

**INVESTIGATING THE CHALLENGES AND SUCCESSES OF COMMUNITY
PARTICIPATION IN THE FISHERY CO-MANAGEMENT PROGRAM ON LAKE
VICTORIA, EAST AFRICA**

by

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The Nile perch (*Lates niloticus*) is a highly controversial species on Lake Victoria, East Africa. It is highly prized for its valuable, fleshy fillets, and its potential for food security and development for the countries surrounding Lake Victoria. It is also highly destructive, with a voracious appetite for Lake Victoria's diverse endemic species. The Nile perch fishery has been attributed to an economic boon and to the destruction of the social fabric of communities around the lake. For certain, the Nile perch changed the lake's ecosystem, the fishery, and the economy; it has changed fishers' harvest behavior and the approach to fishery management. The Nile perch: Savior? Villain? Fish.

Photo: T. Lawrence

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To Jane Frances Lawrence
One fish,
Two fish,
Red fish,
Nile perch

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TABLE OF CONTENTS

Dedication.....	ii
Acknowledgments	iii
List of Figures.....	v
List of Tables	vi
List of Appendices	vii
Acronyms and Terms.....	viii
Abstract.....	x
Chapter 1: Introduction.....	1
Chapter 2: Top-down and bottom-up approaches in the management of the Laurentian Great Lakes and Lake Victoria Fisheries: A comparison of two shared water bodies	20
Chapter 3: It takes more than a village: The challenge of co-management in Uganda’s fishery and forestry sectors.....	51
Chapter 4: Self-organization, community participation, and the value of experience in Lake Victoria’s fishery co-management program	76
Chapter 5: Taking the “co” out of “co-management”: Investigating legitimacy and fishing communities on Lake Victoria, East Africa	119
Chapter 6: Evaluation of fishery co-management on Lake Victoria, East Africa: Conclusions, implications, and suggestions of a community-participation approach.....	141
Appendix A: Questionnaire for BMU Executive Committee Leaders	159
Appendix B: Questionnaire for Boat Owners.....	176
Bibliography	190

LIST OF FIGURES

Figure 1.1: Maps of Africa detailing the Lake Victoria region.	2
Figure 1.2: Institutional Linkages of the Lake Victoria fishery co-management program	8

LIST OF TABLES

Table 4.1. Questions from the survey tested to evaluate characteristics of co-management and self-organization.....	89
Table 4.2. Summary of site and respondent numbers for surveys conducted on Lake Victoria from July 2009 to February 2010.....	90
Table 4.3: Self-organizing characteristics that are statistically associated against the dependent variable	95
Table 4.4: Response rates of enhanced enforcement of regulations and rules compliance characteristics	97
Table 4.5: Response rates of improved information flows characteristics	98
Table 4.6: Response rates of equitable treatment of constituents characteristics	100
Table 4.7: Response rates of ability to resolve disputes and conflict characteristics	100
Table 3.8: Response rates of equitable distribution of benefits characteristics	101
Table 4.9: Reporting rates of boat owner with illegal gear.....	108

LIST OF APPENDICES

Appendix A: Questionnaire for BMU Executive Committee Leaders	159
Appendix B: Questionnaire for Boat Owners.....	176

ACRONYMS AND TERMS

BMU – Beach Management Unit (see p. 11 for full description)

BMU Committee – A Beach Management Unit Committee consists of 9-15 people (known as BMU committee leaders) from the **community** who have been elected by their peers to administer fisheries and undertake fishery management activities

By-laws – Regulations made by BMU community and committee members to influence behavior of members who are a part of, or use, resources associated with that BMU. By-laws are consistent with the national fisheries laws or regulations

CBO – Community-based organization

Cichlid – see haplochromine cichlids

Commission – reference to the **Great Lakes Fishery Commission**

Community – individuals or groups of individuals at the beach level who are engaged in fishery-related activities on Lake Victoria. Community in this study refers to members of the **Beach Management Units** (described on page 82), unless otherwise noted. In Chapter 3, community and community organization can refer to either forest or fishery-related individuals, groups, or organizations.

Community-level – general term referring to individuals or groups of the lowest administrative level, those typically living in the same place and having the same laws.

Dagaa – the term in Uganda for the species *Rastrineobola argentea*, see *Rastrineobola*

DFO – District Forestry Officer

DFS – District Forest Service

DOF – Department of Fisheries, a generic term referring to the appropriate government entity in each of the three countries that address fishery management. Formal names are:

Kenya: Fisheries Department

Tanzania: Fisheries Department

Uganda: Department of Fisheries Resources

EAIFFPA – East African Industrial Fishing and Fish Processors Association

GDP – Gross Domestic Product

GEF – Global Environmental Facility

GLFC – Great Lakes Fishery Commission

Haplochromine cichlids – species-rich genus of fish *Haplochromis*; diverse species of fish in the family Cichlidae. These species provide a major fishery on Lake Victoria

IDA – International Development Association

IMF – International Monetary Fund

Landing site – A formal, dedicated area for fish to be brought in and weighed and recorded; a **Beach Management Unit** can consist of many landing sites, or just one

LVBC – Lake Victoria Basin Commission

LVFO – Lake Victoria Fisheries Organization

Mukene – term in Tanzania for the species *Rastrineobola argentea*, see *Rastrineobola*

NFA – National Forestry Authority

Ngege – important native tilapia (*Oreochromis esculentus*)

Nile Tilapia (*Oreochromis niloticus*) – introduced tilapia species on Lake Victoria

NGO – Non-governmental organization

Omena – term in Kenya for the species *Rastrineobola argentea*, see *Rastrineobola*.

PFE – Permanent Forest Estate

***Rastrineobola* (*Rastrineobola argentea*)** – sardine-like fish endemic to Lake Victoria, locally known as **dagaa** (Uganda), **omena** (Kenya), **mukene** (Tanzania)

SES – Social ecological systems

UN – United Nations

UNDP – United Nations Development Project

ABSTRACT

On Lake Victoria, East Africa, formal fishery co-management institutions are designed to facilitate collaboration between national governments and local communities with the intent of empowering the fishers and fishing communities to self-organize and conduct sustainable fishery management. This dissertation investigates the challenges and successes of this approach, focusing on formal co-management institutions on Lake Victoria and the contributions of the fishing community and individuals directly involved in harvest and management of the fisheries.

Lake Victoria's fishery co-management program was created using four concepts: decentralization, co-management, community participation, and self-organization. This dissertation explores these characteristics to determine the program's strengths and weaknesses. To determine how Lake Victoria's fishery management program evolved, I compare two prevailing management approaches: top-down and bottom-up. This comparison reveals the necessity and degree of community inclusion on Lake Victoria due to the nature of dependence on the fishery for livelihoods. To accomplish community participation, it is necessary for devolution of authority—through decentralization—to occur. As community participation requires fiscal and authoritative resources to administer management, I determine that one weakness in decentralization is the unbalanced distribution of both by the government to the community. I compare Uganda's co-management of natural resources, and determine that a balance must be struck between the national government's need for profits from international markets for these natural resources and the required fiscal resources for community administration to manage these natural resources. Further observations of the relationship between higher levels of government and community are often weak, absent, or unclear. When any of these circumstances occur, communities must administer a large part of the fishery management program or activities on their own—they must self-organize. Self-organization is the ability and will of communities and individuals to successfully act within the co-management program, with little or no external influences or incentives. By comparing characteristics of self-organization against communities which had pre-existing fishery management organizations, I determine that communities exhibited strong self-organization characteristics more often at BMUs which had pre-existing organizations, than those communities that did not. Finally, I reveal that without clear lines of authority and stable financial mechanisms, community organizations often lose, or do not acquire legitimacy by the government and fishers, resulting in the community's inability to function as a resource management organization. Findings indicate that: (1) lack of support from higher political authorities undermine enforcement power at the local level; and, (2) lack of financial returns from both the fishery and higher political authorities reduce the BMU's ability to function. Each of these weaknesses de-legitimizes the local-level management organizations. This dissertation concludes by providing recommendations that can be adopted by Lake Victoria's government's regarding fishery co-management.

CHAPTER 1:

INTRODUCTION

Part I: Overview

Kenya's, Tanzania's, and Uganda's borders all converge in the second largest lake by surface area in the world: Lake Victoria (Figure 1.1). The lake is the largest in surface area in Africa, and, like most freshwater resources, it is an important multi-use resource, known distinctly for its valuable, vibrant, and diverse fisheries. Lake Victoria employs three million people in fisheries-related activities and contributes USD 600 million annually to the East African Community (Njiru et al. 2008), and contributes to food security and poverty reduction to 20 million people around the lake (Ugandan Department of Fisheries Resources 2003; LVFO 2011a). Though only a single tropical lake, the capture fisheries produce more fish than the commercial fisheries on all five Laurentian Great Lakes combined¹, triple the harvest of Lake Tanganyika (LTA 2012), and more than quadruple the harvest of Lake Malawi (FAO 2012), the second and third largest lakes in Africa, respectively.

¹ Compared catch data from Great Lakes total commercial fishery catch (45,454 tons/year) source: (<http://www.newton.dep.anl.gov/natbltn/200-299/nb295.htm>) with 1999 catch data from Lake Victoria 700,000 to 1,000,000 t of fish (FAO 2010a-e; LVFO 2012); the Great Lakes provides about 118,430 jobs in agriculture, fishing and food production (Vaccaro and Read 2011). Lake Tanganyika total annual harvest is between 165,000 – 200,000 tons (LTA 2012); Lake Malawi total annual harvest is between 40,000 – 50,000 tons/year (assuming Lake Malawi produces 75 percent of total fisheries catch in Malawi) years 2000-2009 (FAO 2012)

Like many other freshwater systems around the world, Lake Victoria has changed dramatically during the past 120 years due to problems associated with open-access fisheries, competition for common-property resources, environmental degradation (Njiru et al. 2008),

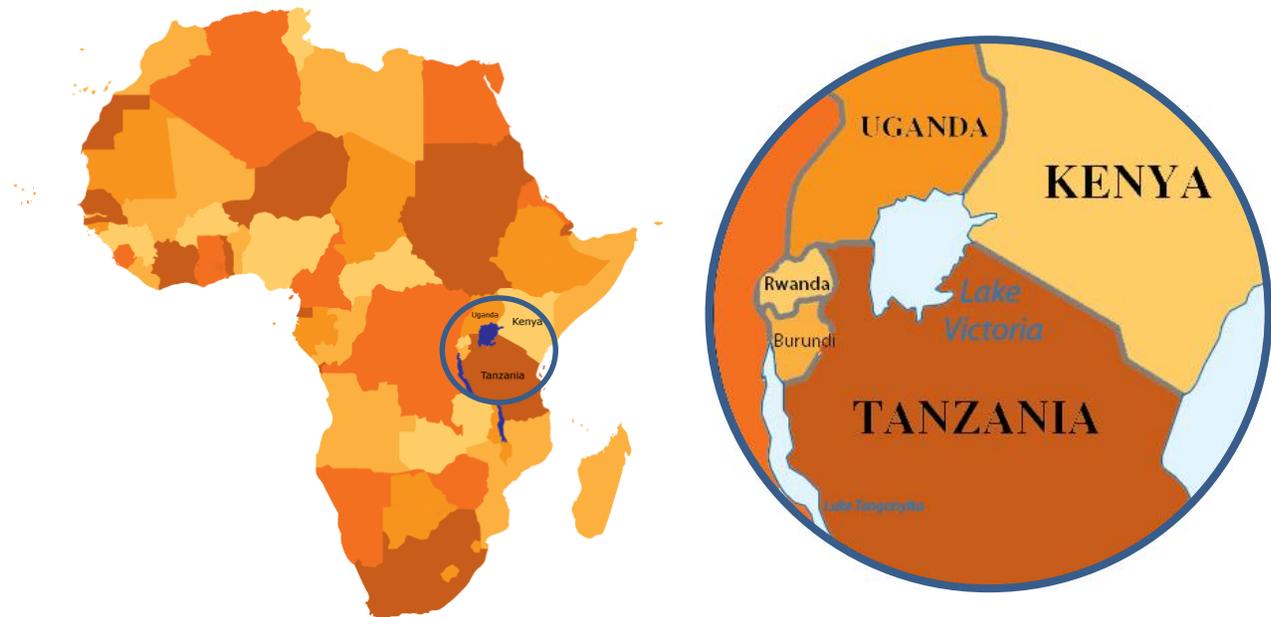


Figure 1.1: Maps of Africa detailing the Lake Victoria region. Images: Adapted from International Resource Center, 2015; and United Nations Map no. 4045 Rev. 4 (Jan, 2004).

introduction of exotic species (Njiru et al. 2005), eutrophication (Njiru et al. 2008), and overfishing (Mkumbo et al. 2007). These problems emerged from heavy use from increasing human populations around the lake. Fishing pressure on Lake Victoria is high, with more than 1,400 fish-landing-sites, 194,000 fishers, and 64,000 fishing craft (LVFO 2010a). Fishing pressure is, in part, driven by demand for fish protein and the resultant increasing value of fresh and processed fish, coupled with increasingly efficient fishing technology.

