines a light on these conclusions but, more importantly, provides a way forward that can help achieve more sustainable outcomes that supports local beneficiaries.

The process of co-management development in L. Victoria (Kenya) was instigated from the top and it focused on external interests rather than resource users' interests. Fisher folk do not,

therefore, know the problems co-management is intended to solve, why they should participate, and what benefit participation is to them. The management benefits of the BMUs is not what was envisaged. In its development, fisher folk involvement was effectively absent. Their involvement in the implementation stage is limited to being informed of decisions already taken. Since what precedes co-management implementation and what happens during implementation stages are important to co-management success (Chuenpagdee and Jentoft, 2007), for the lake's co-management, neither the beginning nor the implementation has been done with any clear objective legitimacy. A lot of focus was put on developing formal institutions with little regard to the influence and importance of informal ones. As such, the lake's co-management is unlikely to provide benefits that include sustainable fisheries and improved livelihoods for fisher folk (FAO, 1995, 2015).

Chapter 3

Playing by whose rules? Community norms and fisheries rules in selected beaches within Lake Victoria (Kenya) co-management

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Abstract

Co-management of natural resources has developed within the premise that sustainable management is more likely achieved through decentralized and participatory governance. For Lake Victoria (Kenya), the introduction of co-management through the establishment of Beach Management Units (BMUs) coincided with apparent increases in unsustainable fishing practices associated with concurrent decline in fish stocks. In this article we identify what institutions at the community level influence practices and how these shapes the interpretation and application of formal rules laid down by fisheries policies. Primary data collected from four beaches on the Kenyan side of Lake Victoria document local fishing practices. We found fishing practices are often contrary to government regulations, despite the creation of BMUs that were established to implement government regulations. Instead, fishing practices regulated by the BMUs are highly influenced by kinship ties and corruption. This analysis uses the concept of institutional bricolage to discuss how norms and rules interact to affect resource management. The findings build on existing evidence which challenges the view that devolution of Natural Resource Management (NRM) to local institutions, even those that follow national guidelines for participatory management, provides for more sustainable fishing. We suggest the need for a, perhaps, radical rethink of the design of participatory fisheries within Lake Victoria if sustainable management goals are to be realised.

Key words: Fisheries co-management, institutions, bricolage, Lake Victoria, kinship, corruption

3.1 INTRODUCTION

A tenet of co-management is that it provides for sustainable management of resources through decentralized and participatory governance. Community Based Natural Resource Management (CB-NRM) has been increasingly advocated since the 1980s, involving various forms of implementation along a spectrum of more-less community control (Allison and Ellis, 2001; Berkes, 2009; Coffey, 2005; Nielsen et al., 2003; Pomeroy and Berkes, 1997; Pomeroy and Williams, 1994; Reed, 2008). Generally, co-management replaces previous top-down hierarchical command and control models of resource management, which tends to relinquish responsibility of management away from those who exploit the resource (Richerson et al., 2002).

In co-management, institutions are formed at the lowest possible level, made up of resource users, who govern their own and influence each other's practices. Advocates for co-management argue that the inherent diversity and nature of fisheries, notably, their tendency to be common-pool resources (Bavinck et al., 2005), requires the sharing of power and responsibility in order to achieve effective management (Ansink and Bouma, 2013; Ayers and Kittinger, 2014; Carlsson and Berkes, 2005; Finkbeiner and Basurto, 2015).

In contrast, the assumption that CB-NRM leads to more effective, or equitable management can be misplaced, with evidence of structural inadequacies of co-management institutions

(Borowski et al., 2008; Francis and James, 2003; Nunan, 2006; Ribot, 2003); the capture of resources by elites (Kamoto et al., 2013; Lane and Corbett, 2005; Lane and McDonald, 2005; Persha and Andersson, 2014; Platteau et al., 2014; Wong, 2013); and wide differences and mismatches in stakeholder attitudes or sense of justice (Kahmann et al., 2015) and differences among communities (Agrawal and Gibson, 1999; Allison and Ellis, 2001; Berkes, 2009; Francis and James, 2003; Nunan, 2006; Ribot, 2003; Wilson et al., 2006).

As the roles played by different stakeholders in co-management are crucial for success, so too is understanding the interplay between formal and informal institutions. Russell and Dobson (2011) used the concept of institutional bricolage to describe the roles played by chiefs and stakeholder institutions in Malawi co-management, suggesting that co-management is likely to fail if established local institutions are merely replaced by formal ones. Nunan et al. (2015) also used the concept of bricolage to explain how institutions inform co-management outcomes by describing the relationship between fisheries departments (formal institutions) and local co-management structures in the Lake Victoria and Malawi fisheries.

Despite a number of reservations on the effectiveness of co-management, the model is the dominant paradigm for low to moderately industrialised fisheries (Ansink and Bouma, 2013; Ayers and Kittinger, 2014; Evans et al., 2011) and adopted by many inland fisheries in sub-Saharan Africa (Blore et al., 2013; Hara and Nielsen, 2002; Nunan, 2010; Obiero et al., 2015; Russell and Dobson, 2011). The Kenyan fisheries of Lake Victoria adopted a co-management approach in 2007, leading to formally designed community organizations of fisher folks within geographically defined Beach Management Units (BMUs) (Eggert and Lokina, 2010; Government of Kenya, 2007). The BMUs are charged with promoting sustainable fishing practices through implementation of government regulations that authorize fishing techniques and gears, defining local structure and administration, and promoting trade to supply chains (Government of Kenya, 2006, 2012).

In this article we examine the fisheries in the Kenyan jurisdiction of Lake Victoria (Figure 3.1) to investigate: 1) if the local institution of the BMUs support government mandated fisheries regulations (Geheb, 2000; Obiero et al., 2015; Riedmiller, 1994); 2) how the rules and norms of the fishing communities can help explain practice we observed at four study sites; and 3) how decisions made at the local (beach) level are influenced by kinship and corruption. We understand institutions as rules, norms and organizations (Hodgson, 2006) and present primary data collected from four beaches on the Kenyan side of Lake Victoria.

The rest of the article is organized as follows. Section 2 briefly describes Lake Victoria fisheries and the rationale behind the emergence of decentralization (co-management) in fisheries management, and what are considered unsustainable fishing practices. Section 3 describes estimates of the so-called illegal practices that transcend a timeframe from 2000, before the establishment of the BMUs in 2007, up to 2014. Section 4 outlines the methods for our research at the BMUs. Section 5 documents the fishing practices in the sampled beaches. The findings of the research are discussed in section 6. In section 7 we reflect on the relevance of the results

and implication for wider debates within fisheries management, and recommendations for the future fisheries in the Kenyan side, and wider extent, of Lake Victoria.

Figure 3. 1: Map of Lake Victoria. Source: Adapted from www.d-maps.com

3.2 LAKE VICTORIA FISHERIES

3.2.1 Institutional setting for co-management

The shift towards a more participatory and decentralized fisheries management in 2007 followed evidence that a centralised, top-down, model of fisheries management had not stemmed declines in fish stocks (Ayers and Kittinger, 2014; Finkbeiner and Basurto, 2015; Riedmiller, 1994).

The new regionally agreed fisheries paradigm (Government of Kenya, 2006; Njiru et al., 2014) envisioned co-management as a partnership between fisher folk and government. It was intended to lead to better awareness of sustainable management, and locally mediated regulation and policing to remove illegal fishing and associated trade along the supply chain. The new approach introduced locally focused fisheries institutions within geographically defined Beach Management Units (BMUs) that would work with the government fisheries department to control entry to the fishery and censor practices defined as illegal in Governmental Regulations. The BMUs were mandated to enforce government fisheries

regulations, control access to the lake, set local bylaws, collect fisheries data and resolve conflicts among BMU members; such as disputes over gears, and among fishermen and traders, boat owners and fishermen (Government of Kenya, 2006, 2007; Obiero et al., 2015).

The central government set the guidelines for the establishment and operations of the BMUs, and their roles and responsibilities, including defining BMU executive committee membership and standardizing operational procedures (Government of Kenya, 2006), with limited consultation with fish folk (Béné et al., 2009; Nunan et al., 2012). The State Department of Fisheries (SDF) has overall responsibility for the BMUs and formulates the rules used to manage the fishery and register BMUs, manage conflicts within and between BMUs, determine areas of jurisdiction, preside over BMU elections and ensure fish quality standards and safety (Government of Kenya, 2006). BMUs themselves are tasked with formulating by-laws used to govern internal operations of the BMUs, and implementing or enforcing the rules set from above (ibid). In turn, both SDF and BMUs mandates are defined by the National Oceans and Fisheries Policy, Fisheries Act and BMU regulations (Government of Kenya, 2007, 2008, 2012), with the Fisheries Act being the principle statute used for fisheries management in Kenya.

Currently, there are 283 BMUs formed from 321 landing sites on the Kenyan side of Lake Victoria (Government of Kenya, 2014). A BMU is composed of at least 30 registered boats, meaning that landing sites with less than 30 boats merge with other sites to form a BMU (Government of Kenya, 2006). Membership to a BMU is through registration upon payment of a prescribed fee and fishers are at liberty to register with any BMU where they fish. While a fisher can only register with one BMU at a time, they can change place of registration with a different BMU, while responding to the mobility of fishers as they target different species or during different seasons (Nunan et al., 2012).

Typically, a BMU is composed of an assembly, an executive committee and several support committees as determined by specific BMUs (Figure 3.2). According to Government of Kenya (2007), an assembly is made up of all members registered with the BMU. They include boat owners, crew, fish traders, gear makers and repairers and agents of industrial fish processors. The executive comprises 9-15 members (chairman, deputy chairman, secretary, treasurer and other defined posts) elected from the assembly by the members. Executive committees reflect different member categories with representation being 30% boat owners, 30% crew, 10% fish traders and 30% other registered members. Sub-committees are formed as considered necessary by BMU members, and are headed by executive members.

The BMU structure and committees do not, however, cover the local level only. They transverse to the regional level thereby providing an arena for BMU representation at higher levels of governance (Nunan et al., 2015). For instance, on the Kenyan side of the lake, the networks and committees have representation at the sub-county, county, national and regional levels, with horizontal and vertical networks present. Horizontal networking refers to networking of actors at the same level (eg. at sub-county level) and vertical networking across levels such as among actors at the national level and those at the county level.

Figure 3. 2: BMU structure (Government of Kenya, 2006)

3.2.2 Illegal fishing practices and management regulations

The fishing practices to be controlled by the BMUs, and deemed illegal (Government of Kenya, 2012), include fishing without a license, fishing during the closed season, and/or using a gear size or method identified as illegal (Table 3.1). The BMUs have the authority and responsibility to monitor all fishing activities in their area, ensure the registration of all fishers, confiscate gears identified as illegal per regulations, and sanction by-law offenders. Those fishers who contravene fisheries regulations are supposed to be reported to the SDF by BMU executives and may be taken to court for sanctioning.

A key objective of existing regulations is the protection of juvenile fish, fish breeding areas, and ensuring that fish are not harvested using methods that make them unfit for human consumption. The national regulations are based on global guidelines that borrow from FAO (1995, 2001), but also draw on traditional indigenous rules, and colonial legislation (Ogutu-Ohwayo, 1990; Opondo, 2011). The protection of juveniles is a norm already established in the indigenous and colonial history of Lake Victoria, although regulations designed to protect juvenile fish have been developed further (Njiru et al., 2009). However, the importance of protecting juveniles, and increased regulation for this, has increased over time as population pressure and impact of the global markets increase pressure on fisheries resource base (Johnson, 2010; Kayombo and Jorgensen, 2006).

Although the Lake Victoria Fisheries Organization (LVFO) has tried to harmonize regulations for fisheries management in Lake Victoria, differences do occur across the three riparian countries. For instance, closed season for *Rastrineobola argentea* (dagaa) is only observed in Kenya from 1st April to 31st July (Ntiba et al., 2001), and monofilament gill nets are banned in Kenya and Tanzania, but allowed in Uganda (Njiru et al., 2008).

Table 3.1: Lake Victoria (Kenya) fisheries management measures

Fishing gears and methods	Implemented measures
Gill net*	Mesh size 5 inches and above
Explosive fishing	Prohibited
Use of drift nets	Prohibited
Use of cast nets	Prohibited
Nile perch slot size (50-85cm)	Legislation present Prohibited
Beach seines	
Trawling	Prohibited
Hook size*	9-4
Fishing in breeding areas	Prohibited
Poison fishing	Prohibited
Small seine**	10mm, use light and fish 2 km from the shore
Closed season for dagaa	From 1 st of April to 31 st of July

*Implemented measures changed following a directive from LVFO council of ministers. Gill net mesh size changed from 5 to 7 inches while hook size changed from no specification to size 9-4. Changes not enforced.

**Implemented measure remained the same (10mm) but council of ministers stressed on fishing 2km away from the shore and use of light.

3.2.3 Current estimates of illegal gears

Government statistics indicate that the decline in fish stocks evident before establishing BMUs has continued, with a fall in fish biomass by almost 50% between 2000 and 2012 (LVFO, 2011). A number of factors related to both over fishing and a general degradation of the ecological state of the lake have been postulated as a cause of the decline of fish harvest (Johnson, 2010; Kaufman, 1992; Kaufman and Ochumba, 1993; LVFO, 2011; Njiru et al., 2008; Njiru et al., 2014; Obiero et al., 2015). Over-fishing is enabled by the use of gears and practices targeting juvenile fish, which contravene fisheries regulations, and are common across all BMUs in Kenya (Government of Kenya, 2014) (Table 3.2).

From 2008 to 2014 the number of illegal gears in use recorded in the Kenyan fishery increased from 809,405 to 1,666,470 (Government of Kenya, 2014). Gillnets with mesh sizes 2.5 inches and below, and hooks greater than size 10 target juveniles of Nile perch (*Lates niloticus*) and Nile tilapia (*Oreochromis niloticus*), and are considered to impact on potential fish recruitment (Balirwa et al., 2003).

Table 3.2: Growth in the number of illegal gears in Lake Victoria (Kenya) beaches

Illegal gear type/ Year	2000	2002	2004	2006	2008	2010	2012	2014	2016	2018
Gill nets mesh										
<2.5 inches	4313	3123	5064	4698	4692	9380	11670	20098	22835	23760
2.5 inches	5266	7907	7841	7226	10526	10204	9304	16568	9702	8495
3 inches	8412	3817	3589	4256	3130	5219	7703	10733	15352	10113
3.5 inches	6826	2262	2923	2965	3906	3905	5154	8215	4826	5993
4 inches	5825	4475	4192	3938	6637	7126	9450	10891	17478	11483
4.5 inches	2902	6943	5387	7793	14576	9724	7003	8700	6988	5283
Beach seines										
	5803	1157	869	553	762	991	1063	856	901	1077
Monofilament										
	0	0	58	0	4190	1468	12161	1432	20842	27584
Small seines										
<5mm	1238	2097	1520	2047	1669	2001	352	1392	4411	5705
6-9mm	0	0	1502	1012	922	837	69	945	6524	1919
Cast nets										
	4548	102	78	144	131	143	85	128	75	79
Hooks										
Size >10	0	0	0	499271	758264	1046041	1227821	1586512	1924920	601762
Total	45133	31883	33023	533903	809405	1097039	1291835	1666470	2034854	703253

Source: Lake Victoria (Kenya) biennial frame survey (Government of Kenya., 2018)

3.3 METHODS AND RESEARCH AREA

To better understand the rules and norms governing fishing practices, and explain how these might affect compliance of fisher folk with government regulations, I employed a case study approach focussed on four BMUs. An extended period of observation of fishing practices, complemented by a series of in-depth interviews with BMU members and fisheries sector actors, were used to record perceptions, rationalizations, and explanations in relation to observations of fishing activities.

Data was collected from four beaches on the Kenyan side of Lake Victoria from May 2013 to June 2014. The beaches, identified simply as A, B, C and D to retain confidentiality, were selected following discussions with the SDF offices, willingness of the BMU executives to participate in the research, accessibility, and the existence of multi-species fishing activities. The last criteria ensured that a variety of gears and practices would potentially be in use. Beaches with high infestation by water hyacinth (*Eichhornia crassipes*), which severely inhibits fishing practices, were excluded from potential selection⁵.

In order to gauge the spectrum of compliance with regulations, I selected two beaches considered by the SDF to be well performing BMUs, and two viewed as performing poorly⁶. At each beach, observations over three months included processing of fish catches, gears and mesh sizes used, and how fisheries officials and BMU executives interacted with fishers including dealing with compliance with regulations. Discussions and interviews, conducted throughout the period of observation, were supported by more structured stratified sampling of 40 respondents, using a predetermined semi-structured questionnaire. The sample was stratified according to BMU membership/registration categories (fishermen, boat owners, traders and others⁷), ensuring that different categories of BMU members were sampled. We actors would use different practices, and provide different rationalizations or explanations for these.

Respondents were then chosen randomly from each stratum. A breakdown of the number of interviews is 20 fishermen, 8 boat owner, 6 traders and 6 others (2 fish selectors, 2 loaders and 1 net repairer and 1 boat repairer). In-depth interviews were conducted with the BMU executive chairpersons and committee members, government officials from the local SDF offices and

⁵ Based on this criterion, 29 beaches out of the 62 located in the two counties (Siaya and Busia) studied would have qualified to be included in the study.

² Ranking is based on the operation of the BMU offices such as in record keeping and BMU account operations rather than management outcomes. Hence, BMUs that were reported on paper to be doing well by government also recorded difficulties in enforcing government regulations as discovered during the study.

³ Boat repairers, net repairers, fish equipment dealers, fish processors and other people who handle fish at the beach such as loaders, graders and packers presumed different types of

fishermen aged above 50 years. This was done to gather their perspectives of the fisheries practices in the lake and used to triangulate what was reported by fisher folk. One focus group discussion (FGD) with fisheries officers, BMU executives, customary leaders and members of different fisher folk categories was held at each beach. The FGDs served to supplement and clarify information collected through interviews, reviewing of documents and general observations. Respondents were given a chance to ask questions at the end of interviews and focused group discussion.

3.4 RESULTS

3.4.1 Compliance with regulations

Fishing practices reported and observed at the four BMUs are clearly in contravention of government regulations prescribed in the Fisheries Act. The survey sample illustrates the use of destructive fishing methods, such as beach seining, poison fishing, drift netting and *amuok* fishing (Table 3.3). In addition to self-reporting of these methods by the survey, these practices were observed on a daily basis in all four beaches sampled.

Table 3.3: Illegal fishing methods reported in the sampled BMUs (N=40)

Outlawed fishing method	Total and percentage respondents who mentioned the methods
Beach seining	35 (87.5%)
Drift netting	9 (22.5%)
Poison fishing	7 (17.7%)
<i>Amuok</i> * fishing	36(90%)
<i>Sekeseke</i> **	6(15%)
<i>Bunglu</i> **	4 (10%)
<i>Set</i> **	2 (5%)
<i>Silencer</i> **	2 (5%)

* This fishing method employs the use of small seine used for harvesting dagaa (*Rastrineobola argentea*). While small seine is a legal gear prescribed for use by government, fishermen using this method are supposed to use light and fish 2km from the shore to avoid harvesting juveniles of other fish species. However, fishermen use *amuok* without adhering to the specifications. The gear is popular among fishermen in the four beaches because of its non-selective nature.

** These are fishing methods used to harvest fish in breeding areas. Undersize gill nets of mesh sizes between 2 and 3 inches are used to harvest fish.