To stay abreast of changing ecological, social, and political factors, fishery management on Lake Victoria has also evolved during the past century. The major change that has influenced the creation of Lake Victoria's current fishery management program is the realization that inclusion and participation of local fishers in the governance and management of these resources is necessary based on attributes of the fishers and the natural resources (Ostrom 1999). Therefore, to protect the

fisheries, livelihoods, and well-being of those who depend upon them, formal fishery management institutions were developed to include fishers and other community members engaged in fisheries.

The inclusion of communities into management of natural resources is accomplished through institutions, including decentralization, which is the devolution of authority from higher levels of government, including ministries and departments of fisheries, to lower-administrative levels, including Departments of Fisheries, enforcement entities, and communities. Natural resource management, during the advent of colonialism, was structured in a top-down manner, meaning the government and other higher authorities manage the fishery with little or no input from fishers. Government agencies were directly responsible for managing the fishery. This management approach failed for many reasons, with the most often cited reason being absence of fishers' input. This lack of inclusion led to distrust of the government by fishers, and a sense that their resource was being taken away by outsiders (Abila et al. 2006).

One approach to fisher inclusion is called co-management, a form of decentralization, where responsibility of managing the resource is shared between government and community. Co-management is a set of formal institutions (regulations, organizations, and roles) that have been created to help guide the various entities, including local communities and resource harvesters, in reducing over fishing through cooperation with each other. Co-management creates formal relationship between communities and national governments; communities are often expected to manage the fishery on behalf of the national-level government. Co-management calls upon fishers to establish commitments (regulations), monitor each other's behavior (patrol), and impose sanctions (enforce) when commitments are broken, as well as other activities deemed necessary for effective fishery management. Co-management is defined as a collaboration—sharing of

responsibility and authority—between higher levels of government and community (Pomeroy and Berkes 1997). Challenges, however, exist that often inhibit successful management of the fishery.

Despite creation of fishery co-management institutions on Lake Victoria, illegal fishing continues on Lake Victoria (Mkumbo et al. 2009; Ogwang' et al. 2009). Increasing local, regional, and international demand have led to increased illegal fishing, often challenging both local communities and national governments who collectively manage the fisheries.

Practitioners, managers, the media, and some researchers often blame communities—whether they are a part of a formal management program or not—for failure of natural resource management. This dissertation focuses on Lake Victoria community organizations (called Beach Management Units (BMUs)) to determine the challenges associated at this level of management. Therefore, the reasons why some BMUs do not effectively administer fishery management and some do are the subject of this dissertation and are guided by arguments that Ostrom (2009) posits: that local-resource-harvesters' have the ability to self-organize and maintain their natural resources through modes of oversight and methods for policing their own citizens without external influences.

Natural resources are not disconnected from human interactions, rather, they are confounded and dependent on each other; interactions occur between ecological (biological) and human (social and political) systems called social-ecological systems (SES) (Ostrom 2009). Within SESs, the ability of local communities to successfully manage common property natural resources depends on, in part, the communities' capacity to self-organize—the ability of a group of individuals to act voluntarily on their own behalf (Ostrom 2009). Self-organization of communities can be central to successful co-management institutions because authority is ceded to community members and the majority of responsibility to patrol and enforce regulations which are intended to influence behavior of fishers, thereby limiting fish harvest and protecting the fishery resource. During the previous

three decades, many studies have demonstrated that multiple and complex interactions among humans and between humans and the environment affect the likelihood that local communities will self-organize (Ostrom 2009). SESs are made up of characteristics that can be placed into six causal classes: biophysical (resource mobility, visibility, reproductive capacity), institutional (enforcement capability, level of authority), infrastructural (access to markets), demographic (human populations, education), economic (value of fish, alternative livelihoods), and socio-political and cultural (community response and awareness to fishing regulations and enforcement), contexts that are both a part of, and external to, these SESs (see Béné 2003; Ostrom 2005; Agrawal and Chhatre 2006; Janssen et al. 2007; Ostrom 2009). Specifically, variables under these causal classes influence the ability of communities to effectively self-organize and, thereby, effectively participate in management of natural resources (Agrawal and Chhatre 2006; Pomeroy 2007; Ostrom 2009); indeed, “Sustainable resource management can never be independent of sustainability of collective human institutions that frame resource governance” (Agrawal 2002, p. 41).

This dissertation investigates the challenges and successes of how communities and individuals voluntarily self-organize through this co-management approach. As multiple factors at multiple levels can either hinder or facilitate effective implementation of fishery co-management institutions, I used the six causal classes to inform my approach, as I developed a list of variables identified as influential to self-organization of local communities in natural resource management institutions. Further, factors specific to Lake Victoria’s social-ecological system and the formal fishery co-management institutions were identified. Data about these factors were collected through interviews conducted at 111 BMUs in all three countries. This study identifies variables that influence behavior of fishers who are members of BMUs, and of the BMU committee leaders that administer fishery management.

Part II: Setting the Stage: Lake Victoria's fisheries, challenges, and institutions

The resource

Lake Victoria's highly productive fishery has been a valuable natural resource for communities living on its shores for thousands of years. The fishery employs millions of people, produces valuable fish protein, and contributes millions of dollars to the East African Community (EAC) annually. The lake's fishery is a common-property, open-access natural resource system where it is costly (through effort, time, resources) to exclude users from the resource. The lake is shared by three political states—Kenya, Tanzania, and Uganda occupying 6, 49, and 45 percent of the surface area, respectively (Njiru et al. 2008). The lake has three prominent commercial fish species, the non-native Nile perch (*Lates niloticus*) and Nile tilapia (*Oreochromis niloticus*), and the indigenous sardine-like fish *Rastrineobola argentea*, called omena, mukene, or dagaa in Kenya, Tanzania, and Uganda, respectively.

Over-harvest of Lake Victoria's fisheries have been formally reported since the 1920s (Graham 1929), when governments and scientists relegated to managing the natural resources noted decreases in catches of native species (Mkumbo et al. 2009). Incentives to over-harvest have increased during the past thirty years with introduction of the globally sought after and valuable Nile perch. Recent stock assessments have indicated a serious decline of Nile perch populations on Lake Victoria due to overfishing (Mkumbo and Mlaponi 2007; Mkumbo et al. 2007; Njiru et al. 2007; Ojuok et al. 2007; Witte et al. 2007, and others). Though Nile perch was the impetus for the current fishery management program on Lake Victoria, high fishing pressure and over- and illegal-fishing of all three of the Lake's important fisheries have contributed to management efforts.

The institutions

Acknowledging that fisheries harvest by one partner state will have impacts on the other partner states (LVFO 2005c), a fishery management approach was designed to transcend resource issues across national borders and to overcome differences in fishery management resulting from varying degrees of governance between the lake's three national governments. Additionally, because of the reliance of a high number of community members on the fishery, fishers and stakeholders engaged in fishery activities were included in the management program, thus initiating co-management.

These institutions consist of formal constraints and incentives, in the form of regulations intended to structure human interactions and control fishing harvest behavior on Lake Victoria to ensure sustainable fisheries and community and country-wide development, (North 1990) allowing local communities to *self-organize* in managing their shared natural resource.

The fishery co-management program on Lake Victoria was created to address challenges of over-harvest of common property resources, using current theoretical concepts of decentralization, co-management, community participation, and socio-political institutions. This program was established to motivate and reinforce legal fishing behavior and, therefore, produce more sustainable fisheries and sustainable development (Bwathondi et al. 2001). The five concepts on which Lake Victoria's fishery co-management institutions were created are:

- (1) informal and formal institutions influence human behavior and interactions;
- (2) decentralization, an approach to creating institutions, where authority is formally ceded to lower political or administrative levels;
- (3) co-management, a result of decentralization, where responsibility of managing the resource is devolved and shared between government and community;

- (4) community participation, an approach where local communities and other stakeholders become active in management of natural resources; and,
- 5) self-organization—a concept of co-management where local actors act on behalf of the fishery in collective interests with little or no external assistance or influence.

Lake Victoria’s fishery co-management program consists of organizations, agencies, sets of rules, and regulations to guide fisher’s harvest behavior on the lake. Inclusive in this program are the national fishery research institutes of each partner state, regional department of fisheries officers, and community members engaged in fishery related activities including fish traders, net makers and menders, fishers, and fish sellers. All of these entities, groups, and individuals have a role, whether formal or informal, in management of the fishery and fall under guidance of the Lake Victoria Fisheries Organization (LVFO), a regional organization responsible for managing fishery resources

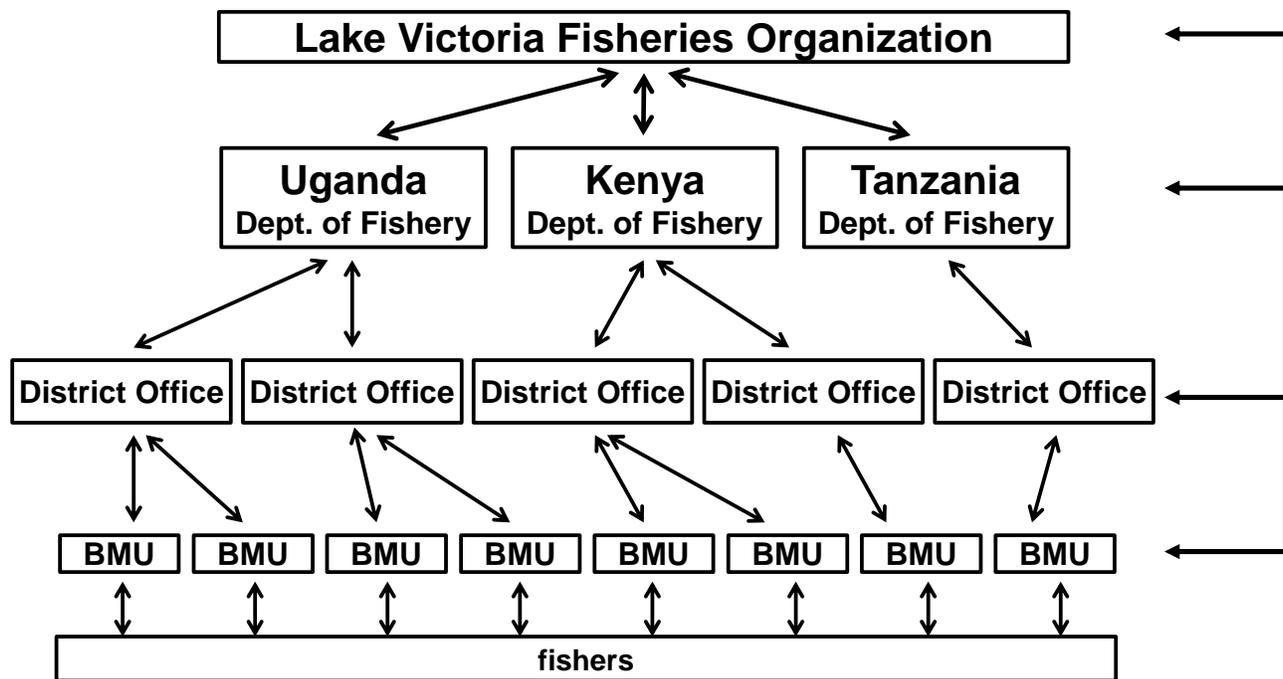


Figure 1.2: A simplified map of institutional linkages of Lake Victoria’s fishery co-management program. The Lake Victoria Fisheries Organization coordinates fishery policies between the three partner states and ensures harmonization of these policies between higher level government and the BMUs. Co-management, the shared responsibilities and movement of information is represented by the vertical lines and arrows on the far right. Mid-level authorities are not represented by design (see discussion in Chapter 5). Adapted from LVFO (2005a).

under the East African Community (EAC) (Figure 1.2). The LVFO is charged with developing conservation and management measures for sustainable fisheries and coordinating fishery management through fostering cooperation among partner states and between partner states and BMUs (LVFO 2011b).