There were no discernible differences between the four BMUs, all being relatively equally high in the number of observed illegal gears and practices. Minor differences in the types of illegal

gears and methods used in the sampled beaches can be explained by the fishing environment rather than better compliance. For example, at beach A, the roughness of the littoral zone prevented use of beach seines used at beaches B, C and D (Table 3.4).

Table 3. 4: Illegal gears and methods used in the four beaches sampled

Beach	Illegal gears used	Illegal methods used
A	Undersize gill nets Monofilament gill nets Small seines Small hooks	<i>Amuok</i> fishing Poison fishing Drift netting <i>Silencer</i> <i>Set</i>
B	Beach seines Small seines Undersize gill nets Monofilament gill nets	Beach seining <i>Amuok</i> fishing Cast netting
C	Beach Seines Undersize gill nets Monofilament gill nets	Beach seining <i>Bunglu</i> Drift netting <i>Set</i> Poison fishing
D	Beach seines Monofilament gill nets Small hooks	Beach seining Drift netting <i>Silencer</i>

Non-compliance with the regulations was practiced by fishers across all the BMUs, including members of the executive, some of whom admitted to owning illegal gears and even observed fishing illegally. One BMU leader from beach C remarked, "*we rarely patrol because some of us (BMU executives) have illegal gears. Then how can we patrol and to catch who?*" A BMU leader in-charge of patrol at the same beach C opined, "*I have never patrolled though I am a member of patrol department (committee) in this BMU. We are supposed to patrol but we do nothing. In any case, the chairman of the BMU has 4 beach seines, how can we patrol?*" A fisherman from beach B also stated that "*fishers know that BMU executives cannot take action against them since they also engage in bad fishing practices, the chairman has several beach seines, the beach treasurer also has, so what can they do to me?*"

Non-compliance with the regulations is not through lack of awareness of the regulations. Interviews revealed that among the beaches sampled, over 80% of fisher folk were aware of

what was allowed or disallowed with, for example, 87.5% and 90% of fishers aware that, respectively, beach seining and *amuok* fishing have been outlawed (Table 3.3). Both methods are used commonly. However, as we go on to discuss below, the lack of compliance with government regulations visible at all four beaches does not indicate an absence of rules or norms. Rather, fishing practices in these sites can be explained through the societal conformance to locally established rules and norms.

3.4.2 Fulfilling obligations to kin: livelihoods

The results of the surveys indicated the importance of obligations of kinship as more important among BMU executives than ensuring compliance with government fishery regulations (Table 3.5). Kinship is a significant social system guiding decisions and practices of life within Kenya (Luke and Munshi, 2006; Nyambedha, 2004; Nyambedha et al., 2003). Kinship ties are often more significant than state/citizen relations. In Kenya as whole they significantly shape the national political system (Lynch, 2006).

At all BMUs studied a lack of enforcement of government regulations was declared as reluctance to harm one's kin, leading to a failure of BMU executives to take action against violation of government regulations. Kinship was mentioned by 32 out of 40 respondents (80%) as the key reason why action could not be taken against fishers engaging in government outlawed fishing practices. Within the broad category of kinship, most respondents mentioned blood relation as the reason why they would not take action.

A BMU leader from beach B permitted fishers to engage in practices outlawed by government because "*the people who engage in illegalities are our neighbours and relatives and there is no way we can stop them.*" A BMU leader from beach D justified the same kinship obligation as rational for not enforcing the government fishery regulations, stating '*I would not want to be the reason why my brother's children will not go to school or sleep hungry just because I confiscated his tool of trade or I arrested him and he has to spend some time in jail.*'

3.4.3 Fulfilling obligations to one's self: corruption

The second norm guiding fishing practice relates to corruption, the abuse of position of authority for personal gain (Nguyen et al., 2011). Within the fisheries sector, a position of public authority is seen as entitlement to generate private profit. The positions of authority in the fisheries sector used in this way include the authority of the SDF to regulate fishing practices, and the authority of the BMU to give penalties, impose fines, and regulate beach activities. While corruption is identified as a national issue, and the topic of numerous international initiatives in the country (Transparency International, 2012-2014), and by no means limited to the fishery sector, it either frustrates implementation of government regulations, or contravenes them.

At all four beaches, incidences of corrupt behaviour were the rule, rather than the exception. All the respondents interviewed mentioned having witnessed or engaged in some form of corruption. However, 38 respondents (95%) mentioned corruption perpetrated by the custodians of government laws (fisheries officials and BMU executives), mainly due to activities the leaders were engaging in (Table 3.5). This norm is reported by fishers at the beaches to exist both at the level of the BMU, and the government agency responsible for regulating or managing BMU activities - the SDF. Fishers in the studied beaches reported that SDF did not enforce government regulations against those fishers they received money from. In this way, fisher folk engaging in banned fishing practices are not sanctioned. A fisheries officer in charge of beach A noted:

I am aware that some of my colleagues have been taking money from fishermen and that is why sometimes when we go for patrols we find the lake empty; because our plans were leaked to fishermen. We are sometimes forced to avoid some officers when planning for patrol activities if we have to arrest fishermen violating government regulations.

The regularity of these practices was corroborated by fishermen. At beach B, a fisherman reported that:

Some money which they refer to as "protection fee" is paid to SDF officials so that they do not take action when any form of government outlawed fishing practice is detected, and to inform fishers breaching government regulations of any impending enforcement activities so that they keep away from the lake.

The amount of protection fee given was reported to vary, with fishermen negotiating the fee with recipient SDF official. Such was the case reported by a fisherman in beach B who stated, *"we give a fisheries officer Ksh 20,000 (approximately US\$220) a month and this amount is collected from fisher folk and given to the fisheries officer. This is our protection fee and they inform us of any impending patrol."* This financial calculation works in beach seine owners' favour: Ksh 20,000 represents on average 50% of an SDF officer's average monthly basic salary, but this amount can be made by an individual beach seine owner engaged in a good day of beach seining. While this was the total amount an officer was to receive from the entire BMU for protection, the amount contributed by each fisher towards protection fee is based on the number of contributors and fisher folk category the contributor belongs to. For instance, boat owners and beach seiners are considered wealthier than fishermen and are therefore expected to contribute more. This protection fee does not, however, always guarantee immunity from the law. A fisherman in beach C noted that *"fisheries officers sometimes confiscate our gears even after we have paid the protection fee."*

Corrupt behaviour by the BMU executives was also reported, and covers a range of practices related to the opportunities provided by the BMU which makes membership within the BMU executive a lucrative position. Per formal regulations, executives are not paid a salary for their BMU work, but pay themselves modest sitting allowances for meetings. The amount paid is determined and voted for by the assembly. However, the modest sitting allowances paid in the

four beaches sampled ranging between Ksh 300 and Ksh 500 (approximately US \$3.3-5.5) does not explain the importance attached to the executive positions. Instead, financial gain comes mainly from other benefits of the position, and it appeared during the research that many fishers would go to considerable effort to secure an executive position that offers a range of corrupt opportunities related to the authority of the BMU.

As the government does not fund BMU activities, BMUs are mandated to levy fees and charges on its members and other beach users (Government of Kenya, 2007). Such levies include membership fees, registration fees for fishing vessels, fish landing fees, penalties for by-law violations and charges for using beach facilities. The levies are a source of BMUs' revenue and are supposed to be deposited in BMU accounts to be used for operational expenditures. However, it was observed during this research that most of these accounts were non-existent. It was only in beach A where the account was found to be operational, but limited information was shared about the financial position of the account. For the other three beaches (B, C and D), whose accounts were non-operational, the money was reported to be used by BMU executives. While fishers who violate fisheries regulations are supposed to be reported to SDF officials for possible sanctioning, this was not common. In most cases, it was reported, and observed, that in such situations, BMU executives would ask the offender to pay some agreed amount so that the case is not forwarded to SDF.

Dissatisfaction with the way BMU executives were using BMU finances was reported by fisher folk across the four beaches. Financial transparency is absent, although the BMU executives are mandated to maintain both receipt and expenditure accounts that should be presented to assembly members on a quarterly basis for interrogation per regulations (ibid). This did not occur at any of the four BMUs. The use of BMUs' revenues by executive members was corroborated by a fisherman from beach B who noted that *"members are told that their money was used for patrol but we do not see them patrolling."* Another fisherman, from beach C, was of the opinion that their leaders are not transparent with financial matters in what he summed as *"a lot of money being eaten in this office and you cannot even question them, if you do you are labelled a trouble maker and they make your life difficult, so we just keep quiet."* To give support to what was reported by the two fishermen from beaches B and C, a boat owner from beach D added by asking, *"how can you explain that some of these people have worked here with us for a long time, but as soon as they are voted into office their lifestyles change. They now eat well, build better houses, buy good clothes and some marry more wives. We know what these people do with our money but if you refuse to pay, they threaten to chase you out of the beach. What can we do but pay the dues?"* The extent of corrupt behaviour among BMU executives was confirmed by the BMU chairman in beach B who stated, *"I do not see anything wrong if I or my colleagues eat something small here. In any case our leaders in big offices eat a lot and nothing happens to them."* In Beach C, a village elder noted that *"BMU officials have spoilt the lake. You just have to give them money and you do what you want in this lake"*.

Table 3.5: Socially embedded rules determining fishing gears and practices in sampled BMUs (N=40)

Norm-subcategories	Percentage respondents
Kinship	80%
-Relations created through marriage	
-Social relations among neighbours	
-Clan members (blood relations)	
Private benefit from public authority	95%
-Involvement of BMU executives in outlawed fishing	
-Failure of BMU executives to take action on kin	
-Bribes paid to BMU executives	
-Bribes to SDF officials	

3.5 DISCUSSION

In their ground breaking work on the contribution of communities in natural resource management, Agrawal and Gibson (1999) reported the importance of focusing on institutions rather than communities for success in natural resource management. They highlighted the assumptions often made about communities within CB-NRM in regards to their homogeneity, internal power structures, and divergent interests; calling attention to the role of institutions within the community, rather than the community itself as an organisational structure. They argued that the norms and rules (both formal and informal) guide the interactions of individuals with the resource base, with outputs that could equally be sustainable management, or over-exploitation of the resource. Within the BMUs, the institutional norms and rules have a major effect on fishing practices, irrespective if these are legal or not.

Within the BMUs, the formal rules and regulations mandated by government overlap with the informal rules that govern local social interactions. Bonds of kinship, hierarchical authority, and the blurred lines between a position of public authority and private benefit exist in parallel, and often in contradiction of, the formal rules of the BMUs. This overlapping of rules and norms is visible in the ways in which new rules on gear sizes, for example, are enfolded within norms of corruption to create simply more opportunities for BMU executives and SDF officials.

The overlapping is termed by (Cleaver, 2002) as the process of bricolage, whereby new institutions for resource management and collective action are crafted from existing ones. This

concept allows for the examination of institutions beyond the formalized setting by engaging with both formal and informal institutions, described as either bureaucratic or socially embedded (ibid): bureaucratic would be formal government regulations; socially embedded would be bonds of kinship and norms of corruption.

While the effect of socially embedded institutions on natural resource management may often be less visible, interactions that occur between the two sets of rules are crucial for management (de Koning, 2011). Within the four BMUs, we observe that socially embedded institutions are of greater importance to fishers than the bureaucratic institutions since they determine norms of operation of daily activities. However, it is also apparent that a) the persistence of illegal fishing is perceived as harmful to the resource base on which the fisher folk depend, and b) the prevailing corruption at both the tier of BMU executives and the SDF, does not benefit the general assembly membership – i.e. the fishers who are not part of the executive. In other words, the socially embedded institutions have led to practices which are harmful to both fishers' livelihoods, and the fisheries resource base. This illustrates the argument of Agrawal and Gibson (1999) that community based institutions are not inherently more sustainable.

Regarding the resource base of the fishery, Lake Victoria has been subject to a number of severe ecological shocks, providing a back-drop to the current fishery. The introduction of Nile perch (*L. niloticus*) in the 1950s and the later commercialization of the fishery (Balirwa et al., 2003; Muhoozi, 2000; Njiru et al., 2005) has been linked to the disappearance of over 200 endemic haplochromine species from the lake. Later introduction of the Nile Tilapia (*O. niloticus*) may have caused the disappearance of other endemic tilapia species (Lowe-McConnell, 2009). Increased eutrophication of the lake and, likely related, infestation from water hyacinth (*E. crassipes*) have added to the pressures in the lake (Kayombo and Jorgensen, 2006).

Government responses to the ecological condition of the lake have focused on the fisheries, with increasing regulation of gears and practices aimed at protecting juvenile fish. The BMU structure, however, provides no mechanism to restrict the number of fishers, which manifests as a fishery that is an open access common pool resource that, by its very nature, promotes over fishing. However, this consideration does not appear to factor within the bureaucratic institutions of the BMUs, which focus on restriction of fishing techniques as the method to achieve sustainable management. Nevertheless, in practice this appears a moot point because of the dominance of socially embedded institutions that shape the day-to-day reality of the rules and norms of the fishery, with its illegal fishing activities and corruption, irrespective of the decline in overall fish catch (de la Torre-Castro and Lindström, 2010).

Of overriding influence within the fishing communities are the norms of kinship based on marriage, family (blood relations) or other close relationships, affecting actions taken against an individual, and seen in relation to a broader social network of the clan. Such ties are not only present at the local level but are part of Kenyan society, guiding people's relations in all aspects of life (Nyambetha et al., 2003). This makes it difficult to report a relative breaking

the law or for a BMU executive to sanction an offender who is a relative, as these actions may be seen to be against norms based on kinship where one is supposed to be the "brother's keeper".

Owing to historical settlement of the areas at the lake (Opondo, 2011), most BMUs are composed of members who have close family ties. This means that in most cases, those who are elected as executives are members of the same clan or even family, and are elected to office by clan members. Any action from BMU executives against their clan members may be viewed as going against the clan and jeopardize their chances of re-election since they depend on clan members to vote them to office (ibid).

Rules based on kinship are enforced by community members who know what is expected of them. Compliance with these rules is assured by mutual benefit and sanctions for non-compliance. If one disobeys the rules, they may not be able to call upon one's own kin for social safety net (education, death in family, access to livelihood opportunities) which are not adequately provided by the state. However, while kinship can explain protection of fisher folk from formal sanction and the persistence of illegal fishing, it presents a paradox to the prevalence of corruption from the same clan, which is presented as providing social support.

Corrupt practices reported at the beaches can be seen as reflecting norms in the country as a whole, and across public sector offices at national, county, and local levels (Transparency International, 2012-2014). Regulatory discretionary power linked to opportunities for corruption, and low risk of punishment that provides conditions for corruption (Jain, 2001), occur within the BMUs and SDF enforcement officers. The examples of kin-associated corruption also suggest that corruption at the BMUs is seen as a collective action phenomena involving cooperative behaviour (Rege, 2004) rather than as a principle agent one (Fehr and Falk, 2002; Persson et al., 2013).

The widely held opinion of the unacceptability of abuse of power also emerged in the interviews at the four beaches, whether it involved BMU or SDF officials. However, there are many reasons why communities tolerate corrupt practices, even when objecting to them, and where individual gain may not be evident. These include avoidance of intimidation or social exclusion (Guerrero and Rodríguez-Oreggia, 2008; Tirole, 1996), maintaining social cohesion (Nguyen et al., 2011) or where corruption is seen as a common social phenomenon (Guerrero and Rodríguez-Oreggia, 2008) and perpetuated by what Dong et al. (2012) term "conditional corruption". Perceptions, or in the BMUs, first-hand experience, that government officials are engaging in corruption is likely to provide a sense of allowance of similar behaviour among BMU executives (Sundström, 2012). Corruption among small scale fisheries (Bergh and Davies, 2002), and within other examples of natural resource management, impacts both sustainable resource use and local economic development (Mauro, 1995; Mo, 2001). It is also evident from our study that illegal fishing practices and corruption were observed at all the beaches, irrespective of the original assertion that some beaches were better managed or with better functioning than others.

From many studies on co-management, it is evident that adopting or revising the institutional framework of fisheries management to a participatory co-management structure does not necessarily translate to more equitable participation or sustainable fisheries (May, 2012, 2013; Nunan et al., 2012; Obiero et al., 2015; Ratner et al., 2012). Indeed, in many parts of the world the co-management paradigm is accompanied by strong, technically supported, recording and verifiable declaration of fish catches, that include independent monitoring of the use of fishing gear, duration of fishing and satellite tracking of location. However, it is also clear that, at least for now, such technological approaches are not feasible for fisheries such as Lake Victoria, where individual craft size is generally small and, despite designation of BMU areas, there are numerous landing sites and under-resourced local organizational structures susceptible to corruption (Nunan, 2010; Sundström, 2012). Therefore, the question needs to be asked if without strong and even-handed enforcement, is the participatory model of fisheries governance a step towards or away from sustainable resource use?

For the BMUs examined in this research, social norms strongly influenced by kinship and corruption overshadowed compliance to government regulations, despite awareness among fisher folk of ongoing declines in fish catches and general acceptance that illegal fishing practices were not conducive to sustainable fisheries. However, at the same time, the institutional structure of the fisheries, with a need for the BMU to comply and play a role in enforcement, of government regulations may not be conducive to a sense of local empowerment for sustainable management. This is made more complicated by the *de facto* open-access regime of the fishery and examples of corruption by the government officials. Indeed, under these circumstances, sustainable fish harvests would seem destined to be unobtainable, and made less, rather than more, likely through the current form of decentralised fishing governance.

3.6 CONCLUSIONS

The results from this research suggest that the current structure of co-management in Lake Victoria (Kenya) is inappropriate as an instrument for sustainable fishing practices in the lake. We have documented an extensive and open use of gears and methods considered harmful to future fish stocks, and which have increased under co-management. Although co-management was instituted in Kenya as a response to the failure of the top-down management, there is no evidence that the new paradigm of fisheries management has been a successful substitute in fostering a sustainable fishery.

The rules and regulations overseen by BMUs are strongly influenced by social norms. Kinship and corruption shape the interpretation and application of formal regulations. These findings in Lake Victoria (Kenya) are in line with other research on fisheries, and co-management/ CB-NRM institutions which have questioned the ability of participatory management to equate to sustainable management (Ayers and Kittinger, 2014; Measham and Lumbasi, 2013; Obiero et al., 2015). Redefining the roles of the various regulatory institutions is clearly necessary, although regionally, nationally and locally complex. Questions as to the overall legitimacy of

the formal institutional structure by fisher folk suggest a need to review the role of the SDF as mediators between local fisheries institutions and government.

Overall, our study of the BMUs in Kenya support the need for, a perhaps radical, re-think of the design of co-management if the goal is sustainable fish catches and improved livelihoods (Chuenpagdee and Jentoft, 2007; Nunan et al., 2015). This rethink, and subsequent re-design, needs to engage both with the specific complexities of the resource base, and the role of socially embedded institutions. The BMU structure, although claimed to be participatory, effectively amounts to the creation of local organizations that are there to implement regionally agreed rules and restrictions on the fishery. As such, it does not conform truly to a bottom-up process. Neither, however, it is simple to envisage a bottom-up participatory process that could be standardised, and relevant, across the lake. More effective restrictions for entry to the fisheries, and reducing corruption appear needed, although not without better understanding of the underlying drivers, and the exploration of wider and participatory solutions. The need of livelihoods shapes local rules and norms, and subsequent fishing practices. Reducing corruption at the different tiers of fisheries governance can benefit from greater alignment of social and bureaucratic norms, supported with effective regulation and awareness building. Whether this is, ultimately, feasible would be highly influenced by effective local finance models as well as governance. This necessarily requires attention to the drivers behind increasing pressure on the fisheries resource, including rural poverty, lack of alternative livelihoods, global fish markets and growth in human population (Geheb et al., 2008; Johnson, 2010; Kirema-Mukasa and Abura, 2013; Mkumbo and Marshall, 2015; Njiru et al., 2014; van der Knaap and Ligtoet, 2010).

Chapter 4

Promoting social accountability for equitable fisheries within Lake Victoria (Kenya) Beach Management Units

Publication based on this chapter:

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Abstract

The decentralization of resource management through co-management assumes the devolution of power benefits resource users. This assumption is often premised on the democratic election of leaders within resource user organizations. In this article we investigate the validity of co-management assumptions as to who benefits from a devolution of decision-making power through a case study analysis of political equity in fisher folk organizations of Beach Management Units (BMUs) in Lake Victoria (Kenya). From this analysis of the distribution of political power we identify how, where, and for whom greater accountability can work to improve/address current political inertia of fisher folk, who constitute the majority of BMU members. We also identify the relations between the empowerment of fisher folk, accountability of BMU leaders, and distribution of political power determining decision making in co-management. We conclude with identifying how other mechanisms for social accountability, beyond elections, can improve accountability of elected resource users' leaders for improved co-management outcomes.

Keywords: Accountability, co-management, decentralization, fisheries, Lake Victoria, power

4.1 INTRODUCTION

Co-management is widely embraced as an attempt to mitigate the failures associated with top-down government led Natural Resource Management (NRM) approaches (Ayers and Kittinger, 2014; Berkes, 2009; Pomeroy and Berkes, 1997). The top-down management approach is accused of failing to include resource users in decision making, leading to low compliance with management rules, thus failing to ensure the ecological sustainability of the resource (Chuenpagdee and Jentoft, 2009; Cochrane, 1999; Ratner et al., 2012). On the other hand, co-management is viewed as a mechanism for inclusion (Armitage, 2005) and empowerment of resource users – two societal goals which are identified as promoting achievement of more sustainable management of natural resources (Ann Zanetell and Knuth, 2004; Sen and Nielsen, 1996).

The co-management model is based on the assumption that when power to make and enforce decisions in NRM (Borrini-Feyerabend et al., 2004; Njaya et al., 2012) is shared between the government and resource users (Jentoft, 1989) co-management outcomes will be both more socially equitable and ecologically sustainable (Ostrom, 1990; Pomeroy, 1995). The distribution of decision-making power and relations of power between stakeholders is, therefore, seen as critical to the practice and outcome of co-management (Béné et al., 2009; Nunan et al., 2015) and has been analysed to explain, and improve, various co-management outcomes –from participation to accountability, empowerment and inclusivity. For example, Béné et al. (2009) have shown how when co-management is poorly designed it can merely redistribute power among actors who advance their own needs at the expense of fisher folk while, Nunan et al. (2012) document how co-management processes can fail to enable the participation of key stakeholders in the fishery because of unequal power relations. A current gap in knowledge is understanding how these relationships play out following the devolution

of management from central to local control. The fisheries of Lake Victoria provide a prime example of a major restructuring of the organisation of the fishing designed to enable greater decision-making powers based on formalised local governance.

To understand the extent to which decentralization has enabled the participation of fisher folk in Lake Victoria (Kenya) co-management decision making, the key question driving our research is how elected leaders of BMUs exercise the powers devolved to them by the government and how accountable they are to those who elected them. To answer this, we apply the decentralization framework (Table 4.1) from Agrawal and Ribot (1999) to (1) identify actors within Lake Victoria (Kenya) co-management who exercise power devolved by the government, (2) the powers devolved by the government to the actors and (3) the mechanisms that have been put in place to make fisher folk leaders downwardly accountable to their constituents. These dimensions are crucial to the understanding the extent to which decentralization has taken place and associated accountability within co-management for equitable decision making (Ibid).

Table 4.1: Decentralization framework

Decentralization dimensions	Description
Actors	Actors who exercise some form of power over natural resource governance. They exercise their powers at the regional, national or local levels. They include regional body officials, government officials, political leaders, resource users' leaders, traditional leaders, NGOs and resource users.
Power types	Decentralized powers categorised into four types: <ol style="list-style-type: none"> 1. Power to craft or modify rules 2. Decision making powers 3. Implementation powers to ensure compliance with rules 4. Dispute adjudication powers <p>These powers also broadly categorized into three (legislative, executive and judiciary) and are required for effective decentralization.</p>
Accountability measures	Measures used to make power holders accountable include: <ol style="list-style-type: none"> 1. Elections (commonly used) 2. Awareness creation 3. Procedures for recall 4. Third party monitoring (by media) 5. Community score cards.

In this article we are concerned with the relationship between the distribution of decision-making power between resource users –what we identify as political equity– and co-management outcomes. Specifically, we are concerned with the key modality through which more inclusive, and equitable, power to make decisions on NRM management are organized – democratic electoral processes. For, while some scholars have shown how equitable distribution of benefits is achieved if decision making power is channelled through local/community based organisations with democratically elected leadership (Béné and Neiland, 2006), early on in the development of co-management models it was recognized that elections alone may not guarantee accountability from elected leaders required for this outcome (Agrawal and Ribot, 1999).

Analysis of the relationship between the development of democratic local organisations for co-management and political equity within resource user organizations are, for the most part, concentrated in literature on elite capture (Schmidt and Theesfeld, 2012; Wong, 2010). The

term elite capture is used to explain the unequitable distribution of co-management benefits which occurs when people who enjoy superior political status due to their wealth, education and community status misuse their power (Bardhan, 2002). Elite capture includes both distortions of economic (allocative) equity and political (procedural equity) (Jacobs, 1989; Poteete, 2004). Economic equity involves the sharing of benefits from natural resources (Persha and Andersson, 2014), while political equity is about how resource users have their concerns raised and heard by their elected leaders (Jacobs, 1989). Economic and political equity are often linked, but in this research, we investigate political equity within fisher folk organizations in Lake Victoria (Kenya), following our aims of improving the design of fisheries co-management. We discuss how political inequity in BMUs hinder democratic participation of fisher folk in co-management decision making.

In our case study in Lake Victoria, several user organizations (BMUs) were established at the local level following co-management adoption in the late 1990s. BMUs are the organisations through which power is devolved to fisher folk by the government. The BMUs are composed of those who earn a livelihood from the lake's fishery including fish traders, boat owners and fishermen. These form an assembly and vote to elect BMU leaders who exercise devolved powers. There are 321 landing sites, organized into BMUs, whose operations are guided by BMU regulations and by-laws (Government of Kenya, 2007), each with an elected chairperson through whom powers are devolved by the government to fisher folk. The BMU chairperson may delegate power to other BMU executives, which include elected BMU leaders such as vice-chairperson, secretary and treasurer, and committee leaders to enable them monitor the implementation of the Fisheries Act (Government of Kenya, 2016).

4.2 METHODS

To understand how decisions are made within the BMUs and how accountable BMU leaders are to their constituents, a case study approach was chosen. This approach allowed for an in-depth understanding of elite capture and political inequity within fisher folk organisations of BMUs in Lake Victoria (Kenya) co-management. Unstructured interviews using open ended questions allowed for probing, providing an opportunity for the research questions to be fully explored. Open ended interviews were used to identify the actors who exercise power within the BMUs, the powers devolved and captured by the actors and the mechanisms that have been put in place to make BMU leaders downwardly accountable. Focused Group Discussions (FGDs) were used to explore the questions further, to bring out information that may have not been captured from the interviews.

Four chosen BMUs were labelled as A, B, C and D to conceal their identities for confidentiality. They were chosen following initial visits to some of the BMUs and various discussions with fisheries officials and BMU leaders; while considering willingness of fisher folk within specific BMUs to participate in the study, beach accessibility and the extent of water hyacinth (*Eichhornia crassipes*) infestation in a beach. Beaches heavily infested by the weed were deliberately avoided since such beaches register limited or no fisheries activities. This does not

mean out of the 321 beaches on the Kenyan side of lake, only four BMUs could qualify to be included in the study based on those criteria. A total of 283 BMUs, without weed infestation, could have qualified to be included in the study, but we had to limit the number studied because of time needed to generate meaningful answers. Selection of the BMUs was based on ranking by the local fisheries departments of two high and two low performing BMUs, in terms of resolving conflicts among members and record keeping.

Agrawal and Ribot (1999) decentralization framework was used to identify and analyse the relationship between co-management processes and outcomes of distribution of decision making power. The framework identifies three empirical governance variables (actors, *de jure* powers and accountability) that determine decentralization (i.e. decentralized NRM, or co-management) outcomes. The authors emphasize the importance of understanding who the actors are within decentralization, what powers are devolved and how issues of accountability are dealt with - to whom and how leaders are made accountable. They distinguish decision making powers which they suggest are crucial for understanding decentralization outcomes. These include: a) power to make rules; b) enforce rules; and c) adjudicate disputes. These are classified further as legislative, executive and judicial powers.

Published and unpublished literature on co-management in Lake Victoria, Kenya was reviewed to examine powers devolved to fisher folk through their BMU leaders following the change in governance from top-down government led management approach to co-management. This includes government policy and BMU documents. Interviews conducted with both BMU leaders and fisheries officials were used to build sufficient inclusion of all actors. Observations on how BMU leaders related with other assembly members were made during the data collection period which lasted one year, four months. I observed how the BMU leaders answered questions and resolved conflicts during one BMU assembly meeting convened in beach D.

Data from document reviews and observations were supplemented with 52 unstructured interviews with fisher folk, local leaders (chiefs, assistant chiefs and village heads) and fisheries officials. Fisher folk were grouped in their categories (boat owners, fish traders, gear repairers, fishers and any other group registered with a BMU) after which each category was sampled randomly to allow category members equal chance of being included in the study. Interviews with fisher folk were then used to get their perceptions on how they are involved in BMU management decision making and how their needs are served by their leaders.

The distribution of the interviews was eight local leaders (one chief and one village head for each beach), eight BMU officials, four fisheries officials and thirty-two fisher folks. The eight local leaders were composed of seven men and one woman. The leaders from BMU A and B were from the Samia ethnic group while in beach C and D the leaders were from Luo ethnic group. Fisher folk who responded to our questions were also mainly from the two ethnic groups (Samia and Luo) and their gender distribution was 21 men and 11 women. Fishers who had fished in the lake for over 40 years were purposefully included in the study since they could compare fisheries activities before and after co-management adoption in the lake. Interviews

took place between June 2013 and August 2014. One FGD was held in each BMU with fisher folk, deliberately excluding the BMU leaders, fisheries officials and local leaders (chiefs and village heads) from the discussions to better enable fisher folk to express themselves freely. The FGDs were used to discuss the research questions further.

4.3 RESULTS

4.3.1 Actors and elites within Lake Victoria (Kenya) BMUs

Within fisheries management in Lake Victoria (Kenya), actors who exercised power before and after co-management adoption and assumed the status of elites were identified. This was done by reviewing government and BMU documents, published and unpublished literature on co-management, and interview with fisher folk conducted in four case study BMUs.

A BMU is made up of registered members (the assembly) whose livelihood activities are supported by the lake's fishery. They include fishermen, boat owners and traders and BMU membership is attained through payment of registration fees. Responsibilities of assembly members, BMU executives and committee members are specified, as was noted from a review of BMU regulations and guidelines. The assembly, for instance, is mandated to approve activities such as income expenditure, determine membership fees and other fees to be levied on fisher folk and elect and remove committee members from office. While any assembly member from any fisher folk category can be elected as a BMU chairperson, it was observed in the four BMU studied all the chairpersons were boat owners.

Results from interviews with local leaders and fishermen who had fished in the lake for more than 40 years and a review of literature on Lake Victoria fishery management indicated that prior to shifting from government led top-down management approach to co-management in the late 1990s, access and use fisheries resources of Lake Victoria (Kenya) was controlled by clan elders or local leaders (chiefs, assistant chiefs or village heads). Clan elders, who were mostly the oldest members of a clan and came from the largest clan inhabiting the beach, managed fisheries resources by decree (Opondo, 2011), but chiefs and sub-chiefs who inherited their positions from their fathers or uncles, directly appointed beach leaders with whom they managed the fishery. However, in the 1970s, some form of democracy was exercised in the election of beach leaders by fisher folk through *mlolongo* (a voting mechanism in which people queue behind the leaders they want and the person with the majority of people behind him is considered elected). This was done mainly when two or more people expressed interest in becoming a beach leader, as described by a retired fisherman from beach A, *'beach leaders had to be appointed from the largest clan. If there were many people from the clan who wanted the position, then we would vote.'* There were no written rules on what was required for someone to be appointed or elected as a beach leader. While the clan elders mainly used customary laws to manage the fisheries (Opondo, 2011), in 1989 the first Fisheries Act was formulated by the government. The Act contained rules formulated by the government to manage the lake's fisheries by the chiefs and their assistants, beach leaders and fisheries

officials. However, the local leaders used the Act in combination with customary laws to manage the fisheries.

Although a review of government policy documents showed no form of power was devolved to chiefs and beach leaders by the government, still the chiefs and beach leaders used the Fisheries Act and customary laws as their sources of power with responsibilities including dispute adjudication and enforcement of fisheries regulations. The clan elders, chiefs/ assistant chiefs and beach leaders were considered local elites (Figure 4.1) during the top-down management approach due to their community status and fisheries management powers they had at the beach.

Figure 4. 1: Beach elites in Lake Victoria (Kenya) fisheries prior to co-management

The shift from government led top-down management to co-management in Lake Victoria introduced new institutions and centers of power. This shift was necessitated by the understanding that government alone could not enforce fisheries regulations due to limited resources and human capacity. There was also pressure from development partners since the top-down management approach had failed to provide sustainable fisheries. The reforms gave rise to other elites at the beach level (Figure 4.2) as was noted from a review of both government policy and BMU documents, interviews with fisheries officials and fisher folk. The BMU elites are those BMU assembly members who are elected as members of the BMU executive committee, thereby attaining a new community status within the BMU. From a review of BMU regulations, it was noted the executive members should not be less than nine or more than 15 (Government of Kenya, 2007). At least three of the BMU executive positions are reserved for women. The BMU elites were identified as the BMU chairperson, vice chairperson, secretary, treasurer and committee leaders (Figure 4.2). It was noted BMU elites in BMU A, B and D were all from the dominant clans and wealthier boat owners within specific beaches. In BMU C, six BMU elites were from smaller clans that settled around the beach, although the larger clans still dominated leadership positions.

Figure 4. 2: Institutions and centres of power introduced at the beach level following co-management adoption

- Key institutions and power bases within BMUs
 Elites within key BMU institutions

Boat owners use their wealth to ensure they get elected as BMU chairpersons. For example, a fisherman from beach D said, ‘*a boat owner who wants to be elected as a BMU chairperson pay registration fees for fishermen during the election year so that they vote for him.*’ A trader from beach A also added her view by stating, ‘*boat owners pay our registration fees and promise to supply us with fish from their boats if we vote for them as BMU chairmen.*’ Since only registered BMU members are allowed to vote to elect BMU leaders, a BMU secretary from beach C observed, ‘*election years register the highest numbers of registered assembly members in the BMU as people prepare to elect their leaders.*’

The chairperson is in-charge of the beach and is responsible for ensuring fisheries regulations are implemented for compliance. BMU committee leaders’ responsibilities are stipulated in the by-laws and fisher folk are free to establish as many committees as they deem necessary. Unlike BMU leaders, whose elections are guided by the BMU regulations and guidelines, past beach leaders were appointed and operated without having a clear mandate. For instance, a fisherman

from beach C who fished under both beach leaders and BMU leadership compared the two, by stating, *'BMUs have clearly written rules one must follow if they want to be elected. One must come from one of the fisher folk categories (fishermen, boat owners, traders etc.) and then apply for a position through the Ministry of fisheries.'* This was further corroborated by a fisheries officer who stated, *'before one can stand for an elective position in any BMU, he must fulfil some requirements laid down in the BMU regulations such as having not engaged in illegal fishing, should be nominated by at least ten fisher folk and should be able to read and write.'* Even with these requirements, the domination of larger clans in beach leadership has continued under BMUs. When asked to provide his view about the election of BMU leaders, a fisherman from beach C indicated, *'Leadership comes from the largest clan. You have to be from the largest clan to lead here. Even politicians will not allow you to lead if you are not from the largest clan.'* Nonetheless, it was also noted from interviews with fisher folk that occupation determines whether one can be considered as an elite or not. For instance, boat owners are likely to be elites compared with fishers or fish traders due to their wealthier status.

4.3.2 Powers held and exercised by actors within BMUs

Results in this section describe to what degree the three powers (legislative, executive and judicial) required for effective decentralization (Agrawal and Ribot, 1999), have been devolved to the four BMUs. Both interviews and document reviews revealed limited powers are devolved to the BMUs by the government although the powers are held and exercised by a few actors within the BMUs.

The first level of power, legislative, is the power to craft or amend fisheries management rules. The review of BMU by-laws (a set of rules crafted by fisher folk for day to day running of beach activities) of the four BMUs revealed a lack of fisheries management rules crafted by fisher folk. Rules in use are those developed by the government and described in the Fisheries Act. When asked about the source of management rules implemented at the beach, a majority of interviewees (96%) had the understanding it is the government that crafts and amends management rules. For instance, a chief from beach D was of the opinion, *'that crafting rules has always been the job of the government even before the BMUs were established and it is their mandate to date'*, while a fisheries officer from beach B added by indicating, *'government is the policy maker and that is our job. How can we let the BMUs do this unless we are ready to lose our jobs? Do they have the capacity to develop rules?'* A boat owner from beach C responded by stating, *'fishing rules are government rules.'*

Power to craft rules for managing internal beach activities are devolved to fisher folk. The rules are included in the BMU by-laws and all the four BMUs enlisted in this study had crafted their by-laws in which they included these rules. A review of the by-laws indicated a set of specified beach rules used for governing BMUs' internal operations, such as rules on fish handling at the beach, beach offenses and corresponding fines and procedures to be followed for membership registration. For example, on membership registration, a fisherman from beach D indicated, *'you first have to register as a member of fisher folk category before you pay for BMU membership.'* A BMU leader from beach A added by stating, *'these are rules that were*

developed and voted for by fisher folk during our assembly meetings. They are important for our daily operations in the beach.'

Executive power includes power to implement fisheries rules in the Fisheries Act (Government of Kenya, 2016) to achieve compliance and power to make decisions on fisheries management within co-management areas. A review of BMU regulations indicated power to implement fisheries rules for compliance are devolved to the BMUs through the BMU chairmen (Table 4.2). Other committee members within the BMUs may exercise these powers through delegation by the BMU chairmen.

Table 4.2: Power to implement fisheries rules and make management decisions

Collection of membership registration fees.
Administration of gear identification marks.
Arrest of fisher folk violating the Fisheries Act.
Undertake patrol activities within BMU areas.
Confiscate fishing gear used to commit offence and fish harvested using outlawed fishing gears and methods.

Power to make decisions on fisheries resource use within BMU co-management areas is devolved to the BMUs, although this power is not utilized by the BMU leaders. A review of BMU regulations showed BMUs are required to develop co-management plans for their areas, specifying fisheries management measures to be observed by the assembly members. The co-management plans are to be developed in conformity with the Fisheries Act and enabled through BMU by-laws.