The Lake Victoria Fisheries Organization: An interjurisdictional organization

The Lake Victoria Fisheries Organization was formed through a convention, entered into force in 1996 between the three EAC partner states which share Lake Victoria: Kenya, Tanzania, and Uganda. The LVFO is the fisheries management arm of the EAC and serves two important functions, first, to coordinate and harmonize fishery management and research between the three partner countries, and second, to coordinate fisheries management between each of the central government's department of fisheries (DOFs) and their respective local fishing communities (BMUs). The former function serves to address challenges that common-property, multi-jurisdictional fisheries present. The latter function facilitates the shared relationship, responsibilities, resources, and authority between the national governments and BMUs (Jentoft 1989).

The LVFO secretariat is the executive organization of the Lake Victoria Fisheries Organization which ensures policies and decisions created at the highest levels of government—Council of Ministers²—are adopted (LVFO 2011c) and instituted at the local level. The fishing regulations created within Lake Victoria's fishery co-management program outline the use of fishing gear and practices, including restrictions on fish size, fishing gear, and fishing methods. These rules are directed at the local user—fishermen—who make the ultimate decision about how they will

² The Council of Ministers (Council), consist of ministers of the partner states' ministries responsible for fisheries. The Council is presented recommendations by the Policy Steering Committee which is informed by a Fisheries Management Committee and Scientific Committee. Members of all committees are engaged in fisheries, including heads of fisheries departments, research institutions, and permanent secretaries responsible for fisheries (LVFO 2001; LVFO 2011c).

harvest the resource. The LVFO Secretariat and its partners are charged with educating fishing communities (BMU committees and members of BMUs around the lake) about rules and how those rules create sustainable fisheries and community development, the functions and responsibilities of BMUs and of fishers, and other functions and responsibilities of the fishing community.

Central government: Ministries and departments

Fishery-related central authority on Lake Victoria are the Ministries of Agriculture: Animal Industry and Fisheries (Uganda), Ministry of Fisheries Development (Kenya), and Ministry of Livestock and Fisheries Development (Tanzania). These ministries oversee their respective departments of fisheries³ (DOF). Each central government around Lake Victoria—under trust law—is obligated to hold natural resources in trust for the people of their countries (United Republic of Tanzania 1977; Ugandan Ministry of Agriculture Animal Industry and Fisheries 2004; Republic of Kenya 2008). Legal ownership of fisheries resources is vested in the states' central government authority as trustee and, therefore, the state is obliged to manage resource in the interest of beneficiaries, those who depend on these resources (Naluwairo 2005).

Guidelines for fishery management on Lake Victoria state that each partner state's department of fisheries promote, support, and guide BMUs ability to function, especially under “circumstances where local capacity alone will not be sufficient to safeguard the livelihoods of people depending on fisheries resources” (Ugandan Ministry of Agriculture Animal Industry and Fisheries 2004, p. 12). However, as is noted throughout this dissertation, support by government of community entities can be weak or non-existent.

³ Ugandan Department of Resources, Tanzanian Fisheries Department, Kenyan Fisheries Department.

Mid-level entities

Enforcement of fishing rules at the community level is often more successful when partnerships between law enforcement officials occurs. Mid-level entities are numerous around Lake Victoria and include the police, marine police, army, regional and district fisheries officers, and village committees. These mid-level entities often assist in the administration of patrols, ensuring the safety of community patrol members and reinforcing the legitimacy of the BMU committee. The purposes and functions of these mid-level entities, however, are either poorly defined or not included under BMU guidelines and other guiding materials for Lake Victoria's fishery co-management program. Specifically, the function of the marine police, army, or village committees is either unclear or unwritten. Confounding the problem, not all police have fishery-related duties. Confusion, therefore often exists as to who has authority in fishery matters. Reports of police and army intervention, both helpful and hampering fishery management, have occurred at BMUs around the lake (see Chapter 5, Lawrence 2013). It is often unclear whether these enforcement entities are required to report to, or collaborate with, local BMUs. It is also unclear whether army or police have any authority in fishery matters or where BMUs operate. Often times, police or army authority is abused for financial gain or procure valuable fish.

The lack of a consistent line of authority between any mid-level entities tends to disrupt the legitimacy of BMU committee leaders, thereby reducing their ability to conduct enforcement activities or other fishery-related activities.

Local fishery management: Beach Management Units

Beach Management Units are the foundation of Lake Victoria's fishery co-management program. They are legally empowered, local organizations that are responsible for the majority of fishing management activities, such as patrolling, enforcement of rules, and—to a lesser degree—

punishment, on Lake Victoria. Each BMU is located around pre-existing, local fish-landing sites (Ugandan Department of Fisheries Resources 2003). The BMUs are community-run governing organizations consisting of all users engaged in fisheries-related activities, including “boat owners, fishing crew members, fish mongers, artisanal fish processors, local gear makers and repairers, boat builders, fishing input suppliers, and industrial fish processors’ agents” (Ugandan Department of Fisheries Resources 2003, p. 18). Following notions of democratic decentralization, the fishing community must elect a BMU committee of 9–15 members to be drawn from their population and be inclusive of all stakeholder groups. Specifically, guidelines of membership of the committee specify that representation on the committee should follow a distribution of 30 percent boat owners; 30 percent crew (fishing laborers); 30 percent other community groups (including fish processors, boat makers, local gear makers or repairers, and fish equipment sellers); and 10 percent fish mongers and traders (LVFO 2005a). Efforts are in place to include those who were historically underrepresented or disenfranchised, including women, fish mongers, and traders (LVFO 2005a; LVFO 2011d). Thus, in addition to the required 10 percent fish mongers and traders, BMU committee guidelines require 30 percent membership of women, so as to empower women and consider their views in management decisions, especially based on their influence in the movement of fish (Ugandan Department of Fisheries Resources 2003; Kenyan Department of Fisheries 2006; United Republic of Tanzania 2011).

The BMU operates within pre-determined geographic boundaries, and assist with policy development, rules enforcement, and administrative duties pertaining to fishery-related activities. The BMUs: create and enforce their own local by-laws—governed by lake-wide guidelines—for sustainable fisheries management; serve as resource-data collection points for better fisheries

management and monitoring; and increase local users' capacity to manage their finances (Ebong et al. 2004).

Fishery management, such as enforcement of rules, patrolling for illegal gear and activities, and tax collection, are executed by the BMU committees. When done appropriately, these activities are carried out in "collaboration with the relevant authorities" (LVFO 2005a, p. 12). It is at the local level, the interface between the BMU committee (regulators) and fishers, that fisheries harvest is regulated and the resultant tax collection is conducted.

On enforcement of fisheries rules, BMUs major charge is specifically to "ensure compliance with local and national regulations . . . formulate and enforce community by-laws at the local level; [and] monitor fishing activities within their localities" (LVFO 2005a, p. 3). BMUs are therefore considered the action arm of fisheries management on the lake, designating the national departments of fisheries to supporting roles. BMU committee members have legal authority to conduct enforcement and the authority to arrest offenders, but BMU committees cannot prosecute offenders. BMU committee members are required to transfer arrested offenders and their illegal gear or fish to fisheries officers or the police. In Kenya and Tanzania, the authorized officers (fisheries officer or police) then need a court injunction to dispose of the illegal gear or fish. In Uganda, BMU committee members are allowed to destroy (usually through burning) illegal gear or fish by an authorized officer of the BMU committee.

The central government also bestows authority for tax collection associated with the fishery to the local level. Guidelines for BMUs, however, do not automatically allow BMU committees to collect taxes, instead, BMUs in Tanzania must apply to be the tender for tax collection; otherwise other entities (not the BMU committee) are in charge of tax collection. The purpose of tax and fine collection is to provide for sustainable and consistent operation, such as patrols for illegal activity.

When the central government bestows authority to BMUs to collect taxes, there is a level of trust that is demonstrated by the local level to conduct fisheries management operations (see Chapter 5 for a discussion on this subject).

Summary of Lake Victoria fishery co-management

The fishery co-management program was developed using five concepts intended to include fishing communities. These concepts include: decentralizing authority and resources from central-level government to allow lower-administration of fishery management; community inclusion through co-management institutions, whereby community organizations called BMUs were granted authority and ownership of the fishery through formal roles; and self-organization, a result of the other concepts, where local actors act on behalf of the government, the resource, and the community to implement fishery management activities. Each BMU on Lake Victoria is bound by the same set of fishing rules and guidelines, informed by all partners within the program. The LVFO guides BMUs in implementing fishery management policies and ensures that each BMU has the appropriate committee and structure outlined in BMU guidelines, and that each BMU has appropriate capacity (through trainings) to organize and follow established rules and guidelines for sustainable fishery management. To this end, responsible management and sustainable harvest are meant to be achieved by changing fisher's behavior through roles, regulations, and goals with input by the local communities and fishers (Stein 2008). The BMUs are also meant to share fishery management authority with each national government's fisheries department and enforce fishing regulations that are standardized around the lake to prevent illegal fishing. As will be shown in this dissertation, inefficiencies have emerged in Lake Victoria's co-management program; the intended processes, relationships, and administration do not always achieve the planned result.

It should be acknowledged that the fishery co-management program on Lake Victoria is the result of much larger efforts by the international community to influence the development of developing countries. The inefficiencies which have emerged in Lake Victoria's co-management program are, in part, a reflection on much larger efforts by the international community to intervene in poverty alleviation and debt relief undertaken by multi-national organizations, specifically the International Monetary Fund (IMF) and the World Bank. These two institutions provide financial and technical assistance to developing countries for development with the goal of reducing poverty. Their approach was strongly influenced by neoliberal economic policies which diminished livelihood alternatives in many sectors—such as agricultural livelihoods and formal sector employment—contributing to the general human migration toward “open-access” natural resources (Stein 2008), such as Lake Victoria's fishery. The emergence of the valuable Nile perch, both domestically and internationally, further augmented economic and livelihood incentives for migration towards the lake and fishing in an unsustainable manner.