It was observed that none of the four BMU enlisted in the study had developed a co-management plan. However, it was noted, from a review of their by-laws that some fisheries management rules from the Fisheries Act were included as part of the by-laws. A BMU leader from beach A when asked if the BMU had developed fisheries management rules for their co-management area made reference to the management rules in the by-laws by stating, *'everything we need to manage fisheries in our area is here and it is what fisheries rules say in the Fisheries Act.'* A leader from BMU D when asked if they had developed some management rules for their BMU area asked:

What do we need a co-management plan for if everything is clear in the Act regarding the fishing gears to be used, fishing methods allowed, the areas where fish breed are known? Our job is to make sure government rules are followed and not to start making our rules here. These rules are also in our by-laws and members know what to do and what not to do. For us leaders, we are here to enforce the rules and for members who break the rules, the by-laws are used to punish them.

To give his view on development of co-management plans by BMUs, a fishery official from beach D added by indicating, *'it is true the BMU regulations require all BMUs to come up with*

co-management plans for their BMU areas but most of them have not done this. They basically use the rules provided in the Fisheries Act.'

Judicial power enables adjudication of disputes which arise within the BMUs. Two types of disputes were identified within the BMUs studied. Disputes from fisheries rule implementation and those from misunderstandings among BMU assembly members. Power to adjudicate disputes from fisheries rule enforcement is not devolved to the BMUs. This power is with the judicial court. In the event fisheries rules are violated, BMU leaders can only arrest the offender and hand him over to fisheries officials who can take him/her to court. For instance, when a fisherman from beach C was asked to describe how fisheries disputes are handled in the beach, he was of the opinion that, *'BMU leaders arrest the offenders and hand them over to the fisheries office after which the matter is taken to court and the offender is either jailed or fined.'* An ice seller in beach A had a similar view by adding, *'those who are found violating fisheries rules are arrested and taken to court.'* A fishery official from beach B stressed:

Disputes emanating from fisheries rule enforcement cannot be adjudicated by BMU leaders but by the courts. BMU leaders do not have the capacity to adjudicate such disputes and are required to forward such cases to our offices after which we forward them to court.

However, a majority of the fisher folk (75%) were of the opinion BMU leaders adjudicate disputes emanating from fisheries rule enforcement and forward very few cases to fisheries officials. For example, a fish trader from beach D said, *'if BMU leaders find you using a disallowed fishing net, they will arrest you and take you to the office and they will fine you. If you refuse to pay the fine, they will threaten to chase you from the beach.'* A boat owner from beach C added, *'most fisheries problems are solved in the BMU office here. It is long since I saw someone being handed over to the fisheries office.'*

Power to resolve conflicts among assembly members is devolved to BMUs. A review of by-laws of the four BMUs showed there are mechanisms in the by-laws for resolving conflicts caused by issues such as theft and destruction of fishing gears, fights and domestic disagreements among members. Fines for these offences are defined in the by-laws too. To demonstrate the process of conflict adjudication among members as handled in the BMU office, a trader from beach A described the process as:

I report the person I have a grievance with to the BMU office. We each pay a fee of Ksh 200 (US\$2) for the case to be heard by our BMU leaders and the person on the wrong side of the law is fined as specified in the by-laws.

But a chief in beach B registered disappointment with power to resolve conflicts at the beach level being devolved to BMUs. He stated:

Although BMUs have been allowed by law to resolve conflicts that happen within the BMU among its members, these leaders are resolving conflicts that have nothing to do with fisheries. These are issues that need my attention and not BMU leaders'. Chiefs' duties include maintaining law and order in our locations and the BMUs are in our locations. So, it is our mandate to maintain law and order and BMU leaders should enforce fisheries rules as required.

Equally, a village head in beach D was of the opinion that:

BMU leaders have taken over our jobs. We cannot enforce fisheries rules as we used to do before BMUs were established. That job has been given to the BMUs. They are also resolving conflicts that have nothing to do with beach activities. I think it should be made clear to the BMU leaders what conflicts they can resolve and those that should be left for the office of the chief.

The quotes from local leaders suggest they have lost some of their adjudication powers to BMU leaders following co-management adoption. In giving his opinion on BMU adjudication powers, a fishery official from beach C said:

'BMU leaders are over stepping their boundaries. They know very well that their powers as specified in the by-laws concern operations or what happen within their BMUs and not outside. They just need to understand that to avoid conflicts with the local leaders.'

However, the conflict between BMU leaders and local leaders on dispute adjudication may be a result of fisher folk forum shopping. Fisher folk prefer to register their disputes with the BMU leaders and not local leaders, because they believe they are likely to get favourable and less punitive rulings from the BMU leaders compared with local leaders.

4.3.3 Downward accountability within Lake Victoria (Kenya) BMUs.

To understand the extent to which BMU leaders are downwardly accountable to their constituents, interview questions focused on powers devolved by the government to the BMUs, how BMU leaders use the powers and fisher folks' perceptions of how their leaders serve their needs and involve them in co-management decisions. To do this, the interview questions focused on the two forms of power devolved to BMUs; power to implement fisheries rules for compliance and make BMU management decisions and power to adjudicate conflicts among assembly members.

Interviews with fisher folk revealed BMU leaders use power to implement fisheries rules to favour their friends and relatives. They also use power to their advantage (Table 4.3). For instance, a fisherman from beach D was of the opinion, *'a BMU chairperson may find a relative using an illegal gear and he will do nothing, but if he finds someone who is not a friend or relative, he will confiscate his gear.'* A boat owner from beach A was, however, of the view:

BMU and committee leaders have no regards for the fisheries management rules. They are just using their offices to benefit themselves instead of ensuring illegal fishing gears are not used in the lake. Because of what they are doing, there is almost no fish in this lake. Sometimes you cannot even get fish to eat.

Table 4.3: Examples of outcomes of political inequity identified in the four BMUs studied

-
- BMU leaders not taking action on family and friends who violate fisheries rules.
 - Selective sharing of information with family and friends on impending enforcement by the government.
 - BMU leaders engaging in illegal fishing practices instead of enforcing fisheries rules for compliance.
 - BMU finances used by BMU leaders for personal gain instead of supporting beach activities.
 - Power to adjudicate beach disputes used by BMU leaders to generate personal income.
 - BMU assembly members unable to hold BMU leaders accountable
-

To support the boat owner's sentiments, a fisherman from beach B added, '*BMU leaders are supposed to enforce the rules to get rid of illegal fishing gears in this lake. Instead, they own the majority of illegal fishing gears. I can tell you my chairperson owns four beach seines.*' There were also indications of BMU leaders misusing information from the government to benefit themselves and their family members and friends. For instance, a trader from beach C noted, '*information from the government to the BMU concerning any impending patrol was quickly shared with family and friends enabling them to hide their illegal fishing gears until patrol is over.*' This was also observed in beach B during data collection. The beach all of a sudden had fewer beach seines because there was an impending monitoring and enforcement activity from the government and beach leaders had shared the information with those close to them enabling them to hide their illegal fishing gears. As soon as government inspection was over, most beach seines were brought back to the beach.

Concerning the use of BMU finances which include levies charged on assembly members as membership registration fees, fines imposed on BMU rule violators and fish landing fees; over 90% of fisher folk interviewed were of the view BMUs do not include them in BMU financial management decisions. For example, a fisherman from beach B said, '*every day we land fish in this beach and pay fish landing fee, but we do not know where the money goes. What we know is the BMU account is not operational but we pay fees everyday*', while a boat owner from beach D added:

It is true assembly members contribute a lot of money every day through the activities undertaken in this beach, but if you try to question where the money goes, you will cause yourself problems and the leaders may even say you engage in illegal fishing practices just to get rid of you.

The BMU chairperson has the power to convene an annual general meeting at the end of every financial year. The meetings are supposed to be used to inform assembly members about BMU income and expenditure. It was, however, noted from interviews with fisher folk such meetings

are rarely held and, if convened, nothing much comes out of the meetings in what a fish trader summed as, *'we just go there to be informed and not to question'*, while a fish grader said, *'they are not transparent in the way they use our money. They just read the budget and it does not matter whether you agree with it or not.'* It was also observed from the review of BMU documents only beach A and D had convened at least one assembly meeting in a year although BMU regulations specifies that at least four assembly meetings should be held in a year by a BMU. Observations were made during an assembly meeting convened in beach D which corroborated what was reported by fisher folk on how questions by fisher folk were given minimal attention by BMU leaders. These quotes illustrate how BMU leaders use their decision-making powers to appropriate BMU finances without involving assembly members, while denying them access to financial information.

Interviews with BMU and committee leaders, nonetheless, indicated the leaders consulted assembly members before making financial and fisheries management decisions in the BMUs. For instance, a BMU chairperson from beach D noted, *'by law, the BMU assembly is the organ through which decisions are made in a BMU through voting and there is no way I can decide on anything on my own without the support of the assembly.'* To add to this, a BMU treasurer from beach C said, *'all our financial books are open to any member/ person who may want to see how much money we have collected and how it has been used,'* although he declined to produce the books when requested during the course of this research.

Interviews with fisher folk also suggested powers to adjudicate disputes within the BMUs using by-laws are misused by BMU committee leaders who are using those powers for their own gain. For instance, fees paid to the BMU to adjudicate disputes and fines paid by offenders are not banked as required, but end up in the committee leaders' pockets. For example, a boat owner from beach C noted, *'fines paid by offenders here are shared among the BMU leaders who preside over and determine the cases'*, while a trader from beach B added, *'the committee leaders are not paid a salary and therefore they have to 'eat' such money.'* Observations in beach B and C indicated there were many cases being adjudicated in the BMU offices, with some having nothing to do with beach activities. This according to a village elder in beach B was mainly driven by greed since the BMU leaders *'have gone beyond their boundaries by doing what they are not mandated to do.'* When asked about the cases they were adjudicating in the BMU offices that did not concern fisheries activities, a BMU leader from beach B stated, *'the cases concern members who are registered in this BMU and that is why they bring them here,'* while a leader from beach C was of the opinion, *'our members know where to take their cases and that is why they do not go to the chiefs.'* On the issue of benefitting from fines paid by offenders instead of depositing it at the bank as beach revenue, a leader from beach D stated, *'we may share the money sometimes, but not always,'* while a leader from beach A justified their use of the fines by stating, *'this is the money we can use to pay ourselves some allowance because what we do here is basically charity work. There is no pay and even the money from fines is not enough.'*

In addition, results from the review of BMU documents showed the BMU leaders are not accountable to the assembly members. In theory, the BMU assembly is an institution that has the powers to bring the BMU leaders to account. In reality the assembly finds it difficult to

bring the BMU leaders to account because the leaders use their decision-making powers to control activities within the BMUs. The assembly is supposed to approve and question the activities of BMU leaders through assembly meetings which are supposed to be convened every three months (Government of Kenya, 2007). The powers to convene assembly meetings and any other meetings rests with the BMU chairmen who may deliberately fail to convene the meetings so that they are not brought to account. In the event they convene the meetings, interviews with fisher folk from the four BMUs demonstrated the BMU leaders use their powers to dominate and intimidate assembly members, making it difficult for fisher folk to challenge some of the decisions made by BMU leaders.

4.4 DISCUSSION

Decentralized NRM approaches are promoted as more equitable than top-down management (Jacobs, 1989; Poteete, 2004) and as a mechanism that better enables resource users' participation in co-management (Ayers and Kittinger, 2014; Pomeroy and Berkes, 1997). Within the Kenyan Lake Victoria BMUs, power devolved to fisher folk by the government are clearly more limited than those generally accepted for co-management (Béné et al., 2009; Berkes, 2009; Borrini-Feyerabend et al., 2004). Agrawal and Ribot (1999) highlight the structural and capacity limitations of devolution to fisher folk; who have little if any power to hold BMU leaders to account.

Devolved powers to implement fisheries rules for compliance and to adjudicate disputes among assembly members, has created elites among the fishing communities, with an enhanced status as elected leaders within the BMUs. The current state is reminiscent of power within elites in Lake Victoria during the pre-colonial period (1880-1894) described by Opondo (2011) who could decide where, when and who could fish. The benefits envisioned for more equitable and effective fisheries management (Ansink and Bouma, 2013; Ribot et al., 2006) have not been achieved by the creation of the Kenyan BMUs (Etiegni et al., 2016; Irvine et al., 2019). Minimal co-management benefits have also been registered for Tanzanian and Ugandan BMUs owing to unequal power and gender relations (Nunan et al., 2015). The activities of elites within BMU organisations have, in contrast, considerably reduced co-management benefits. Local power now invested in BMU leaders favour themselves and their close associates, leaving other assembly members with limited influence on decision making that affect their livelihoods. The leaders have failed to sanction those who harvest fish using outlawed fishing gears and methods, encouraging political inequity. These findings are similar to what was reported by Schmidt and Theesfeld (2012) in their study of a local fishery in Albania where local fishers were side lined by local elites. Similarly, unequal power distribution within Lake Malawi fisheries co-management resulted in the marginalization of fisher folk (Béné et al., 2009), although Mansuri and Rao (2004) demonstrated that elites can produce outcomes that are beneficial within community driven development initiatives.

In the Lake Victoria Kenya BMUs elections do not guarantee downward accountability as they favour those who already occupy powerful positions based on their wealth. Although BMU regulations specify that at least 30% of BMU executive representation should be filled by

fishermen (Government of Kenya, 2007) it would be difficult for this group to occupy the most powerful roles, including the chairperson. Additionally, as most fishermen are employed by boat owners, who in some cases also pay for their registration fees, opposing, or competing with, their employers would be unlikely.

BMU organisations are the link between fisher folk and the government within the lake's co-management arrangement. The BMU chairpersons are the contact people at the beach level and are often the first to receive information concerning fisheries management from the government. How they manage and use the information passed to them by the government is clearly important. For example, our study indicates that information on impending monitoring, control and surveillance activities is shared among the BMU elites and friends/ kin. The BMU elites may also pay fisheries officers 'protection fee' so that they are kept informed of planned government enforcement activities (Etiegni et al., 2016). The summative consequence of elite capture of power contributes to the marginalization of other resource users, who may not have the financial resources to invest in fishing gears or bribe fisheries officials to avoid sanctions.

4.5 CONCLUSIONS

Within Lake Victoria (Kenya) co-management, limited powers are devolved by the government to fisher folk through their organisations of BMUs, suggesting fisheries management is not fully decentralized and does not lead to a participatory approach. Nonetheless, the powers that are devolved are captured by elected BMU leaders who can be classified as elites within the organisations. Although development of representative local level resource users' organisations is encouraged to avoid misuse of power (Béné and Neiland, 2006; Persha and Andersson, 2014), the powers are used to limit the space for participation of fisher folk in decision making (Nunan et al., 2012). Although the leaders of BMUs are democratically elected, these are hardly accountable to their constituents, and use devolved powers to advance their personal agendas. This promotes political inequity within the BMUs. As such, co-management as currently structured in Lake Victoria has not provided space for effective fisher folk participation in co-management, but has only allowed redistribution of powers devolved by the government among BMU leaders (Béné et al., 2009).

The activities of BMU leaders conflict with assumed benefits linked to resource user engagement in co-management that include livelihood improvement and participation in decision making (Ho et al., 2015; Persha and Andersson, 2014; Pomeroy and Berkes, 1997). Development of institutions to encourage genuine fisher folk representation and involvement in decisions is therefore encouraged. This may require a re-look at the lake co-management institutional structure and how it enables power sharing (Béné et al., 2009; Ho et al., 2015) and inclusive participation (Armitage, 2005; Nunan et al., 2012).

Election of organisation leaders, although encouraged as a mechanism for ensuring representation and downward accountability (Agrawal and Ribot, 1999) does not guarantee political equity as our study has shown. In situations where powerful positions of BMU chairmen are occupied by wealthier boat owners, other fisher folks' needs may not be served

by their elected leaders. We suggest inclusion of other accountability mechanisms within BMU regulations such as external procedures for recall of BMU leaders and monitoring of their activities by third parties such as civil society. These measures may be useful in the event fisher folk are not in a position to bring their leaders to account due to power imbalances.

Empowerment of fisher folk through capacity building and awareness creation (Ho et al., 2015; Nunan, 2006), may also enable BMU assembly members to make their needs known, while ensuring they are involved in decision making within the organisation of BMUs. Fisher folk can also use social accountability mechanisms such as community score cards, social audits and budget monitoring (Kimchoeun et al., 2007; Malena et al., 2004). These are methods that not only involve the resource users who may not be in a position to question their leaders, but also other co-management stakeholders such as government, NGOs and civil society. By working together, the stakeholders create synergy which is crucial for social accountability efforts (Malena et al., 2004). With such arrangements, resource users' leaders are less likely to use their power to intimidate their constituents. The marginalized also use their engagements with other stakeholders to learn how to demand accountability from their leaders and in the process empower themselves. This empowerment enables resource users to become more proactive in demanding accountability from their leaders for equitable co-management outcomes.

Chapter 5

Prognosis for long term sustainable fisheries in the African Great Lakes

Publication based on this chapter:

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Abstract

Declines in fish yields and shifts in species composition are serious concerns in the African Great lakes of Tanganyika, Malawi (Nyasa/Niassa) and Victoria. Despite management and regulatory structures, all the lakes remain open-access fisheries, severely depressing yields, economic returns and threatening biodiversity. While the lakes require an ecosystem-based approach to management, this has not been realized because of a lack of institutional capacities, insufficient political will or simply being overwhelmed by the scale of the endeavour. Sustainable fisheries management can only be achieved through a refocus towards a stronger socio-ecological approach and re-evaluating how to realistically improve fish yield and environmental protection. This requires a combination of the following: (1) acceptance of suboptimal fish yields; (2) community-enforced regulations that restrict access to fisheries and destruction of inshore habitats; (3) enhanced national and local institutional capacities and collaboration among the riparian states; and (4) major awareness and educational efforts that demonstrate the national and international importance of these lakes for food supply and biodiversity in pursuance of the Sustainable Development Goals. Without such actions, the prognosis for long-term sustainable fisheries is bleak, and international projects and conferences will merely bear witness to further degradation of resources and the livelihoods they support.

Key words: Conservation, ecosystem approach, Malawi, management, Tanganyika, Victoria.

5.1 INTRODUCTION

In order to act, you have to know what you wish to achieve (Allison, 2002).

The African Great lakes of Tanganyika, Malawi (Nyasa/Niassa) and Victoria provide essential and high-quality food for millions of people, livelihoods for tens of thousands and a range of other ecosystem services. Adaptive radiation of fish of the Cichlidae family and other fauna has led to exceptional biodiversity (Coulter, 1991 ; Genner and Turner, 2005; Lowe-McConnell, 2009; Sturmbauer, 1998), making the lakes a unique global heritage as well as classic biodiversity “hot spots”, subject to both high human impact and conservation importance (Darwall et al., 2011).

Classically associated K-selected traits of high investment in parental care, low fecundity and slow growth rates make cichlids particularly vulnerable to overfishing and other human impacts. In L. Malawi, cichlids dominate both the inshore and offshore fish communities. This was also the case in L. Victoria before the dominance of the centropomid Nile perch *Lates niloticus* following its introduction in the 1950s and subsequent expansion that is widely considered to have decimated the native cichlid haplochromine species flocks (Witte et al., 1992). Other possible, perhaps coincidental, mechanisms for the haplochromine decline and *Lates*’ dominance include overfishing and changes in trophic dynamics associated with nutrient enrichment, including a postulated state switch following lake-wide anoxic events that released predation pressure on juvenile perch (Bundy and Pitcher, 1995; Goudswaard et al., 2011; Sitoki et al., 2010; Verschuren et

al., 2002). While the expansion of *L. niloticus* has been explained using a simple population model (Downing et al., 2013), over the last 50 years L. Victoria has also been subjected to major biotic and chemical disturbance (Muyodi et al., 2009; Odada et al., 2009). In L. Tanganyika, the historical dominance of pelagic *Lates* species likely confined cichlids to inshore areas (Thompson, 1999), although numbers of a piscivorous cichlid of the genus *Bathybates* recorded in the lake by Fryer and Iles (1972) are likely to have been reduced by earlier fishery exploitation.

In all three lakes, small sardine-like fish with high growth rates (*Engraulicypris sardella* (Gunther) in L. Malawi; *Limnothrissa miodon* (Boulenger) and *Stolothrissa tanganyicae* Regan in L. Tanganyika; and *Rastrineobola argentea* (Pellegrin) in L. Victoria) represent classic *r*-selected species of the pelagic zones, but with likely dependence on inshore spawning (Wanink, 1999). With high fecundity and an evolutionary history likely associated with disturbed habitats, *Lates* species are generally intermediate between the cichlids and sardines in the range of *r*-selected to *K*-selected traits. These attributes are important for species response to fishing and other pressures.

Inshore and offshore fishing pressures across the lakes range from industrial and highly organized commercial, net and long-line demersal and pelagic fishing, to localized individual line fishing, beach seining and nearshore deployment of gears from traditional canoes. While the main targeted fish in L. Tanganyika and L. Victoria are dominated by a few species, in L. Malawi, a much wider number of species are commonly caught (Darwall et al., 2010; Weyl et al., 2010). Many of these, such as demersal *Lethrinops* spp., have restricted distributions and are vulnerable to localized impact (Weyl et al., 2010).

Fisheries that target fast-growing small fish species together with larger, slower growing, species present particular challenges for fisheries management. Strategies largely developed for single-species temperate fisheries do not transfer well to tropical multi-species harvest (Lorenzen et al., 2006; Welcomme, 1999). In the African Great Lakes, fish production is driven by physical structure of the lakes and a food web involving vertical biological energy transfers between pelagic deep and surface waters and horizontal transfers between the pelagic and inshore demersal zones.

In all of the lakes, there is increasing demand for fish by riparian populations whose incomes can be close to or below poverty thresholds, as well as for larger high-value fish. The *L. niloticus* fishery of L. Victoria, for example, supports a valuable international export industry. Protecting endemic species subject to interacting pressures, while enhancing sustainable livelihoods, requires sensitive and well informed management (Allan et al., 2005; Andrew et al., 2007). In all three lakes, there have been moves to establish international management authorities, accompanied by the development of new or revised institutional and transboundary structures for co-management of the fisheries.

In this study, trends in the fish catches of lakes Tanganyika, Malawi and Victoria over about the last 50 years and whether the management responses are appropriate for longer

term sustainable practices are explored, and a prognosis for long-term sustainable fisheries and biodiversity of the lakes is provided.

5.2 METHODS

Available fisheries statistics for all three lakes are somewhat disparate, so a number of sources were used to evaluate changes in fish catch. Statistics for total and sardine fisheries of the Burundi and Zambian waters of L. Tanganyika were downloaded from FAO FishStat (www.fishstat.org) and extracted from Sarvala et al. (2006). Long-term catch data for *L. niloticus* from L. Victoria were downloaded from FishStat, and more recent stock assessment data were obtained from LVFO (2016b). Catch of *R. argentea* in L. Victoria was derived from Pitcher et al. (1996), Kolding and Van Zwieten (2014) and LVFO (2016b), using maximum values on occasions when there was an overlap of data across years.

Catch data for L. Malawi were based mainly on those reported by Weyl et al. (2010), supplemented with information on the nature of the demersal artisanal catch from Irvine (2003) and summary catch data for the southern lake region presented in Hara and Njaya (2016). Given the nature of fisheries data in the lakes and the very large areas over which these are collected, as well as those areas where they are not, the purpose of collating and analysing this study was to identify broad trends in catch relative to current fisheries practice and policies. Discrepancies in reported fish catch data across the three lakes are problematic, which includes unaccounted for fish owing to, for example, difficulty of access for recorders to landing sites, large areas that have no formal reporting and underreporting of illegally caught fish. Further details are provided in relevant sections below.

Current fisheries policy overview was obtained from a literature search and personal experiences. For L. Malawi, the effectiveness of fisheries management practices has recently been reviewed by Hara and Njaya (2016) and a useful overview of governance structures for L. Tanganyika fisheries is found in Petit and Shipton (2012).

5.3 RESULTS

5.3.1 Lake Tanganyika

Collation of accurate and recent data from L. Tanganyika is limited, with variable recording across the riparian states (Cirhuza et al., 2015). Data used reflect intensive effort in collating statistics up till the mid-1990s, supplemented by review of more recent publications and reports (Cirhuza et al., 2015; Petit and Shipton, 2012; Van der Knaap et al., 2014). In the Burundian waters of L. Tanganyika, total recorded catch sourced from Sarvala et al. (2006) showed steady increase in fish yield from the early 1950s to the mid-1960s, reaching a maximum of about 30,000 t in 1977 (Figure 5.1). Comparative aggregated data from FishStat (not shown) suggest maximum catch of 24,000 t in 1992 and of 18,900 t in 1978. The discrepancies in figures most likely relate to differences in

reporting from different data sources. Sarvala et al. (2006) collected data directly from local fisheries offices. Aggregated data from FishStat since 1995 suggest a reduced, and fluctuating, catch (Figure 5.1). Overall, the trend in L. Tanganyika shows increasing fish landings from the 1950s to mid-1990s, marked fluctuations in catch and increasing importance of the artisanal over the industrial from the mid-1980s. In Burundi, the main catch until the 1990s was dominated by *L. stappersii* (Boulenger) (Van der Knaap et al., 2014), but this declined thereafter. Catch of all other *Lates* species *L. angustifrons* Boulenger, *L. mariae* Steindachner and *L. microlepis* Boulenger declined following intensification of purse-seine fishing in the 1960s (Sarvala et al., 2006).

Figure 5. 1: Fish catch totals (tonnes per annum) recorded for Burundian waters of Lake Tanganyika from 1950 to 2014 derived from Sarvala et al. (2006) for traditional and industrial fishing and from www.Fishstat.org for data aggregated across fishing craft from 1996 to 2014

Figure 5. 2: Fish catch (tonnes per annum) derived from Sarvala et al. (2006) for Zambian waters of L. Tanganyika, 1960–1995

While some of the variability in Burundian catch rates can be attributed to political disruption, especially in the mid-1990s, overall fluctuations over the last 30 years appear largely as a result of variability in the catch of the two small clupeids *L. miodon* and *S. tanganyicae*, whose catch showed a marked decline since the mid-2000s. Fish caught by pelagic catamarans and apollo-type lift nets declined, respectively, from about 130 kg and 200 kg per fishing unit per day in 2002 to 50 and 80 kg per unit per day by 2009 (Van der Knaap, 2013a). By the end of the last century, industrial fishing had effectively ended in the northern part of the lake (Van der Knaap et al., 2014). In Zambian waters, maximum annual catch of about 6,000 t recorded in the mid-1980s (Figure 5.2) was followed by dramatic collapse of the clupeid fishery (Sarvala et al., 2006). This decline occurred later than in Burundi, but industrial fishing had generally ended by the time of a 2011 frame survey; with a concomitant increase in long-line fishing targeting *L. stappersii* throughout the lake (Van der Knaap et al., 2014). Recent estimates from the DRC (Cirhuza et al., 2015) suggest a catch comprising about 80% clupeids, predominately *S. tanganyicae*.

5.3.2 Lake Malawi

Lake Malawi has a physical structure similar to L. Tanganyika, but differs markedly in underlying tropic pathways (Coulter, 1991 ; Darwall et al., 2010). Fishing effort is concentrated in the southern end of the lake where catch rates, biomass and diversity have been in decline (Weyl et al., 2010). The industrial trawl fisheries operating in the southern end of the lake largely exploit a multispecies community of demersal and pelagic species. Lake-wide, the artisanal catch comprises more than 180 species (Irvine, 2003), and, using data from the late 1990s, Weyl et al. (2010) estimated a lake-wide fisheries yield of $\approx$

80,000 t/year. The last assessment of catch and effort, based on 1976–2002 data from the Malawi section of the lake, demonstrated that, although total catch was relatively stable, increasing fishing effort had decreased catch rates, depleted larger, more valuable species and led to species changes (Figure 5.3). This is most evident by the decline in the large, and valuable, endemic *Oreochromis* “*Nyasalapia*” (*chambo*) species flock. This fishery yielded between 5000 and 9,000 t/year from southern Lake Malawi until 1992, thereafter declining to $\approx$ 2,000 t/year, with loss of habitat in addition to overfishing considered a causative factor (Weyl et al., 2010).

In response to discussion by Menz and Thompson (1995) to expand fishing to the pelagic zone, Turner et al. (2000) demonstrated that local reductions in genetically homogenous *Diplotaxodon* and *Rhamphochromis* by the artisanal fishery were likely to be replenished by populations from the rest of the lake. In addition, the small cyprinid *E. sardella* or “*usipa*” has a high reproductive output, high natural mortality and a density independent larval survival. The fish supports a highly productive fishery requiring limited management intervention (Thompson et al., 1996). By the late 1990s, the artisanal fishery had increased exploitation of deep-water multispecies fish stocks (Weyl et al., 2010), while in the south of the lake, the fishery is now largely based on *E. sardella*, and catches of cichlids and particularly *chambo* have continued to decline (Figure 5.3). Fishing effort in the lake appears to have reached an asymptote.

Increased targeting of offshore demersal and pelagic stocks by the Malawian *Artisanal Fisheries Development Project* in 2006 increased capacity of the artisanal fleet. In recent years, fish catches in southern L. Malawi have subsequently remained fairly stable (Hara and Njaya, 2016). Inspection of the 2016 Frame Survey (Department of Fisheries unpublished data) indicates increased effort using mainly offshore gill and *chilimira* nets and decreased use of beach seines (Figure 5.4). Overall, this resulted in increased fishing capacity in the artisanal fishery.

Figure 5. 3: Fish catch (thousand tonnes) in southern Malawi prior and subsequent to increased focus on offshore fishery from 2000, derived from Weyl et al. (2010) and Hara and Njaya (2016).

Figure 5. 4: Change in use of gears in Malawian waters of L. Malawi prior to and since the expansion of offshore fishing (Source of data: Malawi Dept. Fisheries unpublished frame survey reports)

5.3.3 Lake Victoria

Following the introduction of *L. niloticus* in the 1950s, recorded catch increased steadily until the dramatic explosion of the mid-1970s (Figure 5.5), and a shift from a largely artisanal fishery exploiting native haplochromines to one dependent mainly on the larger *L. niloticus* and to a much lesser extent on the introduced Nile tilapia (*O. niloticus*). By the late 1980s, *L. niloticus* contributed 80%–90% the number of total landings of the artisanal fishery and almost 100% in trawl catches (Mkumbo and Ligtvoet, 1992; Moreau and Ligtvoet, 1993), with a maximum biomass landed across the lake of about 370,000 t in 1991 according to FishStat. Figures produced by the Lake Victoria Fisheries Organisation (LVFO) indicate a maximum landing of 340,000 t of Nile perch in 1990, with subsequent fluctuations around 250,000 t/year (Indian Ocean Commission, 2015), compared with a steady decline from data extracted from FishStat. Data from LVFO (2016b), indicate a maximum catch across the lake of about 309,000 t in 2008, but with a fairly steady decline since then to approximately 165,000 t in 2015. Discrepancies in data from different sources are notable, although overall trends are similar. For example, there is a difference of about 44,000 t between the approximate 251,000 t of *L. niloticus* catch reported by Indian Ocean Commission (2015) and the 207,000 t extracted from FishStat for 2014. LVFO (2008a) indicated

decline in the contribution of *L. niloticus* to total catch from 58% to 39% between 1996 and 2007.

Figure 5. 5: Total catch of *L. niloticus* across L. Victoria 1950–2014 extracted from www.Fishstat.org

Coincident to the decline in the *L. niloticus* fishery, catch of the smaller *R. argentea* increased considerably in the 1980s and early 1990s and has dominated the catch since 2005 (Kolding et al., 2014) (Figure 5.6). Catch rates of *R. argentea* are subject to notable seasonal, inter-annual and spatial fluctuations, with a general decline in CPUE in Tanzanian waters since 2008 (LVFO, 2016a). Evidence from research trawls suggests production of *R. argentea* increased in the mid-1980s (Wanink, 1999). Marshall and Mkumbo (2011) reported a recovery of haplochromines with an estimated stock in 2010–2011 of about 25% of total fish biomass, comprising about 10% of the catch.

Figure 5. 6: Catch of *R. argentea* in L. Victoria derived from Pitcher et al. (1996), Kolding et al. (2008) and LVFO (2016 a, b) using maximum values when there was an overlap of years for the data

5.4 DISCUSSION

5.4.1 State of the fisheries

Although reports of overfishing in all three lakes date back to at least the 1950s (Graham, 1929; Kudhonganika and Chitamwebwa, 1995; Lowe, 1952; Njiru et al., 2014; Van der Knaap et al., 2014), the current state of the fisheries are far more worrisome than those historical concerns. In all lakes, declines in fish yield and/or a shift in composition of fish following periods of maximum catch have occurred. In L. Victoria, there has been increased dominance of immature *L. niloticus* and, in all lakes, a reduction in mean length at maturity of the commercial species (Kolding et al., 2014; Njiru et al., 2007; Sharpe et al., 2012). Similar trends have been reported from L. Tanganyika (Sarvala et al., 2006; van Zwieten et al., 2002).

Shifts in catch and composition are consistent with high fishing pressures that drive production to favour smaller and faster growing *r*-selected species over more classically *K*-selected fish, although not necessarily accompanied by reduced overall catch biomass (Welcomme, 1999). In L. Victoria and L. Malawi, increases in catch of smaller cyprinids have largely compensated for the reduction in larger fish. A shift to

more *r*-selected species can lead to a preponderance for high-amplitude population cycles, with increased risks of a fisheries collapse (Jul-Larsen and van Zwieten, 2002). This disproportionally affects food security of low-income riparian populations dependent on the smaller and lower value species. Furthermore, because population dynamics of small pelagic species are typically environmentally driven, a fishery based on *r*-selected species provides for lower resistance but higher resilience to environmental changes.

5.4.2 The ecosystem approach

In the preface of a special issue on the Africa large lakes (Lindqvist et al., 1999), the editors made the eminently reasonable statement that “Management of aquatic resources must be built upon a thorough assessment of the status of natural resources that is also informed of the dynamic relationships within the biotic community and the impacts of human activities on the aquatic and terrestrial environments”. The sentiment, made in one form or another many times, as an imperative to guide fisheries of the African Great Lakes, has been confined mostly to words rather than deeds.

Although the ecological changes brought about by the changes in fish composition in L. Victoria are generally better known than those in L. Tanganyika, in both lakes they have had widespread impact on food webs and associated trophic interactions. In L. Victoria, the boom of *L. niloticus* associated with reduced haplochromine numbers led to a shift in diet of *L. niloticus* and greater reliance on the open-water shrimp *Caridina nilotica* coincident with increased stock of *R. argentea*. Nutrient enrichment provides a plausible mechanism for altered energy flows supporting production of *C. nilotica* and *R. argentea* (Moreau and Ligtvoet, 1993), but stocks of the shrimp are also subject to marked seasonal oscillations (LVFO, 2016b). L. Tanganyika, reduction in the pelagic feeding *L. stappersi* was coincident with large increases in dominance in the catch of its smaller clupeid prey. Overall, declines in commercial catch have been attributed to both overfishing (Sarvala et al., 2006) and modest increases in surface temperatures that strengthen the thermocline; restricting nutrient input from deeper water results in lower plankton productivity that cascades to fisheries production (Cohen et al., 2016; Tierney et al., 2010). Between 1995 and 2011, however, the total number of beach seines in the lake, despite being illegal, had increased by about 50% to about one seine per km; fishing lines that target juvenile *L. stappersii* had increased 10-fold and motorised craft more than doubled (Van der Knaap et al., 2014).

Top-down alterations of fish stocks and bottom-up processes affecting basal productivity have consequences for the structure and function, and hence fisheries, of the African Great Lakes ecosystems (Allan et al., 2005; Allison and Ellis, 2001; Cohen et al., 2016; McIntyre et al., 2007). With the exception of the prevention of the introduction of Tanganyikan sardines into L. Malawi as a means to convert the hypothesised, but mistaken, notion of “wasted” production of the dipteran *Chaoborus*

edulis Edwards into fish protein (Darwall et al., 2010), there is no convincing evidence that the “ecosystems approach” has been adopted in any of the lakes or, for that matter, in the management of their catchments. The persistence of biodiversity richness in the African Great Lakes can be attributable more to default than design. The loss of the biodiversity in these lakes as a consequence of fisheries policy is, however, very evident. An ecosystem-based approach also necessitates the monitoring, and mitigation, of other pressures including those emanating from the catchments such as nutrient, sediment and other pollutants. Effective lake management is ultimately dependent on effective catchment management and the policies that support that. In the catchments of the African Great Lakes, this has been largely absent, and in the lakes themselves, most of the usual variables monitored, as well as for most fish species other than those discussed in this study, have been carried out through externally funded and short-term research projects. While the focus of fisheries monitoring (see below) has been largely on the main target food species, neglecting species level or species flock data is a potentially risky deficit for the better understanding of ecosystem functioning and stability.

5.4.3 Monitoring fisheries

While effective ecosystem-based management strategies remain to be developed for any of the African Great Lakes, monitoring of fish catch dates back to colonial administrations. Given the size of the lakes and number of riparian countries, this has been spatially and temporally patchy. Well-structured monitoring of fish catch from Burundian waters of L. Tanganyika in the 1980s and 1990s was disrupted by civil strife in the 1990s (Van der Knaap et al., 2014). Monitoring of catch in Zambia largely focussed on the southern industrial landing at Mpulungu, which have now been superseded by artisanal fisheries (Sarvala et al., 2006). Monitoring of fish catch in Tanzania and, even more so, in the DRC has been extremely limited. In L. Victoria, the focus on the *L. niloticus* fishery, operated through Beach Management Units (BMUs), has provided a reasonable infrastructure for collecting fisheries statistics, although further attention to monitoring *R. argentea* is necessary as it now dominates the catch. Malawi has invested heavily in fishery management; initiating long-term monitoring of catch from trawlers in the mid-1970s, a “catch assessment system” of the small-scale fisheries and, since the 1990s, frame surveys of boats and fishing gears under the “Malawi Traditional Fisheries” system. This high investment in monitoring effort has not, however, been supported with sufficient analysis of the data (Darwall and Allison, 2002).

Connecting fishing practice to potential yields requires the following: (1) accurate reporting and management of catch statistics; (2) reasonable estimates of fish stock and composition, commonly achieved by a combination of experimental fishing, hydro acoustics and trophic modelling; and (3) a governance feedback that regulates effort. Understandably because of the logistics involved, estimates of stocks have been variable and generally infrequent. Stock assessment requires lake-wide sampling using

acoustics and calibration fishing. It is only possible with suitable craft capable of deep-water trawling. Estimates of fish stock using acoustics have been extremely limited in L. Malawi (Menz, 1995) and L. Tanganyika (Coulter, 1991). In the latter, changes in lake structure and fish populations means that estimated annual fish production of between 175,000 and 200,000 t by Mölsä et al. (2005) can be considered to now have even greater uncertainty (Van der Knaap et al., 2014).