The policies that these institutions provided for developing countries, including those around Lake Victoria, influenced the current conditions around the lake in general, and the development of the fishery co-management program specifically. Funding for development improved beach sites to prepare fish for international movement of fish are often provided by donor international organizations, bringing into question whether BMUs were established for the purpose of export (and benefiting international demand) rather than for development of communities. The effects of such policies will be seen throughout much of this dissertation, but for a more comprehensive discussion on the influences of development policies, how they impacted Lake Victoria's fishery co-management program, and the potential for perverse incentives, see Chapter 6.

Part III: Plan of dissertation

Cooperation in fishery management on Lake Victoria and why and how it occurs, specifically at the community level, are the central themes of this dissertation. Bottom-up approaches to fishery management in developing countries has been an approach during the past 30 years and is based on decentralization policies, where authority is devolved to lower levels of political authority, including the communities. **Chapter 2**, in part, answers the question: *Why is it necessary to approach fishery management with strong community involvement?* This chapter presents a comparative analysis of top-down and bottom-up approaches to fishery management, comparing the approaches to inclusion of community and stakeholder (those who are in one way or another engaged in fisheries) investments in the Laurentian Great Lakes and Lake Victoria, highlighting the necessary approaches for each geographic resource. This chapter establishes the necessary component of contemporary approaches to natural resource management in developing countries, that of community inclusion. Therefore, the discussion of Chapter 2 evaluates fishery management in both the Great Lakes and Lake Victoria Basins, with a focus on primary structures and institutions established to facilitate interjurisdictional cooperation, collaborative processes, and co-management. Fishery management in both regions involves both “top-down” and bottom-up” elements; top-down is defined as the execution of fishery management by central government agencies, and bottom-up is defined as resource-harvesters or community member involvement in the development of policy and engagement in management and enforcement.

Using the notions of bottom-up natural resource management approach from Chapter 2, **Chapter 3** uses Uganda as a case study for investigating decentralization on natural resource governance, comparing forest and fish resources to determine some of the strengths and weaknesses of the approach. With community participation the focus of co-management, it is essential that

devolution of authority to lower administrative levels, specifically community organizations, takes place. The value of natural resources, however, extends well past benefiting the communities', individuals, their subsistence livelihoods and development; the value often contributes to the government's Gross Domestic Product (GDP). The GDP benefits the country as a whole. Therefore, it is important that governments, when devolving authority to community organizations, strike a balance between the government's need for gaining profits from regional and international markets, with the communities' required fiscal flow and authority for conducting natural resource management bestowed on them by the government.

In developing countries, community members who rely on natural resources are affected most when a new management or governance arrangement is instituted to manage that natural resource. Natural resource management programs rely on the ability and willingness of individuals to follow regulations, often determining success of the program, especially management programs that rely on the community to execute them. **Chapter 4** highlights Lake Victoria's fishery co-management program, where inclusion of community features prominently in the administration of the program. Though sharing management responsibility and authority between higher-level government and community, the majority of fishery management responsibilities fall on the community. This chapter, thus, looks at the ability and will of communities and individuals to successfully act within the co-management program with little or no external influences or incentives. And further, determines that experience and familiarity with self-organization, prior to co-management, strengthens self-organization within the co-management program. I define the central characteristics of self-organization and co-management and why each is necessary. I include pre-existing fishery management experience as my dependent variable. By comparing characteristics of self-organization against communities which had pre-existing fishery management

organizations, I determined that communities exhibited stronger self-organization characteristics more often at BMUs which had pre-existing organizations, than those communities that did not have pre-existing organizations.

Chapter 5 examines the concept of legitimacy between the BMUs and higher levels of government within the fisheries co-management program. Legitimacy is the acceptance by fishers of the regulations, and of the authority that govern the fishery. I evaluate how effective fishery co-management institutions require a strong relationship between national government and communities, because weakness in this relationship can cause management of the fishery to be ineffective due to weak legitimacy. Two factors that undermine legitimacy of the BMUs: (1) lack of support from higher political authorities; and, (2) lack of financial returns from both the fishery and higher political authorities, thus reducing the BMUs' ability to function. Each of these two factors causes delegitimization of the BMUs, rendering many of them ineffective in their charge to implement fishery management duties.

Lake Victoria's current fishery management program is a result of the region's past and present social, ecological, and political influences. These influences, and many others, offer solutions and challenges in effectively managing the lake's fishery. These four chapters present the fishery management program on Lake Victoria, with a focus on fisher and community participation within the larger co-management program. They identify the necessity of community participation and how culture, norms, and resource use must be considered when instituting a management program; the precondition that communities have the ability to self-organize; and, requisite clear lines of authority and roles by all members of the institutions, to be efficacious. **Chapter 6** then, is a synthesis of the above chapters, while also evaluating the literature on decentralization and co-management to determine if the failures and successes of Lake Victoria's fishery program could be

due to inherent weaknesses in the approach. Much of the data reveals weaknesses and strengths within the co-management program, at first glance, might be approached with institutional fixes (see Chapters 3, 4, and 5). However, the concepts of decentralization and co-management must be investigated further to determine if there is an inherent weakness in these approaches because of faulty economic policies which initially influenced their creation.

CHAPTER 2:

**TOP-DOWN AND BOTTOM-UP APPROACHES IN THE MANAGEMENT
OF THE LAURENTIAN GREAT LAKES AND LAKE VICTORIA
FISHERIES: A COMPARISON OF TWO SHARED WATER BODIES⁴**

Abstract

Community participation is necessary in fishery management. On two of the world's largest freshwater systems: the Laurentian Great Lakes and Lake Victoria, community is included, to different degrees. Both lakes harbor valuable fisheries, depended upon by community members living along their shores. This chapter identifies the differences of these resources and produces a comparative analysis of top-down and bottom-up approaches to fishery management to determine the necessary investment of community inclusion in fishery management. The discussion evaluates fishery management with a focus on primary structures and institutions established to facilitate interjurisdictional cooperation, collaborative processes, and co-management. Fishery management in both regions involves both "top-down" and bottom-up" elements; top-down is defined as the execution of fishery management by central government agencies, and bottom-up is defined as resource-harvesters or community member involvement in the development of policy and engagement in management and enforcement. Results from this chapter reveal the necessity for a "bottom-up" approach on Lake Victoria, where community inclusion is required due to the nature of dependence on the fishery for their livelihoods.

⁴ This chapter was previously published as: Gaden et al. (2012). Top-down and bottom-up approaches in the management of the Laurentian Great Lakes and Lake Victoria fisheries: A comparison of two shared water bodies. Great Lakes Great Responsibilities: Lessons in Participatory Governance. V. I. Grover and G. Krantzberg. Enfield, New Hampshire, Science Publishers: 364-390.

Introduction

The Laurentian Great Lakes of North America and Lake Victoria of East Africa support thriving fisheries that provide millions of people with jobs, food, income, subsistence, and recreational opportunities. The Great Lakes⁵ comprise the largest system of freshwater lakes on the planet and Lake Superior and Lake Victoria rank first and second, respectively, in surface area as the world's two largest lakes. Fishery management authority in both regions is diffuse, with two nations, eight states, the province of Ontario, and U.S. tribes involved in Great Lakes fishery management and three partner states—Kenya, Tanzania, and Uganda—and scores of local entities called “Beach Management Units” involved in Lake Victoria fishery management. Officials in both regions coordinate their fishery management activities amongst themselves, while also understanding and incorporating stakeholder (those who are in one way or another engaged in fisheries) interests and needs into management actions.

This chapter discusses fishery management in both the Great Lakes and Lake Victoria Basins, with a focus on the primary structures and institutions established to facilitate interjurisdictional cooperation, collaborative processes, or co-management. Fishery management in both regions involves both “top-down” and bottom-up” elements; top-down is defined here as the execution of fishery management by central government agencies, and bottom-up is defined here as resource-harvesters or community members involvement in the development of policy and engagement in management and enforcement. In the Great Lakes region, top-down authority is exercised by each of the states, the province of Ontario, and U.S. tribes in that they develop and implement their fishery regulations on behalf of stakeholders, while bottom-up coordination is

⁵ Throughout this chapter, the term “Great Lakes” refers to the Laurentian Great Lakes: Lakes Superior, Michigan, Huron, Erie, Ontario, and the connecting channels. The Great Lakes discussed in this chapter are not to be confused with the “great lakes of Africa,” a term used to refer to Lakes Victoria, Malawi, Tanganyika, Albert, Kivu, Turkana, Edward, and others as a single group.

done at the discretion of each jurisdiction and, thus, varies across the region. Cooperative interjurisdictional management occurs as well, coordinated by the Great Lakes Fishery Commission through a governance arrangement called *A Joint Strategic Plan for Management of Great Lakes Fisheries* (GLFC 1997), which serves to moderate unilateral, parochial action on a shared resource. On Lake Victoria, the Lake Victoria Fisheries Organization (LVFO)—the fisheries management arm of the East African Community—harmonizes fisheries regulations between the three partner states. The LVFO also coordinates fishery management responsibilities between each partner state and their respective BMUs in the co-management program (LVFO 2001). In both the Great Lakes and Lake Victoria regions, the established coordination structures were developed deliberately and over time to meet the specific needs of the respective regions.

Dimensions of top-down and bottom-up

Management of the Great Lakes and Lake Victoria fisheries ultimately comes down to issues of sovereignty and how best to respect that sovereignty when resources are shared among jurisdictions. A “sovereign” government has defined territory, a defined population, autonomy, governmental powers, a legal identity, and fiscal independence (Holloway 1972). Sovereignty has two basic elements: the government’s ability to control its own domestic activities and its ability to interact autonomously and equally with other sovereigns (Haas and Sundgren 1990). Simply, sovereignty allows jurisdictions to pursue their own interests (Weiss 1999). A jurisdiction’s sovereignty and its ability to exercise its will is limited by its ability to defend itself from the encroachments of other jurisdictions, its ability to expend resources to encroach upon the sovereignty of others, or its willingness to give up some sovereignty to achieve a collective goal. Conversely, preventing the exercising of another jurisdiction’s sovereign will is difficult in the

absence of binding mechanisms that include enforcement or punishment. Nevertheless, as this chapter will discuss, sovereign, top-down execution of a jurisdiction's will can be tempered by strategic governance approaches.

In fishery management, sovereign actions affect and in turn are affected by fishers' behavior, attitudes, and compliance. A management decision involving a quota, for instance, will influence how much a commercial fisher will harvest, while that commercial fisher's level of compliance with the quota will likely influence future management decisions. Because the relationship between those who govern the fishery and those who are governed is somewhat symbiotic, the process about how decisions are made and ultimately who has the authority for the decisions are central to management.

Decisions and subsequent management actions are regularly considered to be "top-down" or "bottom-up." Top-down (also called "command-and-control" or "managerial") decisions descend from a central authority—usually a government agency with prevailing regulatory or management responsibilities—and contain often broad policies that are to be applied to specific cases (Rachlinski 2006). Top-down management is driven by the sovereign will, goals, and responsibilities of the government entrusted to allocate the fishery in the name of the public good; compliance on the part of the governed for regulations is sought, regardless of whether the governed agree with the jurisdiction's goals (Bryan 2004). Throughout the world, sovereign authorities generally have the power requisite to carry out fishery management and, in fact, top-down approaches to management practice like quota-setting, law enforcement, and bag limits are the models generally followed (Townsend and Pooley 1995; Acheson et al. 1998; Kooiman and Chuenpagdee 2005). Townsend and Pooley (1995) say

Not only does the government determine the appropriate level of rights to allocate at each point in time, but it also has the sole responsibility for all other decisions that determine stock conditions (such as closed seasons or minimum mesh sizes). The only responsibility that is distributed to individuals is the right to organize fishing activity within the constraint of the input or quota allocation.