More effort on estimating fish stock has occurred in L. Victoria as management planning of the *L. niloticus* fishery has placed a greater emphasis on stock estimates, with a coordinated approach across riparian states since 2005 (Kayanda et al., 2009; LVFO, 2016b; Njiru et al., 2014), but necessitating major extrapolation from sample areas to the whole lake. Maximum *L. niloticus* stock biomass was estimated as 1.3 million tonnes in 1999, declining to 0.8 million tonnes by 2011. This contrasts with the Indian Ocean Commission (2015) estimated stock of 1.44 million tonnes in 2006, considered to have been followed by a large decline to 0.55 million tonnes in 2008, then increasing to 1.23 million tonnes in 2014. Lake-wide estimates of *L. niloticus* landed obtained from the LVFO (2016a) were about 290,000, 310,000 and 250,000 t for 2006, 2008 and 2014, respectively. Since approximately 2005, landings of *R. argentea* have exceeded those of *L. niloticus*. Acoustic estimates for the period 2005–2008 indicated a stock of over one million tonnes (Kayanda et al., 2009), with reported maximum catch rates of *R. argentea* of about 600,000 t (Figure 5.6). Even given the uncertainty in these numbers, it is evident that the L. Victoria fishery has been harvesting a high percentage of its stock, reflecting relatively high intrinsic production for both the smaller cyprinid and the larger centropomid *L. niloticus* (Downing et al., 2013). Furthermore, given the regulations of the fishery with restriction on landing undersized fish, catch since the establishment of the BMUs could be grossly underestimated. There has been a steady increase in use of illegal gears and an almost doubling of fisher folk since 2000 (Table 5.1).

Table 5.1: Estimated increase in illegal fishing gears operating in Kenya and total fishers in entire Lake Victoria since 2000 (Etiegni et al., 2016; Government of Kenya., 2018).

Year	Total illegal gears (Kenya)	Total fishers operating in the lake
2000	43133	129305
2002	31883	175890
2004	33023	153066
2006	533903	196426
2008	809405	199242
2010	1097039	194172
2012	2291835	205299
2014	1666470	206425
2016	2034854	219919
2018	703253	-

5.4.4 Fisheries management and governance

Across the three lakes, the management response to the pressures on fish stocks and their habits has focussed on restrictions on gear and fishing activities rather than access. In none of the lakes has this led to a greater sustainability of catch. In L. Victoria, the establishment of BMUs to manage the *L. niloticus* fishery is the most structured approach (Figure 5.7) to fisheries governance across the three lakes. While envisioned that this would halt declining yields through formal and locally managed participatory governance, estimates of CPUE nevertheless declined from 8.8 to 6.3 and 5.3 tonnes per year per fishing craft targeting *L. niloticus* in the years 2000, 2006 and 2011/12, respectively (Obiero et al., 2015). Restrictions in mesh and hook sizes, and legal limits to the size of fish landed are commonly breached and not enforced (Etiegni et al., 2016). For the *R. argentea* fishery, a closed season between 1 April and 31 July and restrictions on beach seines are designed to protect inshore breeding areas (Ojwang et al., 2014).

Like the riparian states of L. Victoria, Malawian fisheries legislation focuses on input controls on fishing gear and licensing, but only the industrial trawl fishery is effort limited. Malawi's legal framework to implement co-management strategies for fisheries through Participatory Fisheries Management (PFM) and Beach Village Committees (BVCs) have been largely ineffective in reducing pressure on over-exploited inshore stocks (Hara and Njaya, 2016).

In L. Tanganyika, failures to regulate the fishery over several decades have led to what amounts to sequential collapse not only of the offshore fishery, but consequential widespread degradation of spatially restricted inshore habitats of largely endemic fish.

The result has been diminution of both fish for food and biodiversity. While L. Tanganyika illustrates the extreme seriousness of the current situation for livelihoods, food security and biodiversity, it is also a reflection of the current or pending situation in L. Victoria and L. Malawi, respectively. In all of the lakes, a key question is whether retaining largely open-access fisheries is a feasible management strategy?

The need to restrict access as a fundamental principle of stock management for the African Great Lakes has been recognised for decades e.g. (Mölsä et al., 1999). Open access fisheries lead to high potential for overexploitation of stock. This is aggravated by subsidies creating perverse incentives, including international donations that reduce the cost of entering a fishery or, as in case of the *L. niloticus* fishery, European investment in processing plants.

Figure 5.7: Lake Victoria fisheries governance structure. Adapted from (LVFO, 2008b)

Without restrictions on access, the objectives of L. Victoria co-management were destined to fail. Restrictions on gear, even if effectively enforced, can only provide an, albeit important, second tier measure in highly exploited fisheries. Furthermore, while the L. Victoria BMUs were set up as an institution of participatory management, their structures and operations are firmly set within the constraints of a regional management paradigm that established a “top-down” governance framework. Like calls for an ecosystem-based approach to management, access control to the fisheries has not yet been translated into tangible action, although there are signs of a shift in philosophy.

The 2013 Lake Tanganyika Authority (LTA) Action Plan (Lake Tanganyika Secretariat., 2013) includes strategies for restricting access to the fishery and a Monitoring, Control and Surveillance system (MCS) (Van der Knaap et al., 2014), although it is unlikely that the relevant institutional structures will be effective any time soon. More significant is the recognition in the second Lake Victoria Fisheries Organization Nile Perch Fisheries Plan, 2015–2019 (NPFMP2) (Indian Ocean Commission, 2015) that fish yields cannot be maximized unless access is reduced. The mechanisms outlined in NPFMP2 include establishing clearer user rights and a target to reduce fishing effort by 15%–20%. It envisions registration of fishing vessel and processing plants, fishing licenses, limits of mesh size and prohibition of monofilament gillnets and beach seines. NPFMP2 has ambitions to “rebuild” the *L. niloticus* fishery stock to the historical high of “1.4 million tonnes”, sustaining catches above 300,000 t/ year.

A management target to achieve a previous maximum catch rate of *L. niloticus* assumes some semblance of constant underlying ecosystem conditions and appears to disregard ecosystem and social effects with respect to the *R. argentea* fishery and the trophic dynamics that support both fisheries. Setting policy in anticipation of a resurgence of stock and production of *L. niloticus* and without good understanding of the dynamics among the other fish and their food supply, including *C. niloticus* and the haplochromines (LVFO, 2016a), appears at best a highly uncertain strategy and at worst a fundamentally flawed one. There is, however, a very realistic opportunity to connect NPFMP2 better to the long-advocated ecosystem approach.

NPFMP2’s vision raises fundamental questions that challenge the paradigm of community-based management, hinting that in L. Victoria it has been a failed experiment. A shift from the current governance has major implications for how to retain community involvement, while avoiding the problems of the past. An implicit assumption of co-management is that local communities support enforcement of rules through social monitoring because the preservation of stocks is in their own interest. Under the structures of the BMUs, this has not materialized (Etiegni et al., 2016). Restricting access to the fishery through licensing and reducing potential damaging beach seining appears necessary if stocks of the main commercial species (*L. niloticus*, *R. argentea* and, the recovering cichlid communities) are to be protected and yields improved. Given the current practice for BMUs to bypass regulations and fisheries management officials to allow (or be part of) illegal practice (Etiegni et al., 2016; Lawrence, 2013; Obiero et al., 2015), the targets of NPFMP2 to increase yields, provide a 10% increase

in economic return, with a greater share of wealth for local communities, and all within a planned two-year period, are starkly over ambitious. A very large (>70%) proportion of fish landed in 2008 was below the legal slot size across all three riparian states (Msuku et al., 2011; Njiru et al., 2014). Recent field observations (Etiegni et al., 2016) do not indicate improvement. Illegal beach seining, for example, is widely practiced, and while local communities understand the impact this has on fish stocks, in L. Victoria and elsewhere (Lynch et al., 2017), a lack of alternatives and what they observe as double standards by fishery officials do not convert “bad practice” to “good practice”.

5.4.5 The way forward and prognosis for sustainability

The Great African Lakes of Victoria, Tanganyika and Malawi have international and regional importance as habitats to large numbers of endemic species and as sources of fish crucial for food security. The lakes differ in their relative extent of important fisheries, but all are subjected to changes in fish stocks and extensive, often increasing, pressures on biodiversity. Decoupling arguments of fisheries output from those of livelihoods, and biodiversity conservation is difficult and counterproductive. Despite the decline in the L. Victoria *L. niloticus* fishery, it remains a major industry important for local and national economies, with an annual catch estimated at almost US \$600 million (Indian Ocean Commission, 2015; Obiero et al., 2015). The local value of the *R. argentea* and cichlid fishery adds substantially to these figures both in terms of local income and food security for millions of people. Across all three lakes, it is also clear that the trend in fish catch is towards greater reliance on the faster growing and smaller r-selected fish species, with lower economic value, but high local food security benefits. Ecosystem structures cannot accommodate increasing yields of high-value fish and maintain maximum harvest of the smaller species at a same time unless there is an increase in utilisable energy transfer to fish. Enhancing nutrient status as illustrated by the eutrophication problems in L. Victoria can lead to a number of undesirable effects (Hecky et al., 2010). Current development of in situ fish cage aquaculture requires further monitoring and environmental risk assessment (Aura et al., 2018; Kashindye et al., 2015).

Additionally, there are complex social issues that need to be considered and resolved for sustainable ecosystem and fisheries management involving local communities. As demonstrated in L. Victoria, without a commitment from local communities and stakeholders for more sustainable management, the fishery is regulated in name only, and stronger regulatory top-down management is unlikely to succeed. Given the scale of the fisheries distributed across a diverse range of small communities, a clearly defined socio-ecological framework (Olsson et al., 2004) would be necessary to align ecological realities with socio-economic demands. The difficult reality is that objectives to maximise fish yield need to be compromised in the interests of longer-term sustainable resource use that reconciles competing needs of food security with conservation of endemic species.

It is evident that current fishing and other environmental pressures will continue to degrade the unique biodiversity of the African Great Lakes and have an impact on food security. Even if there are restrictions on gears, an open-access regime leads inevitably to overexploited stocks. Kolding and Van Zwieten (2014) argued that fishing in proportion to species productivity, rather than a size-based harvest based on gear capability, provides a more sustainable practice for multispecies fisheries. In L. Malawi, Kasulo and Perrings (2005) suggested that an open-access unregulated fishery can provide higher yields and less impact on biodiversity than one designed to maximise profits. While it is possible that multispecies fisheries can provide greater resistance to reductions in total fish yield with increasing pressure than single-species stocks (Brooks et al., 2016), at a certain threshold of effort, undesirable impact is inevitable. “Having the cake and eating it” in biodiverse multispecies fisheries such as those of the African Great Lakes is highly wishful thinking. Greater involvement of communities in participatory co-management is, however, an ideal that requires underlying enabling conditions for sustainable use of common resources (Agrawal, 2002). A successful socio-ecological framework (Carpenter et al., 2009; Olsson et al., 2004) for the African Great Lakes can only be sustainable if hungry stakeholders have a choice not to go fishing and that is regulated and monitored effectively at local scales.

Clarifying food security and biodiversity protection as aligned goals draws explicit attention to rights-based arguments (Allison et al., 2012). An attempt to strengthen user fishing rights, local accountability and stewardship through PFM was introduced in southern Lake Malawi in the late 1990s (Hara and Njaya, 2016). Although this differed from the more obvious transfer of responsibility (but not necessarily authority) to the BMUs in L. Victoria, it has also not halted the steady decline in the fisheries in southern L. Malawi because of increases in fishing effort. Nevertheless, a long-term positive prognosis for the combined management of the fisheries and biodiversity is likely only possible with a socio-ecological and rights-based approach to the fishery. This is not the same as a fishery whose goal is to maximise profits, and given the importance of tropical inland fisheries for alleviating hunger (Lynch et al., 2017), this becomes a crucial, but largely neglected, debate (Allison et al., 2012). Kasulo and Perrings (2005) suggested that developing clear strategies that are both rights-based to restrict entry to the fishery and diversity of fishing effort to mitigate impact on both stock and biodiversity needs greater consideration. This presents a major challenge for the large African lakes, where previous regulatory frameworks have largely not worked, where governance is multinational and where many fish stocks, and those who exploit them, are mobile. The ambitions of the L. Victoria NPFMP2 provide an opening for the shift in political mind-set necessary for developing a compromised approach that restricts access, assesses the merits of gear restrictions within greater limitations of overall effort and yet still works through a participatory framework. It could be argued that such a framework is unworkable because, as per the classic Tragedy of the Commons, there is no incentive for one fishing community to follow the rules when neighbours are breaking them. This is a major challenge, but can be potentially solved by a broader consideration and

development of a rights-based approach that is linked to local community regulation and accountability working across networks of neighbouring fishing villages. A key dilemma for fisheries in the Great Lakes, and maybe everywhere, is how to have both effective community management and lake wide regulation. It is impossible to restrict access without realistic co-management and agreed mechanisms that reconcile the redundancy of some fisher folk, and subsequent inequalities (Van der Knaap et al., 2014), with locally enacted alleviation of poverty and hunger. These issues go to the heart of Sustainable Development Goal 2, focussed on alleviating hunger, and Goal 12 to ensure sustainable consumption and production (<http://www.un.org/sustainable-development>). Realistic alternatives, opportunities and fairer operation of economic value chains that alleviate poverty are inevitable requirements for more sustainable use of fish from the African Great Lakes. This can include protected nursery areas of commercial fish and defined zones for endemic ones; accepting that this also leads to continued impact on species with restricted distributions outside protected areas.

If overarching policy goals can adapt to a philosophy of reduced fishing returns for the longer-term protection of the resources, working with communities for greater sustainable use of resources requires attention to capacity development and relevant communication strategies. This applies to front-line fisheries officers as well as other tiers of governance. While adopting new directions in fisheries management of the African Great Lakes presents what may seem unsurmountable challenges, the alternative of maintaining the current approach is to simply accept further degradation of fish stocks and the biodiversity of the lakes, overseen by unachievable enforcement processes. Such a “lose–lose” scenario increases poverty and promotes the loss of species and the ecosystem services they provide.

A positive prognosis for sustainable fisheries of the Great African Lakes depends on reconciling objectives of economic returns, food security and biodiversity protection. A clear vision of what this means in terms of sustainability, and for whom, needs better elucidation, reminiscent of a quote by Allison (2002) that *“in order to act, you have to know what you wish to achieve”*. The components necessary are as follows: (1) an acceptance of suboptimal fish yields for overexploited stocks; (2) community enforced regulations that restrict access to fisheries and destruction of inshore habitats using a rights-based approach and the necessary governance structures to allow that; (3) enhanced national and local institutional capacities and collaboration across institutions and among riparian states, with increased effort on alternative livelihoods; and (4) major awareness and educational efforts that demonstrate the national and international importance of these lakes for food supply and biodiversity that integrates the management of commercially important species with those that may not have such explicit direct economic value but have high local or international relevance. In this way, management decisions very much connect the African Great lakes with the UN Sustainable Development Goals (Lucas et al., 2013). Achieving socio-ecological goals requires appropriate monitoring that goes beyond that of fish catch and stock (although important) to include indicators of social, economic, biodiversity, policy and education. This may appear ambitious. However, given the high stakes and urgent need to address

the very severe challenges of poverty alleviation and biodiversity protection of the Great African Lakes region, progressive and ambitious thinking are very much in order.

Chapter 6

Summary and Conclusions

6.1 INTRODUCTION

The global decline of fish stocks has led to a number of interventions to improve fisheries management for sustainable outcomes (FAO, 2020). One such intervention is the shift in fisheries governance approach from centralized (top-down) to participatory management, often referred to as co-management. While many inland fisheries have high commercial value, they are also increasingly recognized as a source of food and livelihoods for poorer populations (Lynch et al., 2017). As such, proper governance and management of such fisheries resources is required for sustainable outcomes. Sustainability of inland fisheries faces many challenges, driven by high demands for local and international use (Allan et al., 2005; Mkumbo and Marshall, 2015; Njiru et al., 2014). To meet such demands, fishers engage in fishing activities which provide good returns in the short term, but which may lead to unsustainable outcomes in the future (Lynch et al., 2017). It is the poor that are often hit hardest when fisheries decline, since they have limited livelihood alternatives (Béné et al., 2010).

Co-management is believed to bring resource users closer to decision making, resulting in better compliance with fisheries regulations, equitable use of fisheries resources and sustainable resources (Ayers and Kittinger, 2014; Berkes, 2009). This model of natural resource governance has, however, been shown to face many challenges (Beem, 2007; Béné et al., 2009; Cleaver and Whaley, 2018; Crona and Bodin, 2010; Nunan, 2010; Quimby and Levine, 2018; Ribot et al., 2006; Wong, 2013). Lake Victoria illustrates many of the globally recognised challenges for co-management. These include: limited space for fisher folk participation in decision making (Chapter 2); low compliance with fisheries regulations characterised by an increase in the use of outlawed fishing gears and methods (Chapter 3); a lack of equity in the use of fisheries resources (Chapter 4); and a failure of meaningful participatory processes (Chapter 5). The open access nature of the fishery combined with low compliance with fisheries regulations have led to a fall in the biomass of the more economically viable Nile perch (*Lates niloticus*), the species that this thesis focuses on. Nile tilapia (*Oreochromis niloticus*) population has registered the same trend (Obiero et al., 2015; Ogello et al., 2013; Van der Knaap, 2013b). On the other hand, the small cyprinid *Rastrineobola argentea* (locally known as omena, dagaa and mukene in Kenya, Tanzania and Uganda respectively) which had also shown signs of decline, has lately recovered. The increase in the biomass of *R. argentea* is attributed to the fall in biomass of the predatory Nile perch (Mkumbo and Marshall, 2015).

Despite the introduction of co-management, many fisheries in the world have shown similar trends of decreasing catch and challenging governance (Ann Zanetell and Knuth, 2004; Ayers and Kittinger, 2014; Herrera-Racionero et al., 2015; Ho et al., 2016a; Njaya et al., 2012). This

has called for reconsideration of co-management institutional design if the goal is sustainable fisheries and, as consequence, improved livelihoods and human well-being.

In fisheries co-management, institutions play an important role in determining who makes management decisions (Njaya et al., 2012; Nunan et al., 2015; Nunan et al., 2012; Pomeroy, 1995; Snell et al., 2013). These institutions operate at the lowest level where resource users govern and influence each other's practices with outcomes that may lead to a sustainable or unsustainable resource base (de Koning, 2011; de Koning, 2014). This thesis has analysed formal and informal institutions involved in co-management, co-management instigation and the success of its implementation. It has focussed on how fisher folk participate in decision making for fisheries management, what fisheries management rules are enforced and who participates in the fisheries. Co-management institutions, and to a larger extent, socially embedded institutions, influence the way fisher folk participate in fisheries governance and determine what fishing practices they use. This thesis has shown that the two sets of institutions can be antagonistic in co-management, with formal institutions suppressing and ignoring the informal ones at the national level, while informal institutions undermining and replacing formal ones at the local level. As a result, the fisheries of L. Victoria (Kenya) are poorly managed, with outcomes that are socially and ecologically unsustainable.