Important here is the jurisdiction's ability to exercise its sovereign authority and the limited conveyance of discretion to the individual fishers. A jurisdiction's laws, regulations, and other fishery management mechanisms do not always include provisions mandating fisher involvement or consultation in decision-making (Bryan 2004), thus creating the inherent tendency toward top-down management.

In practice, however, government decisions are not made in a vacuum, absent of an understanding or consideration for socio-economic dimensions. Indeed, while government authorities may make fishery policies, laws, and regulations, they usually do so in consultation with the governed (Kooiman and Chuenpagdee 2005). Given the myriad interest in fisheries—whether stakeholders are interested in maintaining their livelihoods, preserving or enhancing recreational opportunities, or protecting subsistence fishing rights—governments rarely are afforded a blank cheque to impose unfettered power.

The incorporation of stakeholders into the process of fishery management is a “bottom-up” approach, and such approaches have been on the rise in fishery management for decades (Rettig et al. 1989; Townsend and Pooley 1995). Rettig et al. (1989) say: “What is . . . surprising is the increasing number of forums in which fishermen are seriously discussing new approaches [to management].” Bottom-up decisions emerge from the resource harvesters themselves and reflect case-specific policies that might be applied broadly (Rachlinski 2006). This public participation could spawn from citizens who, through political processes, lobbying, or coalition-building demand to be heard, or it could come from government actions to facilitate input (Head 2007).

This chapter focuses on the latter—the establishment of formal processes to ensure that interests beyond the individual government jurisdictions are incorporated into management. These processes take many forms, from formal to informal, from enforceable to non-binding, from narrow in focus to lake-wide or basin-wide. The point of bottom-up approaches on the Great Lakes is not to relinquish the government’s public trust responsibilities to non-governmental actors, rather, it is to create some mechanism to ensure that the public’s interests are heard and, to the greatest extent practicable, incorporated into management decisions. And on Lake Victoria, similarly, not to relinquish the government’s public trust responsibilities to non-government actors, but to ensure the public’s interests are heard and incorporated through the inclusion of community members in decision making and ceding or devolving authority to conduct actual management actions.

Management processes used in Great Lakes and Lake Victoria fishery management fall into four broad categories: (1) interjurisdictional cooperation, (2) collaborative management, (3) decentralization, and (4) co-management. These four general approaches illustrate progressively stronger movement toward true stakeholder empowerment. These approaches define how people work together and stem from the notion that stakeholder involvement legitimizes and enhances management decisions (Jentoft et al. 1998; Krueger and Decker 1999).

Interjurisdictional Cooperation

Sovereign entities, whether nations or sub-national units, retain authority over their natural resources. When a common property resource is involved, independent jurisdictions choose either to compete or cooperate when conflict arises (Kohn 1992). Sovereigns are “jurisdictionally equal” (Young 1994) and, as such, can erect barriers to intervention in their affairs. “Interjurisdictional

cooperation” results when jurisdictions must and do work together to protect and sustain the shared resource. Undoubtedly, sovereign jurisdictions will face conflict over their fishery management activities, and jurisdictions often have differing management philosophies, needs, constituent pressures, and political dynamics. Managers may feel conflicted over whether to satisfy their parochial interests or to consider the interests of other jurisdictions. In the absence of communications, conflicting management philosophies could cause jurisdictions to work at cross purposes; to permit selfish, unsustainable harvest; or to distrust others’ motivations or intentions.

To transcend competition and facilitate cooperation, a typical tool is the use of an institution or an agreement. On the international level, treaties are the strongest, most legalistic way nations cooperate. Treaties are enforceable through international law and often are supported by a commission or a secretariat to facilitate compliance. Agreements among non-federal governments (e.g. states, provinces, tribes) are also common. In the United States, for example, “interstate compacts” are agreements among states that bind them to a shared set of laws addressing a shared policy. In a non-binding or less-formal setting, governments discuss routinely interjurisdictional matters with each other and seek ways to harmonize regulations, share information, and establish reciprocal practices. In many cases, a commission or some other body is formed to ensure compliance with the agreement. The nature and level of formality of an agreement is, of course, highly dependent on the unique circumstances that exist and what the jurisdictions hope to accomplish. The ultimate goal is to facilitate interjurisdictional cooperation among sovereign entities.

Collaborative Management

The term “collaborative management” is often used synonymously with terms like “collaborative decision making,” “citizen participation,” “cooperative management,” or “public consultation,” but regardless of the term, such a process allows people to come together and address issues of mutual interest. Collaborative management occurs when citizens, either by government prompting or their own initiative, have an avenue to participate in the development and implementation of natural resource policies (Head 2007; Ansell and Gash 2008). Although the ability of citizens to be involved in bottom-up processes ranges broadly, collaborative processes go beyond simple information exchange and instead give participants a role in the decision-making process (Ansell and Gash 2008). Collaborative management as a concept, however, generally stops short of the government delegating responsibilities or authorities to stakeholders. Instead, collaborative management is a way for government to incorporate some bottom-up mechanisms into their decision-making processes.

Decentralization

“Decentralization” (also called “devolution”) of natural resource management occurs when a government formally cedes authority and power to lower orders of government, institutions, or the resource-extractors themselves (Ribot 2002b). The logic behind decentralized management is that local institutions and resource-harvesters can often better determine and respond to local needs and aspirations because of their intimate knowledge of the resource and their proximity to it (Ribot 2002b; Jentoft 2004). Indeed, some say the most effective governance is the arrangement closest to the resource, where local knowledge will be greatest and resource harvesters will have an enhanced ability to interact frequently with local officials (see Krantzberg 2012 for a discussion

on the role of municipalities in governance of the Great Lakes). Decentralization goes beyond delegation of responsibilities to local governments or resource harvesters; it is designed to increase the responsibility of the resource-harvester in hopes of better resource management. It creates a sense of ownership, investment, and deep responsibility for the resource (Jentoft 2004); it is an institutionalized form of community participation (Ribot 2002b). Decentralization, with its promises of effective delegation of responsibility to lower administrative levels, offers several challenges which can hinder effective functioning of natural resource governance. For example, the central government might be unwilling or unable to relinquish control to lower-level actors, whether because of paternalistic tendencies (Twyman 1998; Wunsch 2001; Ribot et al. 2006), or perverse incentives, whereby government is receiving benefits without the perceived necessity to devolve financial inputs (shirking their responsibilities to lower-administrative levels) (see Chapter 3: Lawrence and Watkins 2012 for discussion on inefficiencies of decentralization approach).

Co-management

“Co-management” is a broad, widely applied term that describes a cooperative arrangement whereby a traditional government agency shares power with other agencies, with local institutions, or even with the stakeholders themselves (Townsend and Pooley 1995; Sen and Nielsen 1996; Castro and Nielsen 2001; Kooiman and Chuenpagdee 2005; Armitage et al. 2007; Berkes 2007). Embedded in co-management is the sharing of authority and responsibilities (either voluntarily or forced, as in by a court), as multiple entities manage the same resource or the same waters, and share accountability. Co-management is a “horizontal” relationship, less focused on hierarchical control and more focused on the joint development and implementation of fisheries

policies between the governed and government (Pinkerton 1989; Townsend and Pooley 1995; Kooiman and Chuenpagdee 2005). A jurisdiction could choose to create a co-management arrangement or could have that arrangement forced upon it (i.e. because another jurisdiction has responsibilities over the same waters or a court imposes it). Commonly, co-management arises after significant conflict and serves as a way to overcome competition (Castro and Nielsen 2001).

A key aspect of co-management is that no one jurisdiction has complete autonomy over the resource (Pomeroy and Berkes 1997). The literature discusses a wide range of co-management arrangements covering a variety of natural resource policies. Most commonly in fisheries, co-management refers to arrangements made between governments and local harvesters as a way to involve the community at all levels of policy development, and often including implementation of the management program (Kearney 1989; Gough 2006). For instance, co-management could involve the government establishing broad policies and allowing local harvesters to work out details equitably amongst themselves (Pinkerton 1989). Co-management is also discussed in terms of the relationship between governments and native⁶ peoples, where management authorities and expected responsibilities are carefully negotiated and relatively clear (Castro and Nielsen 2001). In many instances, treaties, agreements, court orders, or other legal mechanisms affirm or afford native peoples autonomous rights, which might include management responsibilities (e.g. Busiahn 1989; Doubleday 1989). The important point in cases of co-management between government and indigenous communities is the fact that, in some instances, both authorities manage the same waters and that co-management arrangements recognize such things as who has the right to harvest, who can restrict access to the fishery, and who can participate in management (Doubleday 1989).

⁶ The term “native peoples” and “indigenous communities” in this chapter refers specifically to U.S. tribal or Native American, and Canadian First Nations groups, as sovereign entities.

One major challenge of co-management is the potential lack of balance in the power relationship between the government agency and the other entities involved in co-management (Townsend and Pooley 1995). In cases where the government devolves management to a local organization, a community, or a set of harvesters, the government still retains management authority and, as such, can still dominate management. Often the local participants will need central governments to enforce laws and regulations or even to preserve the rights of the fisher (Folke and Berkes 1995). In other cases, such as arrangements between native peoples and the government, the co-management regime is the result of court cases or binding negotiations (Busiahn 1989; Doubleday 1989). Additionally, central governments can devolve management power to lower-levels of authority and not provide enough resources for effective management to persist (see Chapter 3: Lawrence and Watkins 2013). Unless co-management exists under law or court order, governments can exercise their ability to ignore or supersede many management decisions made through a co-management program, given governments often have more power than local institutions. Even under formal co-management arrangements, central governments might not provide enough direction, and inefficiencies may result (see Chapter 5)

Scholars have identified benefits to a bottom-up approach. Berkes and Folke (1998), who discuss bottom-up actions in terms of co-management, hold the view that humans and the natural system are so closely linked that management decisions made without local knowledge or citizen input lean toward being arbitrary. Others stress that policies made through collaborative processes have the potential to be more balanced than top-down policies and convey a greater sense of ownership among the participants in the policies; citizens feel they have an enhanced stake in the matter (Pinkerton 1989; Hanna 1995; Krueger and Decker 1999; Bryan 2004; Pinkerton and John 2008; Pinkerton 2009). Because of a sense of shared ownership, policies originating at a local

level are likely more accepted than top-down policies that come from a distant source, thus reducing conflict, enhancing compliance, and lessening the costs of implementation and enforcement (Pinkerton 1989; Townsend and Pooley 1995; Berkes and Folke 1998; Acheson 2003; Bryan 2004; Pinkerton and John 2008).

While many espouse the benefits of a bottom-up approach, others are not sure it serves to mobilize citizens effectively or even produce better policies. For instance, while a problem might generate strong, local interest, stakeholders often participate with a special, parochial agenda and a lack of broad knowledge on the topic. Moreover, those who participate in a bottom-up process are often those who are the most passionate about the issue; the bottom-up process, therefore, does not necessarily incorporate the range of views (Manthesian 1998; Abel and Stephan 2000; van Sittert 2002). A policy that fails to take the range of view into consideration is, some argue, an undemocratic reflection of parochial interests; special interests are allowed to have an inordinate affect on policy to the detriment of those interested in larger-scale ecosystem protection (McCloskey 2000; Manring 2005). If the government relies on collaborative processes to legitimize policies, those at the table will dictate the policy, regardless if the policy is sound (Lange 2001). In an attempt to establish bottom-up policies that are more participatory, strong local interests could work to prevent change, divert culpability, and even allow managers to avoid making tough decisions (Coggins 2001).

Fishery Management on the Laurentian Great Lakes

The Great Lakes are a major natural feature on the North American continent. From east to west, the lakes span more than 1,200 kilometers, a distance that is doubled if the Saint Lawrence River is included. Today, as historically, the Great Lakes fishery is important to the region

economically and culturally. The region has a rich history of native fishing from the time of human inhabitation, commercial fishing since European settlement, and recreational fishing starting in the late 1800s and burgeoning the middle of the 20th century. Currently, the Great Lakes fishery provides at least USD 7 billion (ASA 2008) in economic return to the people of Canada and the United States annually, and hundreds of thousands of people earn income from fish-related business including commercial fishing, fish processing, charter fishing, and related industries such as tourism, supplying bait, and boat manufacturing.

The lakes' large geographic range spreads the fishery resources across many political jurisdictions, thus also diffusing fishery management responsibilities. In the Great Lakes region, two nations, eight states, the province of Ontario, and Native American Tribes border the lakes, and the non-federal governments exercise sovereign control over their fisheries, including migratory fishes. Because the state and provincial boundaries extend to the international border (Piper 1967; Bogue 2000), and because tribal fishing areas are defined by treaties (Busiahn 1985; Busiahn 1989; Zorn 1989; Flanagan 2000), jurisdictional authorities are usually clear. Each jurisdiction formulates and executes its own policies in its own waters, illustrating that a jurisdiction will be motivated by its legal needs and political desires (Francis and Regier 1995). Through enumerated powers, ownership rights, court cases, precedent, and legislation, each of the non-federal jurisdictions retained or attained the authority to manage its section of the resource, though with some federal involvement as well. These authorities are generally understood and accepted, though they are not always exclusive (Gaden et al. 2011). In the Great Lakes region, the states, in managing their fisheries, behave like nations.

The non-federal jurisdictions operate through their own agencies (e.g. Departments of Natural Resources) to carry out fishery management. These jurisdictions maintain the authority

to manage in their own waters and, in fact, the Great Lakes fishery are highly regulated. The individual jurisdictions establish harvest regulations, issue fishing licenses, stock fish, enforce the law, and conduct fisheries assessment. The individual state, provincial, and tribal legislative and regulatory bodies have full control over their own waters; they govern the behavior of their own citizens and have their own processes to develop, promulgate, and enforce their fishery regulations (Bence and Smith 1999; Brown et al. 1999). As such, Great Lakes fishery management has inherent top-down tendencies, since sovereignty over fishery resources allows each authority to impose its own regulations. Individual fishers in the Great Lakes region do not have the resource with each other *per se*, as fisher behavior is governed by the will of government; fishers have little ability themselves to make allocation decisions beyond those determined by their personal ethics (e.g. willingness to break the law, belief in harvest versus catch-and-release, etc.). In other words, fishers' behavior is governed by the top-down will of the individual jurisdictions, as determined and implemented through the management agencies.

How that authority is exercised varies from jurisdiction to jurisdiction. For example, in the State of Michigan, a Natural Resources Commission (made up of individuals appointed by the governor) and the Department of Natural Resources (DNR) are each involved in fishery matters, but the commission is consultative only, with the DNR retaining by law the ability to issue fishery rules and regulations. In the State of Ohio, the Department of Natural Resources has the authority to issue administrative rules that establish such things as bag limits, open and closed seasons, and fish size limits, though any rule change requires formal hearings and economic analyses. In Ontario, the Minister of Natural Resources maintains complete authority to issue commercial fishing regulations, while sport regulations are developed by the minister and formally adopted by the federal government. Individual tribes each retain the authority over on-reservation fishing and

shares responsibilities with the states in ceded waters. To develop management regulations, each tribe has its own natural-resource committee, but with varying levels of authority. The two intertribal organizations work to coordinate the activities of the member tribes, but the intertribal organizations do not have authority beyond that which is delegated to them. The other states each carry out their fishery management based on variations of these examples.

In practice, however, top-down management does not occur without considerable consultation with stakeholders. Indeed, the diffuse nature of jurisdictional authority and heavily engaged constituency in the Great Lakes demand bottom-up management. Great Lakes fishery managers from the non-federal jurisdictions face myriad interests and organized stakeholder groups. These stakeholders, who tend to be well-organized, range from those promoting a Pacific salmon fishery to promoting commercial fishing to protecting native biodiversity. The fishery managers must balance those interests if they wish to make their policies defensible with both the public and with politicians (Ferreri et al. 1999; Krueger and Decker 1999; Gaden 2007).

To balance interests and incorporate bottom-up actions into individual management decisions, each of the non-federal jurisdictions, in one way or another, has established a robust regime for consulting stakeholders and incorporating their desires into management. These consultations vary widely in formality, from advisory-committee-type structures (whereby the jurisdiction assembles citizens to discuss proposed rules and regulations) to direct outreach with fishing clubs or business leaders to hear concerns, float new ideas, and receive other types of input. The cooperative arrangements between government and stakeholders that exist throughout the Great Lakes Basin influence, to varying degrees, the top-down decisions that are made in each jurisdiction. While some of the jurisdictions are compelled by law to consult stakeholders before, say, the promulgation of an administrative rule, none are required to accept stakeholders' input.

Bottom-up mechanisms are designed to create some degree of transparency in the decision-making process and allow stakeholders direct access to fishery officials. In Michigan and Ontario, for instance, lake-by-lake advisory committees and zone councils, respectively, are convened regularly as a way for DNR and ministry officials to meet directly with stakeholders; both are relatively formal processes. In Wisconsin, a “Conservation Congress,” comprising elected citizens, meets annually to propose fishery rules. Approved regulations go before the Wisconsin Natural Resources Board, though neither the board nor the Wisconsin Department of Natural Resources must accept the decisions of the Conservation Congress. In both New York and Ohio, public comment periods are required for the establishment or change of administrative rules. Some individual U.S. tribes retain positions on their natural resource boards for commercial fishers. Fishery management staff in all jurisdictions attend annual meetings of sport fishing clubs, commercial fishing associations, and tribal natural resource committees for one-on-one conversations in informal settings. Overall, lines of communication between managers and stakeholders are open, regular, robust, and near-constant; each jurisdiction has its own process and culture dictating how those communications occur.

Stakeholder input is an integral component of fishery management throughout the Great Lakes Basin. Fishery managers interviewed for this chapter indicated that their consultations with harvesters, whether required by law or not, frequently influence policy decisions, because managers have the ability to better gauge stakeholder acceptance and, thus, potential compliance. While none of the managers suggested they compromise the fishery by accepting suggestions that would be unsustainable, they do use the consultations to understand socio-economic needs and desires and then to formulate policies that are consistent with those needs. Said one fishery manager “Stakeholder groups need to know their role in helping to attain goals, but managers need to know

the stakeholders' desires so that alternative solutions can be proposed and evaluated." Indeed, consultation with stakeholders is one way to facilitate the development of alternative solutions that might be both desirable to the stakeholders and contribute to achieving the management goals.

Fishery managers also report considerable communication benefits from a bottom-up, consultative process. Such a process is a "two-way street," said one manager, as it not only allows the managers to hear from stakeholders, but it also allows the stakeholders to hear from the managers about the agency's strategies and goals. Stakeholders, by participating in the process, feel more vested in the outcome than with a straight top-down approach. Managers, by consulting the stakeholders, have the opportunity to explain their policies and promote them directly with stakeholders. In fact, fishery managers generally hold that a major benefit of consultation is it heightens the chances that stakeholders will accept and embrace the agencies' policies and then communicate that acceptance to other members of their community (Gaden 2007). Stakeholders who have been in regular contact with the management agency are stakeholders who are more informed and better educated on the rationale behind the agency's decisions. Such participants are more likely to talk-up the policies with others and eschew political routes that might circumvent the jurisdiction's decisions. Broad acceptance also heightens the chances that fishers' behavior will be consistent with the agency's regulations.

Unlike the ability to enforce the laws and regulations upon their own citizens in a top-down manner, the individual jurisdictions cannot coerce their neighboring jurisdiction's behavior. Thus, a process of "interjurisdictional cooperation" needs to exist to help the jurisdictions coordinate fishery management amongst themselves. For much of the early history of Great Lakes fishery management, the many jurisdictions actually showed very little interest in harmonizing their fishery policies and instead exercised their sovereign will, regardless of the actions of other

authorities (Gallagher et al. 1942; Piper 1967; Bogue 2000; Gaden et al. 2011). This parochial use of top-down authority resulted in conflicting and unsustainable practices, which in turn led to serious declines of fishery resources (Bogue 2000; Dempsey 2001). This untenable fishery governance regime began to change during the 1960s when the binational Great Lakes Fishery Commission—urged by its enabling treaty to establish working relationships—formed “lake committees” as a place for state, provincial, and federal agencies to discuss matters and share information. By 1981, noting the need to be more strategic in policy and more defensive in fending off federal intrusion, the jurisdictions created a regional arrangement—*A Joint Strategic Plan for Management of Great Lakes Fisheries*—to help them identify and work toward their shared objectives (Gaden et al. 2011). The plan is non-binding and, as such, is only as effective as the signatories wish it to be. The process is based on consensus and all members must accept (or at least be able to live with) a decision before the decision can move forward.

“Lake committees” are the mechanisms used to achieve interjurisdictional cooperation and to implement the plan. Under the plan, high-ranking officials from the non-federal agencies on each lake meet as a group to coordinate their fishery management responsibilities. To facilitate the generation of science and integrate the work of the field biologists into management, each lake committee has at least one technical committee, which consists of field-level professionals who undertake such tasks as deciding on data needs and then gathering and interpreting the data. Unlike the lake committees, whose members represent agencies with management authority, technical committees and task groups include as members federal officials and, by invitation, outside experts, such as academicians. Entities that have relevant data to share and that have suitable biological expertise are usually invited to participate in the technical committees. Through the Joint Strategic Plan, fishery managers meet regularly to engage in three primary collective action

activities: to collect and share information; to decide on tasks and who carries them out; and to develop shared plans, policies, and objectives. The Joint Strategic Plan helps the fishery managers achieve shared goals through a cooperative process.

The deliberations through the Joint Strategic Plan process reflect elements of bottom-up management, whereby the jurisdictions take more than their individual will into account as they formulate their fishery policies. Although deliberations under the Joint Strategic Plan influence each jurisdiction's management decisions, the Joint Strategic Plan has served to coerce the jurisdictions, gently, into doing things they might not otherwise have done absent a common forum (Gaden 2007). The result of this interjurisdictional cooperative management is a process that facilitates collective action to manage a common property resource. The lake technical committees further facilitate the Joint Strategic Plan process. The technical committees, by ensuring joint collection and interpretation of data, ensure that no one entity has a monopoly of data and, therefore, can have an inordinate influence over decisions. Moreover, as the data have been collected and analyzed jointly, disagreements about the underlying science and the status of fish stocks do not occur. The work of the technical committees reflects the shared understanding of the field-level scientists because the information needs were identified and then collected and analyzed in a highly coordinated fashion.

Finally, in some areas of the Great Lakes, an arrangement that combines “interjurisdictional cooperation” and “co-management” exists between the States of Michigan, Wisconsin, and Minnesota; the U.S. federal government; and Native American tribes. The role of U.S. tribes in Great Lakes fishery management is relatively strong⁷: tribes have exclusive fishing

⁷ In Canada, although treaties between the First Nations and the federal government also include tribal rights to fish and hunt, the courts have ruled that federal and provincial regulations do not themselves deny tribes access to fish, a conclusion that has often resulted in federal and provincial management on behalf of the tribes. In other words, co-

rights on-reservation, where other fishing laws (e.g. state laws) are generally not applicable (Busiahn 1985; Cohen 1988). Off-reservation (areas known as “ceded” or “sold” lands, which include adjacent waters), tribal fishing rights in the Great Lakes were recognized in two treaties—one in 1836 and one in 1842—between the tribes and the U.S. federal government (Anonymous 1873; Mattes et al. 2005; GLIFWC 2006; Kappler [2004] 2006).