Within institutions for co-management, there are both power and interpersonal relations that influence how fisher folk participate in fisheries management decision making, and how their participation influence co-management. Nonetheless, fisher folk participation is seldom analysed to a level that provides an understanding of what contribution they make in fisheries management decision making or how their participation contributes to fisheries governance for enhanced sustainability. Co-management involves not only the delegation of responsibility to the local level, but also formal structures at that level (Ho et al., 2016c; Njaya et al., 2012). These requires redistribution of power and creation of more space for the participation of resource users (Ho et al., 2015; Njaya et al., 2012; Nunan et al., 2012). This space is created by developing local structures, illustrated in L. Victoria by the Beach Management Units (BMUs), and their legally mandated role in enabling resource users' participation in decision making and management. However, the availability of more participatory space does not necessarily translate to more participation by fisher folk in fisheries governance. Created spaces within co-management can be dominated by elites and other powerful members within co-management who make the voices of poor fisher folk inaudible (Chapters 2 and 4). Participation is often on an invited basis, reflecting the top-down implementation of co-management and its associated power asymmetries. Poorly designed and implemented co-management merely redistributes power among stakeholders (Béné et al., 2009). The more powerful stakeholders advance their needs at the expense of the weaker stakeholders (Njaya et al., 2012; Nunan et al., 2015).

This thesis contributes to the understanding of users' participation for the governance and management of natural resources. It explored the development and implementation of co-management in a developing country using four BMUs on the Kenyan side of L. Victoria. It provides findings and recommendations for improving natural resource governance, and more

specifically fisheries governance, for governments, resource users and development partners. Fisheries governance is challenging owing to the diverse, complex and dynamic nature of most fisheries (Bavinck et al., 2005). This nature of fisheries has prompted a shift in the focus of most fisheries policies from centralised management to co-management. The thesis has investigated the inclusion of resource users in decision making, and their interaction with formal and informal institutions. Although institutions are often mentioned in relation to fisheries co-management, the contribution of socially embedded institutions to the outcome of co-management has been rarely analysed, although they play a critical role in determining fisheries practices and management outcomes. Understanding the interactions between formal and informal institutions can help in understanding the participation of resource users in fisheries management for better fisheries management outcomes.

In this chapter, I integrate conclusions made in the four main chapters of this thesis to identify lessons for fisheries governance in particular and natural resource governance in general. I explore to what extent the objectives of this study were achieved, the contribution made by this thesis to research, limitations of this study, and provide proposals for further research.

6.2 SYNTHESIS OF RESEARCH FINDINGS

The overall objective of this study was to explore how institutions influence fisher folk's participation in co-management decision making and the effectiveness of co-management. This overall objective (Chapter 1) is divided into four specific objectives with each objective contributing to a specific chapter in the thesis (Chapters 2, 3, 4 and 5). The outcomes of each chapter are synthesized in this chapter and they answer specific questions related to the main research objective.

In this thesis, I have analysed and assessed four aspects of institutions within co-management which are: 1) institutions in co-management development and implementation, 2) institutions and fisheries practices, 3) power sharing and equity within institutions and 4) institutions for long term sustainable fisheries of the Great African Lakes.

6.2.1 Co-management development and implementation in Lake Victoria (Kenya)

As discussed in Chapter 2, fisheries governance in L. Victoria has undergone various transformations. From pre-colonial times where cultural management approaches were used to manage fisheries, to top-down management approach and, currently, to ostensible shift to co-management. L. Victoria (Kenya) co-management was adopted in the 1990s with the main aim of improving fisheries management outcomes. However, in Chapters 2, 3 and 4, this thesis shows equitable and sustainable fisheries has not been achieved. In terms of the first research question which looked at the process of co-management development and implementation, the findings of this study seem to build the work of some researchers reviewed in Chapter 2. Many of these studies discuss co-management development and implementation as a top-down

approach as opposed to a bottom-up one. The thesis describes the process of L. Victoria (Kenya) co-management development and implementation which does not meet the requirements of a bottom-up approach. Whether co-management is instigated from the top or the bottom is key to the outcome of co-management. This is because a bottom-up approach to co-management development is often linked to better outcomes, although it is often not clear how all resource users benefit from such outcomes. Co-management in L. Victoria was instigated from the top by development partners (the World Bank and European Union) working together with the riparian governments, typical of most small scale fisheries, or those even on large bodies of water (such as L. Victoria) reliant on small crafts (Beem, 2007; Njaya et al., 2012). The incentives for development partners to instigate co-management development in Lake Victoria was driven by the need to improve post-harvest handling of fish that was being sold to the EU market. At the same time, the partners were concerned about the sustainability of Nile perch species that provided a market and source of protein to their countries. The riparian governments did not have the financial resources to enforce regulations to curtail illegal fishing practices. There was therefore need to involve fisher folk in fisheries management.

For co-management to succeed, it is important that resource users have an incentive to participate (Ostrom, 1990; Pomeroy et al., 2001). For the fishers of Lake Victoria (Kenya) they did not have the incentive to participate since co-management was brought to them by external partners. Fishers view co-management as a government/ development partner project which they help to implement without benefits to them, but with benefits to co-management instigators. This thesis therefore suggests that for co-management to succeed, the better outcomes/benefits of co-management to resource users should be made clear to them before their participation is sought.

The top-down development and implementation of co-management in L. Victoria (Kenya) limits the participation of fisher folk in co-management decision making for a number of reasons. Firstly, institutions involved in co-management initiation and implementation were/are mainly formal, although the fisheries were initially management using informal institutions some of which persists to date and determine a number of management outcomes. The contribution of informal institutions, although largely overlooked in co-management arrangements, is important in determining how fisher folk participate in co-management (Chapter 3). Secondly, the need for resource users to identify with the problems that co-management is meant to solve is important for their participation (Measham and Lumbasi, 2013). Lake Victoria fisher folk did not identify with the problems co-management was supposed to solve as it was being instigated, and to date, they still largely do not identify with the problems since, to them, most of the problems are government problems. For that reason, they lack the incentive to get involved in co-management. Thirdly, within the institutions of co-management, unequal power relations between co-management instigators (government and development partners) and fisher folk, and between fisher folk and their leaders limit fisher folk participation in co-management decision making (Chapters 2, 3 and 4). This thesis (Chapter 4), has analysed powers (legislative, executive and judiciary) that may be devolved to fisher folk to make their participation meaningful. Only executive powers- to implement

fisheries rules for compliance- have been fully devolved to fisher folk. The government is still in control of most decision making powers making co-management “instrumental” (Arthur, 2005), which is not very different from the more traditional top-down management. Fisheries management in L. Victoria (Kenya) has not changed from top-down to co-management as depicted by the workings of the government. What has mainly changed is the name to co-management. This may suggest why fisheries management in L. Victoria (Kenya) has not improved despite “co-management” adoption. There is no co-operation between the government and fisher folk and meaningful power sharing (real co-management). The instrumental co-management (Arthur, 2005) neither benefits resource users nor the resource. This leads to lack of synergy in fisheries governance between the government and fisher folk, an outcome that is expected with co-management.

Co-management instigation and implementation in L. Victoria (Kenya) included an aspiration of including fisher folk in fisheries management decision making. Nonetheless, this has not been achieved since neither co-management instigation process nor its implementation adhered to co-management principles. In both cases, there is limited space and power provided to fisher folk, limiting their participation in co-management decisions. Resource users are likely to participate effectively in co-management when they are allowed to exercise all co-management powers (legislative, executive and judiciary) as equal partners with government. Marginalization of resource users in co-management would mean the benefits of sustainable and equitable resource use associated with co-management would be far from being realized.

The fishery of L. Victoria (Kenya) has effectively remained open-access and this has contributed to unsustainable fisheries. The open access nature leads to high exploitation of fish stocks and unsustainable outcomes. This is due to lack of mechanisms that can be used to determine who can fish where and when, and how much can be harvested. L. Victoria (Kenya) fishers are free to fish anywhere, for hours that they determine themselves and harvest as much as they can. Sustainable outcomes within natural resources depend more on the ability to reconcile the objectives of economic return, food security and biodiversity protection (Chapter 5). For common pool resources like fisheries, mechanisms to control access to the resource are important.

6.2.2 Fisher folks’ support in the implementation of government fisheries rules

The nexus between institutions and co-management success is discussed in this thesis. Chapter 3 illustrates the importance of institutions in determining fisheries management outcomes. Although fisheries management focus in L. Victoria (Kenya) is on formal institutions, this thesis has shown that informal institutions play a key role in determining fisheries practices and co-management outcomes in general. Fisheries practices in the lake are in contravention of government regulations. This thesis shows non-compliance with government regulations is on the rise. This is not because of a lack of awareness, but rather socially embedded norms aimed at fulfilling obligations to family, associates and corruption. Bonds of kinship, positions of authority and the need to fulfil obligations to oneself contradict formal government rules.

This thesis shows that the influence of informal institutions is less obvious, but play a critical role in determining how fisher folk interpret government rules. Informal institutions determine fisheries practices, whether legal or illegal.

6.2.3 Accountability in co-management decision making

Chapter 4 analyses the relationship between political equity and co-management outcomes. Findings discussed in this chapter show the shift from government led management to ostensible co-management introduced new institutions and centres of power giving rise to elites who are not keen to use devolved powers to improve fisheries governance, but to benefit themselves. The shift also disorganized traditional power structures for managing fisheries that were present before co-management adoption. Local leaders such as chiefs and clan elders lost their voices (power) in fisheries governance.

The findings of this research indicate that other elites emerged following co-management development within the BMU assembly. Most of these elites are the wealthier boat owners who use their wealth to attain the revered position of BMU chairperson. BMU chairpersons hold and exercise myriad of power within the BMUs, although this thesis indicates that not all powers needed for effective decentralization (legislative, executive and judicial) are devolved by the government to resource users (fisher folk). Executive power (power to implement fisheries regulation for compliance) is fully devolved to fisher folk, with the aim of lessening government fisheries rule enforcement burden. However, the devolved power is not used to benefit the government or fisheries resource. The research shows BMUs have power to make decisions on fisheries resource use through the development of BMU specific co-management plans. This power is not utilized by BMUs since most of them were found not to have developed their co-management plans during the time of this research. This suggests that they had not taken an ownership role in co-management. To the BMU assembly, co-management is viewed as a government project with no immediate benefits and as such, does not require much support from them.

Concerning downward accountability of elected BMU leaders to their constituents, this research provides evidence that BMU leaders lack downward accountability to the assembly members. The accountability of BMU leaders is upwards- to the government. Although elections are used as a mechanism to ensure accountability of elected leaders, this is not the case for the BMUs. Elections do not guarantee downward accountability since wealth is what determines who gets elected to leadership position (Chapter 4). This thesis provides evidence that minimal benefits have been registered from co-management owing to unequal power and interpersonal relations. Elites within BMUs have considerably reduced the benefits associated with co-management. The capture of power has encouraged political inequity within the fisheries of L. Victoria (Kenya). Devolved power is used to limit the space for fisher folk participation in fisheries co-management (Chapters 2 and 4). Co-management as currently structured in L. Victoria (Kenya) has not provided space for effective fisher folk participation, but has only allowed for redistribution of power among co-management partners and within BMUs, creating elites within BMUs who marginalize other resource users. This thesis suggests

the need of developing institutions that encourage genuine fisher folk representation and participation in co-management decisions. Chapter 4 suggests other mechanisms, rather than elections, that may be used to make BMU leaders more accountable to their constituents in situations where fisher folk are not in a position to make their leaders accountable due to power imbalances. This thesis, proposes more downward accountability as a mechanism for improved co-management outcomes.

6.2.4 Prognosis for long term sustainable fisheries

Chapters 3 and 4 have emphasized the need of involving resource users in decision making for improved co-management outcomes which include sustainable fisheries. In Chapter 5, the fisheries of the three African Great Lakes (Tanganyika, Malawi and Victoria) are discussed. The findings in this Chapter show a decline in fish yields and a shift in species composition in the three lakes. The demand for fish from the riparian communities and for export, especially for Nile perch, in L. Victoria remain high. The findings in this thesis indicate management responses to these pressures has focused on fishing gear restrictions and fishing activities (Chapter 3) rather than access to fisheries (Chapter 5). The fisheries are open access and management measures are rarely enforced, both of which contribute to unsustainable fisheries.

Chapter 5 illustrates the effects of having an open access and poorly monitored fisheries. The findings in this Chapter suggests ways of improving fish yields including, accurate reporting and better management of fisheries data, reasonable estimation of fish data and a governance approach that regulates effort. Chapter 5 provides a prognosis for achieving sustainable yields that balances economic objectives, food security and biodiversity conservation. This thesis proposes that to achieve sustainable yields, there is need to accept sub-optimal yield for over-exploited stocks, have access restriction to the fisheries, enhance institutions for fisheries governance and awareness creation on the contribution of fisheries to food security, livelihoods and economic development.

6.3 DISCUSSION

Fisheries co-management instigation and development in L. Victoria took a top-down approach. This was similar to approaches to co-management development described earlier in literature with development partners playing a critical role (Beem, 2007; Islam et al., 2017; Nielsen et al., 2003; Njaya et al., 2012). Co-management is often linked to better fisheries management outcomes that include a reduction in the use of outlawed fishing gears and methods, improved fish stocks, improved livelihoods and incomes for resource users and equity in the use of natural resources (Herrera-Racionero et al., 2015; Jentoft and McCay, 1995; Measham and Lumbasi, 2013; Tiller et al., 2015). Co-management development is driven by certain incentives, which can be at the international, national, local or at personal levels. Key to the success of any co-management arrangement is the incentive of resource users to be involved in co-management (Ostrom, 1990; Pomeroy et al., 2001). When resource users have an incentive to be involved in co-management, it means they have identified with the problem

co-management is to solve. Who is having the incentive to develop co-management will determine what direction co-management development will take, whether top-down or bottom up. For the fisheries of L. Victoria, the development of co-management came from development partners, who used the government to implement their co-management ideas. Both development partners and government incentives to participate in co-management were clear. The development partners' motivation to co-manage was to ensure better hygiene at fish landing sites, improved post-harvest handling of Nile perch exported to the EU market and sustainable use of Nile perch resource. Although development partners had a problem with the way Nile perch was being handled at the beaches, this was not a problem to fisher folk that would have warranted a shift to co-management. The way fisher folk were handling Nile perch was not perceived by them as a problem. Nonetheless, fisher folk needed to cooperate and meet the demands from the development partners to continue exporting fish to EU markets.

For the government, the motivation to co-manage was to have a partner to help in the enforcement of fisheries regulations for compliance. The government did not have enough staff and financial resources for rule enforcement. Support from fisher folk in rule enforcement was therefore needed by the government. However, this research has shown that fisher folk did not have any motivation to participate in co-management. The better outcomes linked to co-management that necessitated co-management development in L. Victoria (Kenya), were only to the development partners and the government, and not to fisher folk. Fisher folk do not see themselves as part of the fisheries management team, but as external agents whose views on fisheries management are ignored, and who are merely recipients of decisions already made. This research, therefore, emphasizes the need for resource users to identify with the problems co-management is aimed at solving (Herrera-Racionero et al., 2015; Measham and Lumbasi, 2013). This will enable resource users to understand why they need to participate in co-management and also build legitimacy of co-management institutions among them. The thesis is also in agreement with the assertion that what precedes co-management implementation is important to its success (Chuenpagdee and Jentoft, 2007).

The importance of institutions in determining how resource users participate in co-management and influence co-management outcomes has been discussed in literature (Agrawal and Gibson, 1999; de Koning, 2011; de Koning, 2014; Njaya et al., 2012; Nunan et al., 2015). This thesis (Chapter 2) emphasizes the importance of understanding the interactions between formal and informal institutions and how they influence fisher folk participation and co-management outcomes. Institutions determine where decision making spaces are located, what is discussed, who gets to sit at the decision-making table and what decisions are made. Chapter 2 of this thesis describes how decision-making spaces within the lake's co-management are limited and are located far from fisher folk (at national and regional levels). Institutions at these levels instigated and developed L. Victoria co-management and fisher folk were only informed of what was required of them. For that reason, fisher folk view themselves as external agents to co-management. Co-management in L. Victoria (Kenya) is, therefore, not about providing space to fisher folk to participate in fisheries governance, but finding manpower to help the government implement policies. This has, however, not worked as envisaged by the government since fisher folk participation is contrary to government expectations (Chapter 3).

The Chapter highlights the need for more than just devolution of natural resource management to local institutions, if sustainable resource use is to be achieved (Borowski et al., 2008; Francis and James, 2003; Kahmann et al., 2015; Nunan et al., 2015; Ribot, 2003; Russell and Dobson, 2011).

During co-management instigation and development fisher folk participation did not exist because institutions for fisher folk participation were already crafted and they were only informed of what was required of them and what they contained (Chapter 2). The approach given to co-management development is similar to what has been reported in other small scale fisheries where fisher folk are only informed of decisions already taken (Arthur, 2005; Nielsen et al., 2003), as opposed to being part of the process from the beginning (Measham and Lumbasi, 2013). Fisher folk participate in processes that are pre-defined by external agents leading to a process that is not inclusive and empowering to fisher folk as intended with co-management (Ann Zanetell and Knuth, 2004; Armitage, 2005). The need for genuine involvement of resource users in co-management for successful outcomes has been mentioned in research (Armitage, 2005; Arthur, 2005; Measham and Lumbasi, 2013; Njaya et al., 2012; Pomeroy et al., 2001). This study provides evidence for the need for genuine bottom-up process that allows resource users to identify the problems that the intended co-management process is aimed at solving, the roles they are supposed to play and what co-management means. The lack of a clear understanding of what co-management means and the roles to be played by co-management partners is partially to blame for the governance problems facing the fishery (Lawrence and Watkins, 2012).

One of the outcomes of fisheries co-management is increased compliance with fisheries regulations for sustainable fisheries (Ayers and Kittinger, 2014; Berkes, 2009; Obiero et al., 2015; Pomeroy and Berkes, 1997). This research has showed that this may not necessarily be the case. Fisher folk compliance with fisheries regulations was found to be low, which is not a means to support sustainable practices (Chapter 3). The low compliance with fisheries regulations is not attributed to fisher folk's lack of awareness of fisheries regulations since a high level of awareness of the regulations is reported in this study. This thesis identified the drivers of rule breaking as the need to fulfil obligations to kin, friends and oneself, which is also amenable to corrupt practices. These are institutions that operate at the local beach level and determine how fisher folk participate in co-management. As long as there is an open access fishery, other regulations become of secondary importance.

A number of studies have reported the need of focusing on institutions rather than resource users to understand co-management outcomes (Agrawal and Gibson, 1999; de Koning, 2011; Nunan et al., 2015). Focusing on institutions, this study suggests that within natural resource users, socially embedded institutions are more important than formal institutions in determining norms of operation and daily activities. Some activities that are harmful to fisheries resources and fisher folk livelihoods are accepted by fisher folk (Chapter 3). Government response to these challenges has been an increase in the enforcement of formal regulations although L. Victoria (Kenya) continues to face a number of ecological challenges. The decline in fish stocks and fisher folk acceptance that illegal fishing contributes to unsustainable fisheries even though

they continue engaging in it, is evidence that social norms, often influenced by kinship and corruption, are important to fisher folk participation (Nunan, 2006; Nunan et al., 2015). More emphasis needs be put on understanding socially embedded institutions for sustainable fisheries.