While in the past, Native fishers were subjected to state fishery laws and regulations, court cases in the 1970s and 1980s re-affirmed tribal fishing rights; rights that could be exercised without a state license (Busiahn 1989; Chiarappa and Szylvian 2003; Zorn 2003). The major case affirming Tribal rights is *U.S. v. Michigan* of 1979 (United States District Court 1979). In this case, the court ruled that the state does not have exclusive management authority in the ceded waters. The consequence of this and other rulings has been to allow tribes to govern their own fishing activities, such as issuing licenses to their members, conducting law enforcement, and otherwise managing their fisheries, though the tribes must still manage consistently with state conservation goals (Busiahn 1985; 1989; Zorn 1989; Schlender undated).

Tribal responsibilities in some cases, thus, overlap with state authorities, and both state and tribes regulate fisheries in the same waters. To manage a shared resource in this setting, the states, the federal government, and the U.S. tribes have developed an arrangement that maintains a significant level of autonomy for tribes to manage their fisheries, delineates respective state and tribal activities in the same waters that they each manage, allows for deliberation to occur between the states and the tribes, and brings tribes to the same interjurisdictional table that is used to facilitate interstate/provincial management on shared lakes. In the Great Lakes, the states and the tribes work together to formulate and adhere to agreements that allow licensing, open and closed

management between the Canadian First Nations and the federal and provincial governments does not occur nearly to the same degree as it does in the upper Great Lakes region between the tribes and the state and federal governments.

seasons, species-specific management, and law enforcement, among other things. They collaborate on the development of shared policies. The “Consent Decree,” an agreement between tribes, Michigan, and the federal government, governs the co-management relationship in northern Lakes Michigan and Huron and in eastern Lake Superior, and court-ordered tribal consensus on state management decisions and formal state-tribal committees govern co-management in western Lake Superior (United States District Court 2000; Zorn 2003).

Overall, each jurisdiction is responsible for its own waters, deciding on its own regulations, enforcing its own laws, and consulting its own citizens. The process to consult citizens varies by jurisdiction, and some processes are more formal than others. Nevertheless, all jurisdictions have mechanisms in place to meet with and consult stakeholders. Even with this relatively strong ability to manage parochially, the jurisdictions have also recognized the shared nature of the fishery and established a cooperative process that at once respects sovereignty while at the same time facilitates cooperative fishery management. That cooperative process is driven by the Joint Strategic Plan, the lake committees, and the technical committees. This structure is intended to promote the emergence of science through the technical committees. This structure is intended to promote the emergence of science through the technical process and to allow the independent jurisdictions to work together, avoid parochialism, and develop shared interjurisdictional management policies. It is a way for the independent jurisdictions to engage in interjurisdictional, cooperative management on a common property resource. Native American tribes are closely involved in management, participating in the process through interjurisdictional settings like the Joint Strategic Plan and exercising their rights in a co-management-like way in treaty waters.

Fishery Management on Lake Victoria

Lake Victoria is second only to Lake Superior in size, by surface area, in the world. A multi-use resource, it is known for its highly productive fishery, with about one million tons of annual fish production (LVFO 2011a). The fishery employs more than three million people and brings in USD 600 million annually to the East African Community (Njiru et al. 2008). Though only a single tropical lake, it produces more fish catch than all of the commercial fisheries on the five Laurentian Great Lakes combined. Like many other freshwater systems around the world, Lake Victoria faces numerous challenges including environmental degradation, introduction of exotic species, eutrophication, and overfishing. Recent stock assessments, for instance, have indicated a serious decline in Nile perch (*Lates niloticus*) due to overfishing (Mkumbo and Mlaponi 2007; Mkumbo et al. 2007; Ojuok et al. 2007; Witte et al. 2007; Njiru et al. 2008).

Like the Laurentian Great Lakes, the management of Lake Victoria is multi-jurisdictional; three countries—Kenya, Tanzania, and Uganda—share the lake, 6, 51, and 43 percent respectively (Njiru et al. 2008). Whereas fishery management authority on the Great Lakes is vested in the non-federal governments, authority on Lake Victoria is decided at the national political level. Compared to the Great Lakes, where bottom-up processes are the prerogative of the management agencies and are largely *consultative*, Lake Victoria, while vesting management authority in national governments, nevertheless has developed a much more robust bottom-up process to decentralize authority and facilitate considerable co-management between the government and the fishing communities. In fact, the social, political, and economic differences between the Laurentian Great Lakes and Lake Victoria create dynamics which change what “bottom-up” means and how it is implemented in each region. Because the governments see Lake Victoria’s resources as a key factor in alleviating poverty, the success and failure of efforts to achieve sustainable

fisheries might be considered a much higher priority in that region than in the Great Lakes. Moreover, where interest groups and local collective action can influence fisheries policies in the Great Lakes, in Lake Victoria, inherent weakness in community organization disenfranchises a large segment of Lake Victoria's fishing communities; fishing communities who depend on the resource as a relief from poverty. Thus, it is necessary to empower Lake Victoria communities in a "bottom-up" arrangement, such as formalizing co-management institutions between the national-level government and the communities. The fisheries governance regime that has emerged on Lake Victoria was designed to address many of the challenges of fishery management on a common property resource by applying tenets of decentralization and co-management.

Decentralization of Lake Victoria fishery management largely evolved from a lack of compliance on the part of the fishers and the inability of the national governments to institute policies at a basin-wide level. Historically, a centralized, top-down approach to natural resource management in East Africa, exercised by sovereign nations, was based on both resource and economic extractive policies that neither benefited the resource nor the local populations (see Wiebe and Dodge 1987; Stein 2008). This led the fishers to distrust the government and it created a culture of fishing activity that resembled Hardin's (1968) "Tragedy of the Commons." Further, a lack of agreement on measures to enforce shared management recommendations increased the level of government distrust and heavy skepticism of authority by the people who depended on the resource for their income (Wilson 2002; Abila et al. 2006; Mkumbo 2006; van der Knaap and Ligtoet 2006). Unsustainable, parochial fishing practices contributed to the fisheries' exploitation at more than two times its sustainable level (Hecky 2003), devastating the resource, diminishing economic benefits, and harming livelihoods.

The three countries that border the lake have acknowledged that harvest by fishers in one partner state will have impacts on harvest of other fishers in the lake's partner states. To coordinate their sovereign actions, the three nations formed the Lake Victoria Fisheries Organization by convention, which entered into force on May 24, 1996. The LVFO plays two important roles: first, the LVFO coordinates fishery management and research between the partner states and second, it develops and adopts conservation and management measures for the sustainable utilization of the fishery resources of the lake.

The LVFO is the central, harmonizing organization within Lake Victoria's fishery management program. Kenya, Tanzania, and Uganda are the partner states, or contracting parties within the fishery management program, and the other organizations included in the fishery management program on Lake Victoria include the three partner states' fisheries departments, research institutions, and the local fishery communities that exist around the lake. Like *A Joint Strategic Plan for Management of Great Lakes Fisheries*, the LVFO is a way to achieve "interjurisdictional cooperation" between the partner states.

The LVFO achieves its regional coordination through the organization's statutory organs (LVFO 2001). The Fisheries Management and Fisheries Research committees (constituted by directors of fisheries departments and research institutions from the three contracting parties) are the technical arms of the LVFO, which receive fisheries management and research information from the organization's working groups. The working groups conduct research and socio-economic studies related to the status of the stocks and the welfare of the fishing communities. The two committees recommend measures to the LVFO's Executive Committee (made up of the six directors of fisheries management and research institutions) which in turn considers and recommends appropriate management measures to the Policy Steering Committee, comprising

chief executives of the ministries dealing with fisheries matters in each of the contracting parties. The Policy Steering Committee submits the recommendations to the supreme body, the Council of Ministers (comprising ministers responsible for fisheries matters in the contracting parties), which adopts management and conservation measures. The LVFO committees hold one session annually to review progress and compliance in implementing the agreed measures. The measures are also revised as needed. The Council of Ministers meets biennially, though special sessions are held as the need arises.

At the regional level, the LVFO plays the role of harmonizing measures, advocating for the resources and the fishers, and disseminating the agreed measures to the contracting parties after adoption by the Council of Ministers. The convention establishing the LVFO demands the contracting parties provide the organization with such laws, regulations and any other related documents and information for the purpose of assessing compliance or any disparities which will warrant adjustments and harmonization.

Top-down exertion of authority in the Lake Victoria region is essentially used only to develop broad policies through the LVFO's Council of Ministers. The contracting parties adopt the agreed regional measures and formulate their national laws and regulations to fit their situations and enforce them in their territorial waters. Each contracting party exercises direct (top-down) authority on matters regarding enforcement of laws and regulations. Like the Joint Strategic Plan in the Great Lakes region, the LVFO committee structure provides the mechanism to seek and implement shared objectives among the parties. However, also like the Great Lakes region, each of the national governments separately controls policy-making, implementation, and enforcement within their area of jurisdiction. While the LVFO co-management program is non-binding, the ministers in each of the three contracting parties sharing Lake Victoria depend on the LVFO to

provide independent advice, develop sound science, and facilitate the development of policies that maximize the benefits of Lake Victoria stakeholders. Additionally, *Article XIII, Sect 4* of the convention establishing the LVFO states that “[E]ach Contracting Party shall remain free to adopt national laws and regulations more stringent or extensive than those required to fulfill its obligations” (LVFO 2001). The three partner states report their progress in implementing agreed measures to the executive secretary of the LVFO.

Two overarching premises influence community involvement in natural resource management: first, the need for communities to have the opportunity to make decisions about management of the resource on which they rely, and second, effective resource management through the use of local knowledge (Coffey 2005). The LVFO is designed to overcome the differences in fisheries governance between the three governments. At the same time, local-harvesters or community participation in natural resource management programs in developing countries is seen as a necessary component for effectively managing natural resources, in part because of the past failure of centralized resource management efforts and in part because of the realization that communities are essential for effective management (see Kaimowitz and Ribot 2002).

While the three partner states sharing Lake Victoria exercise their sovereign will and use established mechanisms to work together, they also have ways to engage directly with the stakeholders, primarily the subsistence fishers of Lake Victoria, in a bottom-up way. Lake Victoria fishing is highly localized and community-based; fishing communities are spread throughout the lake’s shoreline. To ensure participation of the fishing communities and other stakeholders in resource management and development, the LVFO adopted in 2007 a co-management approach called “Beach Management Units,” or BMUs. BMUs, which are legally recognized by each

contracting party, are community-run governing bodies which manage the fishery and share policy development, enforcement, and research duties with each national government's fisheries department. The fishers themselves throughout the Lake Victoria Basin help standardize regulations of fisheries extraction. The BMU committees enforce the lake's fishing regulations, serve as resource-data collection points for better fisheries management and monitoring, and increase members' capacity to manage their fishing profits (Ebong et al. 2004). BMUs have been established at all Lake Victoria landing sites, totaling 1,069 BMUs, with each BMU containing no fewer than 30 fishing boats. Consequently, landing sites with fewer than 30 boats are required to amalgamate with other smaller sites to form a single BMU. These beach-level management institutions operate using Harmonized Beach Management Guidelines, which were approved by the LVFO's Council of Ministers in 2006 (LVFO 2005a). According to the BMU guidelines, each BMU has a structured executive committee consisting of a wide range of local stakeholders (e.g. fishers, boat owners, traders, gear repairers); each set of guidelines is formally legalized. Collaborative action between neighboring BMUs is facilitated by the formation of higher level BMU committees aligned to government administrative systems in each country. The BMU committees at district and national levels are represented regionally by a regional committee (called the Regional BMU Network), which is offered membership on the statutory technical fisheries management and scientific committees of the LVFO. BMU's operational funding are designed to come from levying equipment and fishing licensing fees, fish-catch taxes, and illegal fishing fines on individuals involved in the fishery (LVFO 2005a). Fees, taxes, and fines are designed to be levied by the BMU committee, vetted through district-level governments, and returned to the BMU as a percentage of the district total. In some cases, fishers make voluntary, in-kind contributions toward BMU operations, often in the form of fish to be sold, with the

proceeds used to pay workers for cleaning the surroundings at a given BMU, local security, or other social programs.