This study has established that a poorly formulated co-management may not promote resource user empowerment for genuine participation in co-management. Of importance is the design of co-management institutional structure (Chuenpagdee and Jentoft, 2007; Nunan et al., 2015). Institutions enable the sharing of decision-making powers among co-management partners. How decision-making powers are distributed among co-management partners and relations of power among resource users are critical to the outcome of co-management (Béné et al., 2009; Nunan et al., 2015). Limited power and financial devolution to BMUs does not enable them to execute a majority of fisheries management activities relegated to them by the government (Lawrence and Watkins, 2012). Chapter 4 examined the powers devolved to fisher folk by the government and how these powers are used within the fisher folk organizations of BMUs. Powers essential for effective co-management are legislative, executive and judiciary (Béné et al., 2009; Borrini-Feyerabend et al., 2004; Njaya et al., 2012; Nunan et al., 2012). Powers devolved to the BMUs by the government are limited compared to those accepted for co-management. This thesis advocates more devolution of power to fisher folk to improve their participation in co-management. However, more devolved power may not necessarily allow for better resource users' participation in co-management. This research has documented how the limited powers devolved to the BMUs are captured by BMU leaders for personal gain. There is need to ensure that devolved powers do not rest with natural resource users' leaders only, but that other resource users also get to exercise power within co-management. The power of election, although used in many instances to make elected leaders accountable to their constituents (Agrawal and Ribot, 1999), this thesis has shown that elections do not always guarantee downward accountability. The use of other accountability measures including use of community score cards, social audits and budget monitoring (Kimchoeun et al., 2007), are suggested make resource users' leaders more accountable to their constituents.

A considerable literature has advanced the essential part played by resource users in contributing towards sustainable use of natural resources (Agrawal, 2001; Ansink and Bouma, 2013; Ayers and Kittinger, 2014; Blackstock et al., 2012; Ho et al., 2016b; Ogwang et al., 2010; Ostrom, 1990; Quimby and Levine, 2018). In Chapter 5, the fisheries of three African Great Lakes (Victoria, Tanganyika and Malawi) are analysed. The Chapter infers that although resource users may play an important role in co-management, sustainable fisheries management can only be achieved through refocusing towards better ways of realistically improving fish yields and environmental protection and by ensuring a stronger socio-ecological approach. A combination of factors is suggested that may be considered to achieve sustainable fisheries including 1) acceptance of lower fish yields, 2) community enforced regulations that restrict entry to fisheries, 3) enhanced institutional capacities and collaboration among riparian states and 4) awareness creation on the importance of these lakes.

The three Great African Lakes analysed in Chapter 5 have all adopted co-management model of management and they are all facing ecological challenges including decline in fish yields and changes in species biodiversity. These fisheries are all open access, fishing effort is uncontrolled and catch rates are on the decline. In literature, access is understood from two perspectives- “the ability to derive benefits from things” and “the right to benefit from things” (Charnley et al., 2018; Ribot and Peluso, 2003). For the African Great Lakes, these would mean the ability of fisher folk to benefit from the use of fisheries resources to improve their well-being and their user rights respectively. The open-access nature of these fisheries implies that the user right based approaches to fisheries management are yet to be developed. Rights over resources are a fundamental requirement for successful natural resource management (Allison et al., 2012). For L. Victoria (Kenya) there would be need to develop the right based approach to fisheries management and legislations to support it. The lack of well-defined user rights may be one reason that could be contributing to the poor performance of co-management in L. Victoria. The rights of fisher folk should be key to fisheries management and they should be exercised to provide motivation for fisher folk to participate in co-management. Resource users’ motivation is key to the success of co-management (Ostrom, 1990; Pomeroy et al., 2001).

This thesis has provided insights on how fisher folk participate in co-management. Their willingness to participate is low because they do not have the motivation to do so. More needs to be done to improve fisher folks’ willingness and ability to actively participate in fisheries governance. This can be achieved by removing conditions that hinder their participation such as co-management structural barriers, social barriers based on power asymmetries and allowing for a genuine bottom-up approach to co-management. Fisheries management that focuses on fishing gear and methods restrictions is unlikely to lead to sustainable fisheries in these lakes until modalities to control access to the lakes are put in place. Chapter 5 suggests the need to adopt a socio-ecological (Berkes et al., 2003) and right based approach (Allison et al., 2012), to fisheries management to reconcile objectives of economic returns, food security and biodiversity protection in order to achieve sustainable fisheries. To achieve this, there would be need to limit access to fisheries resources, although it would be difficult to come up with mechanisms for limiting access that are socially acceptable. Limiting access means that there are those who are likely to continue fishing, while there are those who may be disallowed to access the fisheries. The challenge would, therefore, be on how to make sure that those who are not allowed to access the fisheries are kept at bay. This would require heightened monitoring, control and surveillance of the fisheries, an activity that requires a lot of resources, both human and financial. Of importance would be the need to plough back financial gains to the fishery and to the BMUs to support their management activities. Currently, there is no evidence of financial support to the BMUs from the fishery, although the government expects them to manage the fisheries of L. Victoria. The government seems to be reaping more than fisher folk within co-management (Lawrence and Watkins, 2012), and this acts as a disincentive for fisher folk to participate in co-management.

Nile perch is a high commercial and recreational value fish (Mkumbo and Marshall, 2015; Mkuna et al., 2020), but poverty pervades a majority of L. Victoria fishers (Onyango and

Jentoft, 2010). Nile perch catches are on the decline (LVFO, 2011; Obiero et al., 2015; Van der Knaap, 2013b), but fishers continue to engage in unsustainable fishing practices to earn a livelihood. Poor management of fisheries resources in L. Victoria Kenya has led to high levels of poverty, food insecurity and insufficient livelihood strategies among the fishing community. There is need for the development of sustainable alternative livelihoods for L. Victoria fishers, and especially Nile perch fishers (Mkuna et al., 2020). However, for the fishers of L. Victoria (Kenya), this would require interventions and policies that focus on fisheries management and diversification of income generating activities. Such interventions would require that human, social and institutional weaknesses within L. Victoria (Kenya) are addressed. More importantly, there is need to train fishers on financial management, how to start and run a business, and also address character issues such as honesty and integrity. Fishers would, therefore, be enabled to engage in other livelihood activities thereby reducing pressure on fisheries resources and self-regulate for sustainable outcomes. Identification of sustainable alternative livelihoods should be done through a co-management approach, in which fisher folk are given an opportunity to identify income generating activities of their interests, instead of proposals coming from the government, or other external partners such as development partners and NGOs. Such an approach to identifying alternative livelihood strategies is likely to provide the most economical and sustainable livelihood options for L. Victoria (Kenya) fishers.

6.4 CONTRIBUTION TO KNOWLEDGE OF NATURAL RESOURCE GOVERNANCE

The study has advanced the understanding of co-management as a policy for natural resource governance. It has done this through an analysis of the interactions between formal and informal institutions on the Kenyan side of L. Victoria, and determined how co-management outcomes are influenced by mostly informal institutions even though they are rarely given much attention in co-management development and implementation.

The findings of this thesis can be used to improve co-management in areas where co-management systems are being developed, or in areas where co-management is being implemented but social and ecological challenges are still being experienced. The study suggests that more attention needs to be given to power sharing among co-management partners and locations where spaces for participation are located. Both should encourage the participation of natural resource users in co-management.

Power sharing has been mentioned as key to co-management practice, but it has not been analysed adequately. Little attention has been given to the types of powers devolved to resource users by the government and how power sharing works. This research made some contribution to the understanding of power sharing within co-management.

6.5 LIMITATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

There are limitations in this study that could be addressed in future research. A case study approach was used in this study. The approach provided for a very detailed investigation of participation of fisher folk in L. Victoria (Kenya) co-management. The study was able to shed light on aspects of human behaviour within the fisheries that would have been difficult to understand using other methods. However, only four BMUs were included in the study meaning that conclusions made in the study are limited to the four BMUs. The inclusion of few BMUs in the study happened due to time and financial limitations and the need to ensure that research questions were explored exhaustively. More research on co-management institutional development in L. Victoria (Kenya) is, therefore, needed.

Co-management is a network of not only the government and the BMUs (resource users), but other partners such as NGOs, fish exporters, research institutions with networks that extend from the local level to the national, regional and international levels where Nile perch, Nile tilapia and *omena* are sold. By limiting the study to the local level where fisher folk organizations of BMUs are located, the study did not explore the spaces for decision making at the regional and international levels, the decisions made and how they influence fisher folk participation in co-management. This can be addressed in future research.

Development partners were involved in the development and adoption of co-management, but did not play an active role in its implementation. It would be interesting to explore what types of co-management outcomes are likely to be achieved with active participation of development partners in co-management implementation. Would their involvement guarantee fisher folk more space for participation or not?

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Samenvatting

Afname van visbestanden heeft geleid tot een verschuiving in het visserijbeheer van een top-down benadering naar een vorm van gezamenlijk beheer (co-management). Co-management heeft de voorkeur bij het beheer van gemeenschappelijke bronnen, zoals visserij, omdat gezamenlijk beheer betere mogelijkheden biedt om de standpunten van belanghebbenden, met name die van de gebruikers van die hulpbronnen, te betrekken bij het nemen van beheersbeslissingen. Een belangrijke uitdaging bij het beheer van veel visbestanden is hoe te komen tot duurzaam beheer, dat zowel het milieu als de gebruikers van hulpbronnen ten goede komt. Effectief visserijbeheer wordt bereikt wanneer het samenspel van ecologische- en sociale systemen wordt onderkend. Dit vereist het koppelen van ecologische systemen aan instituties die verantwoordelijk zijn voor het managen van de interacties tussen mens en milieu. Echter, de invloed die instituties hebben op de gebruikers bij het beheer van visserijhulpbronnen wordt vaak niet goed begrepen. Dit proefschrift onderzoekt hoe het samenspel tussen formele en informele instituties de deelname van vissers bij co-management beïnvloedt, en wat dit betekent voor gezamenlijk beheer. Het onderzoek richt zich op hoe instituties de bijdrage van gebruikers van hulpbronnen bij besluitvorming, en de effectiviteit van co-management processen, beïnvloeden om zo duurzame visserij mogelijk te maken. Dit proefschrift onderzoekt in het bijzonder hoe co-management in het Victoriameer (Kenia) is ontstaan en hoe het is geïmplementeerd. Het proefschrift onderzoekt of de lokale organisaties van gebruikers van Beach Management Units (BMU's) de visserijregelgeving van de overheid ondersteunen en implementeren; bespreekt het besluitvormingsproces door de verantwoordingsplicht in instituties voor co-management te analyseren; en verkent de resultaten van de, op basis van gezamenlijk beheer, aanvaarde en geïmplementeerde management maatregelen. Er werd een enkele embedded case study-benadering gebruikt waarbij vier geselecteerde BMU's de analyse-eenheden vormden. Voor het verzamelen van data werd een combinatie van methoden gebruikt, waaronder persoonlijke interviews, gerichte groepsdiscussies, observaties, observaties van deelnemers en beoordeling van documenten. De bevindingen van dit onderzoek tonen aan dat co-management van bovenaf werd geïnitieerd, waardoor vissers beperkte ruimte kregen om deel te nemen aan de ontwikkeling en toepassing ervan. De ontwikkeling werd aangestuurd door externe partners. Hoewel de institutionele focus binnen co-management lag op formele instituties, hebben informele instituties een grote invloed op de deelname van vissers. De interacties tussen formele en informele instituties binnen co-management zijn vaak antagonistisch, waarbij informele instituties de formele op het lokale (strand) niveau ondermijnen en vervangen. Op nationaal niveau onderdrukken en negeren formele instituties de informele. Machtsverhoudingen en culturele normen bleken belangrijk te zijn bij het bepalen hoe vissers deelnemen aan co-management. Visserijpraktijken worden beïnvloed door verwantschap, patron/klantrelaties en corruptie, die de interpretatie en toepassing van formele overheidsvoorschriften bepalen. De verschuiving in managementbenadering van top-down naar co-management viel samen met een toename in het overtreden van overheidsregels. Met betrekking tot politieke rechtvaardigheid als onderdeel van co-management, identificeert dit proefschrift hoe, waar en voor wie een grotere verantwoordingsplicht kan werken om zo actieve deelname mogelijk te maken van de vissers,

die de meerderheid vormen onder de deelnemers aan co-management. De resultaten van dit onderzoek laten zien dat er meer instituties en machtscentra zijn ontstaan op strandniveau na toepassing van co-management. De machtscentra hebben meer elites gecreëerd die een hogere status binnen de gemeenschap hebben met meer invloed over het beheer van visserij, echter zonder duidelijke verantwoordingsplicht tegenover hun afgevaardigden. Als gevolg hiervan hebben vissers een beperkte invloed op de besluitvorming die van invloed is op hun levensonderhoud. Dit proefschrift vindt de huidige structuur van het gezamenlijk beheer van het Victoriameer (Kenia) niet geschikt als instrument voor duurzame visserij. Het medebeheer van het meer is niet echt in overeenstemming met een proces van onderaf, aangezien de ruimte voor deelname van vissers beperkt is. Als resultaat van dit onderzoek wordt de ontwikkeling van co-management voorgesteld, waarbij meer machtsoverdracht naar vissers mogelijk wordt gemaakt. Dit vereist een heroverweging van de structuur van het co-management van het Victoriameer (Kenia) en hoe dit machtsdeling en inclusieve participatie mogelijk maakt. Dit zal de kwetsbaarheid van vissers voor zowel BMU-elites als de overheid verminderen en hun deelname aan het visserijbeheer verbeteren. Nog belangrijker is het controleren van de toegang tot de nijlbaarsvisserij van het meer als een eerste stap naar resultaten die duurzaam en gunstig zijn voor de vissers en het behoud van de visserij op het meer. Het erkennen van zowel formele als informele instituties en machtsverhoudingen op verschillende schaalniveaus kan helpen om het beheer van natuurlijke hulpbronnen te verbeteren, met als gevolg meer duurzame resultaten.

About the author

Christine Adhiambo Etiegni was born in Nakuru, Kenya in 1971. She undertook her primary level education at Naivasha Central Primary and Muguga Green primary schools in Naivasha and Nairobi respectively. She sat for her Kenya Certificate of primary education in 1986. She joined Precious Blood secondary school in Nairobi for her secondary education. In 1991, she joined Moi University in Eldoret, Kenya and graduated in 1996 with a Bachelor of Science in Fisheries. Ms. Etiegni was later employed by Ministry of Fisheries Development and worked in various capacities for eleven years.

In 2006, Ms. Etiegni earned a scholarship from Netherlands Fellowship programme (NFP) to pursue her Masters education at IHE-Delft, in the Netherlands. She graduated in 2008 with a Masters in Environment Science, planning and management option. Her Masters thesis was titled, *"Enforcement and Compliance: Exploring the Missing Link in the Case of Lake Victoria Fisheries (Kenya)"*. In 2009, she earned another scholarship from NFP to attend a short course on *"Participatory Fisheries Governance"* at Wageningen University from the 25th of May-12th June. It is after attending the short course that Ms. Etiegni decided to pursue her PhD studies on fisheries governance.

Ms. Etiegni enrolled for her PhD studies at IHE-Delft on June 2012. Her PhD was on a sandwich construction whereby her field work was done in Kenya and consultations, especially during proposal writing, done at IHE-Delft. Most of her PhD achievements were obtained while she was working with the State Department for Fisheries Aquaculture and the Blue Economy. She currently works as a Deputy Director of fisheries at Kenya Fisheries Service in Kisumu. She has 24 years working experience in the fisheries sector and some of her achievements in fisheries governance and management are shared in this book.

Publications

International journals with peer review

Etiegni, C. A., Irvine, K., and Kooy, M. (2020). Participatory governance in Lake Victoria (Kenya) fisheries: whose voices are heard? *Maritime Studies*, 19(4), 489-507. doi:10.1007/s40152-020-00195-x

Irvine, K., **Etiegni, C. A.,** and Weyl O. L. F. (2019). Prognosis for long-term sustainable fisheries in the African Great Lakes. *Fisheries Management and Ecology*. doi:10.1111/fme.12282

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List of other publications

Etiegni C. A., and Kundu R. (2011). The Role of Aquaculture in achieving the Millennium Development Goals. In: Aquaculture Development in Kenya: Towards food security, poverty alleviation and wealth creation. Samaki News Vol. VII. No. 1 October, 2011, pp 47-48.

Kundu R., and **Etiegni C. A.** Aquaculture development in Kenya: Can GIS provide the solution? In: Aquaculture Development in Kenya: Towards food security, poverty alleviation and wealth creation. Samaki News Vol. VII. No. 1 October, 2011, pp21-22.

Conference/ workshop presentations

Etiegni C. A (2012). Towards participatory fisheries governance. A case of Lake Victoria (Kenya), 3 -5 October, Apeldoorn, the Netherlands.

Etiegni C. A (2014). Challenges for co-management: Illegal fishing as a “wicked” problem in Lake Victoria (Kenya), 3-4 October, Delft, the Netherlands.

Etiegni C. A (2015). Difficulties facing co-management. Illegal fishing in Lake Victoria (Kenya). GLOW 8 International conference- “Advancing the ecosystem health approach: Good governance for adaptation and rehabilitation, 24-25 March 2015, Mangochi Malawi.

Etiegni C. A (2016). Playing by whose rules? Community norms and fisheries rules in selected beaches within Lake Victoria (Kenya) co-management at The ASEAN Fisheries and Aquaculture Conference and Exposition, 3-7 August, 2016, Bangkok, Thailand.

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K O N I N K L I J K E N E D E R L A N D S E
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The SENSE Research School declares that **Christine Adhiambo Etiegni** has successfully fulfilled all requirements of the educational PhD programme of SENSE with a work load of 31.0 EC, including the following activities:

SENSE PhD Courses

- o Environmental research in context (2012)
- o Research in context activity: 'Organized a training for fisher communities and fish farmers under the title: Combating illegal fishing in Lake Victoria (Kenya) through aquaculture: a community approach' (2013)
- o SENSE writing week (2014)

Other PhD and Advanced MSc Courses

- o Introduction to social science research methodologies, UNESCO-IHE (2012)
- o Communicating water- bridging the gap between Science and Society, UNESCO-IHE (2015)

Management and Didactic Skills Training

- o Supervising MSc student with proposal writing for thesis (2015)

Oral Presentations

- o Towards Participatory Fisheries Governance: A Case of Lake Victoria Fisheries (Kenya). UNESCO-IHE annual PhD seminar, day, month 2013, Delft, The Netherlands
- o *Challenges for co-management: Illegal fishing as a "wicked" problem in Lake Victoria (Kenya)*. UNESCO-IHE annual PhD seminar, day month 2014, Delft, The Netherlands
- o *Difficulties Facing Co-management: Illegal Fishing in Lake Victoria (Kenya)*. GLOW 8 International Conference, 24-25 March 2015, Mangochi, Malawi
- o *Playing by whose rules? Community norms and fisheries rules in selected beaches within Lake Victoria (Kenya) co-management*. ASEAN Fisheries and Aquaculture Conference and Exposition, 3- 7 August 2016, Bangkok, Thailand

SENSE coordinator PhD education

Dr. ir. Peter Vermeulen

A key challenge facing the management of many natural resources is how to achieve sustainable resource management outcomes that are beneficial to both the environment and resource users. Effective management is achieved when the interplay of ecological systems and social systems is understood. This understanding requires matching ecological systems with institutions used to manage human-environment interactions. However, the influence of institutions on resource users' participation in natural resource governance is often not well understood, with literature focusing more on the influence of formal institutions. This book explores how the interactions between formal

and informal institutions influence fisher folk participation in co-management within the context of Lake Victoria (Kenya). Although the institutional focus within co-management has been on formal institutions, the findings of this book show that informal institutions and power relations have a major influence on co-management outcomes. Based on the findings, this book shows the current structure of Lake Victoria (Kenya) co-management is inappropriate as an instrument for sustainable fisheries. It is, therefore, necessary to rethink the structure of Lake Victoria (Kenya) co-management and how it enables power sharing and inclusive participation for sustainable outcomes.