To include other key stakeholders in fishery management and to ensure compliance, the Fish Processors and Exporters Associations of the three partner states established a collaborative process, known as the East African Industrial Fishing and Fish Processors Association (EAIFFPA). The association is given membership on the statutory technical committees of the LVFO. The EAIFFPA has imposed strict guidelines parallel to those of the LVFO's to ensure sustainable harvest of Nile perch in Lake Victoria. Severe penalties are imposed on processors who fail to follow the guidelines. The EAIFFPA has also established a self-monitoring team in each partner state to ensure compliance by fish processing factories to adhere to slot sizes—minimum and maximum acceptable lengths—for Nile perch processing and have moved ahead to establish a regional self-monitoring team which is allowed in any fish factory in the three nations for inspections. Any factory not complying is reported to the government authorities, which can deny a factory to operate for a given time as per the agreed guidelines governing self-monitoring.

The EAIFFPA and BMU committees play active roles in self-policing, enforcement, and educating their respective communities. They are allowed to develop their own by-laws so long as the by-laws are consistent with the national fisheries laws or regulations. The authority is, therefore, with the central government, but with elevated powers to the different stakeholder groups like the BMUs. BMU committees have a mandate to protect and conserve fishery resources in their areas of jurisdiction, in collaboration with the fisheries officers from the local and district levels. National fisheries committees, which are formed pursuant to the convention, bring in all the relevant stakeholders at the national level to deliberate on national fisheries matters before they are taken to the regional level for harmonization through LVFO structures.

The Lake Victoria fishery management program is a co-management approach to managing Lake Victoria's fisheries. The institutions are based on decentralization, which include a formal relationship between the national government and local communities through the BMUs. This co-management program incorporates the concepts that active citizen participation at all levels of fisheries governance can protect the diverse interests of those affected by environmental problems (Lemos and Agrawal 2006; Nunan 2006); that natural resources are a source of livelihood and income, and, therefore, are best managed by the local people (self-governance) (Kaimowitz and Ribot 2002; Ostrom 2009); and, that rather than being an expense for central governments, natural resources become a major source of revenue and poverty alleviation when the appropriate property rights and management scheme is instituted (Kaimowitz and Ribot 2002).

Bottom-up processes of fishery management are indeed stronger and more formalized in the Lake Victoria region than in the Great Lakes region. Through the fisheries governance program on Lake Victoria, the three nations include all fisheries stakeholders in decision-making, incorporate the needs of the poor and disenfranchised, and employ bottom-up, community-based development in management plans. These design elements are intended to motivate and reinforce legal fishing behavior and, therefore, a sustainable fishery. Like the non-federal jurisdictions on the Great Lakes, the three nations of Lake Victoria have also developed processes for interjurisdictional cooperative management. The three partner states have agreed to work together to achieve shared objectives, but in a way that respects their sovereignty and their individual constitutional procedures and national laws. And, like the Great Lakes jurisdictions, they agree to implement any decisions that arise through the consensus-based, cooperative process.

Conclusion

Neither the Lake Victoria nor Laurentian Great Lakes fisheries are strictly “open access” resources; rather, governments hold the fisheries in public trust, determine the rules and regulations governing fishers’ behavior, carry out fishery management actions, and enforce the regulations. Authorities in both the Great Lakes and Lake Victoria regions decide on the level of public involvement or devolution to communities in management. The Lake Victoria and Great Lakes fisheries are “common property resources” to the extent that nations and sub-national jurisdictions, with sovereign rights and responsibilities, share the fisheries. Resource-extractors are the jurisdictions themselves who, in the case of the Great Lakes, decide how much of the resource they will allocate to individual fishers⁸ and in the case of Lake Victoria, control harvest by limiting the type of gear, harvest techniques, and fishing in area of spawning habitat.

In both the Great Lakes and Lake Victoria Basin, multiple jurisdictions and stakeholders share the resource, each with varying views about how the fisheries should be managed. Governments in both basins—whether federal or non-federal—strongly retain their sovereignty over their fishery resources and exert top-down authority as they manage fishers’ behaviors. Even with multi-jurisdictional agreements like *A Joint Strategic Plan for Management of Great Lakes Fisheries* and the LVFO’s Fisheries Management Plan, day-to-day management decisions that affect fishers’ behavior—decisions related to licensing, harvest, gear—remain the prerogative of the governments, and the governments generally remain willing and able to exert their will as they see fit.

⁸ In the Great Lakes, jurisdictions establish individual commercial fishing quotas or individual bag limits for recreational anglers. In Lake Victoria, there is no system of allocation to individual fishers, but once a fisher has a fishing license, he fishes throughout the year.

Nevertheless, both basins to varying degrees maintain cooperative management between the governments and the stakeholders. In the Great Lakes region, interjurisdictional cooperation and co-management exists between government and the U.S. tribes. Interjurisdictional cooperation also exists among the non-federal agencies through the Joint Strategic Plan, and each of the non-federal jurisdictions incorporates bottom-up collaborative processes into their management decisions through the use of advisory council-type arrangements. On Lake Victoria, the three partner states have established a formal co-management program administered by the Lake Victoria Fisheries Organization. Local participation is incorporated into policy through the legally recognized Beach Management Units, which reflect decentralization of authority and co-management. Indeed, in Lake Victoria, local governance arrangements serve as the foundation of influencing fishers' behavior and to instill a sense of ownership in the resource.

In both the Great Lakes and Lake Victoria, the management structures reflect the history, composition of the fisheries, and particular socio-economic needs of the fishers. In the Great Lakes region, non-federal sovereignty allows each jurisdiction to promulgate its own fishery regulations, while the shared nature of the fishery mandates co-management with the U.S. tribes and cooperation among the non-federal entities. The growth of educated, capable stakeholders, representing myriad interests, mandates a high level of consultation with the stakeholders so that policies are better accepted. In Lake Victoria, a lack of financial resources at the national level to enforce fishery regulations has led to the emergence and sanction of the local Beach Management Unit as the primary community-level fishery management arrangement. Moreover, the nature of dependence on fisheries by fishing communities on Lake Victoria necessitates a more-robust co-management relationship between the national government and fishers than on the Great Lakes.

CHAPTER 3:

IT TAKES MORE THAN A VILLAGE: THE CHALLENGE OF CO-MANAGEMENT IN UGANDA'S FISHERY AND FORESTRY SECTORS⁹

Abstract

Decentralization approaches have emerged in response to failed centralized natural resource management programs, which are often bereft of community involvement. Decentralization is the devolution of authority and resources by central government authorities to lower political levels for the purpose of administering resource management. Decentralization programs in Uganda—the focus of this chapter—were realized through co-management programs, relationships between the central government and community organizations. The successful administration of Uganda's natural resource management program, as promised through decentralization approach, relies on adequate authority, communications, and financial resources being devolved or distributed to the communities. Focusing on Uganda's highly valued forests and fisheries, we noted weakness in Uganda's approach: revenue from these resources are distributed unequally, with the central government keeping disproportionately more than lower level management entities; and, the central government remains overwhelmingly in charge of policy development and had failed to support lower-level management entities adequately. These weaknesses highlight some of the weaknesses in the decentralized program, and result in ineffective community participation and allow for maximum resource extraction activities to take precedence over ecosystem health, resource sustainability and longevity, and community development. We determined that successful natural resource decentralization requires strengthening local natural resource organizations with increased fiscal flow, enforcement, monitoring, and judicial powers. To accomplish this, central government priorities toward community management organizations must change.

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Introduction

During the past 200 years, approaches to natural resource management in many developing countries have transformed from locally devised indigenous self-governance, to state-centered governance, to current notions of shared responsibilities between local communities and central government (Agrawal and Lemos 2007). In this article, we review current governance approaches used to manage forest and fishery resources in Uganda. We argue that the relationship between central government and local communities in forest and fishery resource management is unbalanced, and thus ineffective. Despite attempts at decentralizing management of forest and fishery resources in Uganda, market often value takes priority over local development and resource sustainability. We argue that successful decentralization of *any* natural resource requires an active and compromising central government that will empower local communities by sharing fiscal benefits and by legitimating judicial power beyond rhetorical policies. Biologically diverse resources need strong institutions at multiple government scales to (1) overcome high market value as the dominant influence on resource management and (2) consider subsistence and ecological values, which benefit development and livelihood of local communities and increase sustainability of the resource.

Our argument is guided by the concept of social-ecological systems, which acknowledges that natural resources are embedded in complex interactions occurring between ecological (biological) and human (social and political) systems (Ostrom 2009). This concept recognizes that social and political institutions (formal and informal organizations, rules, regulations, sanctions, and taboos and customs) matter too. Institutions are affected by their biophysical, infrastructural, demographic, economic and socio-political contexts (see Béné 2003; Ostrom 2005; Agrawal and Chhatre 2006; Janssen et al. 2007). Our analysis of data collected in both forest and fishery sectors

of Uganda and of the literature, emphasizes the role of market pressures and socio-cultural aspects of governance to explain variations in resource governance and resource conditions (see also Agrawal and Gibson 1999; Agrawal 2006; Nunan 2006) in Uganda.

The case for decentralization

Past natural resource management strategies in developing countries often failed because centralized policies were intrusive yet unable to enforce the underlying regulations, and frequently interfered with local institutions that managed natural resources (Gibson et al. 2000; Agrawal 2003; Kajembe et al. 2003; Ribot et al. 2006; Larson and Soto 2008). Furthermore, such management policies have the potential to be biased in favor of market-based preferences while downplaying ecosystem health or resource sustainability (Ben-Yami 2007; Nelson and Agrawal 2008), which can lead to deterioration of the resource and undermine development of local communities (e.g. see Harris 1999; Bavington 2010).

Recalling from Chapter 2, decentralization is defined as any act of formally ceding powers from a central government to lower-level institutions and actors within a political-administrative and territorial hierarchy (Agrawal and Ribot 1999). *Democratic decentralization* refers to power being transferred to lower-level governments whereby officials are elected by and accountable to those they represent (Ribot 2002b). *Devolution* broadens power transfer to include nongovernmental institutions such as community-based organizations (CBOs). Agrawal and Lemos (2007) categorize decentralization and its variants as a form of ‘hybrid governance’, in which there is no one lead authority but rather a partnership between local, non-government, state or market organizations. Contemporary decentralization strategies, they argue, have focused particularly on institutional arrangements that can motivate individuals at the local level to cooperate, while minimizing the risk of powerful individuals co-opting the process. Haley and

Clayton (2003) argue, however, that effective hierarchical organization is still a prerequisite for bringing about effective solutions, particularly where central government change (e.g. policy or fiscal) is required. Uganda's forest and fish co-management programs exemplify a situation in which central government is a significant stakeholder, holding the resources in trust, and thus continues to play an important role in the management of these resources.

Kaimowitz and Ribot (2002) argue that natural resources are viable candidates for decentralized management for several reasons. First, natural resources are utilized for subsistence, livelihood and income, at both local and national levels; they are 'wealth generators'. Natural resources that are wealth generators create incentives for those who benefit directly from the resource to manage it sustainably, whereas social services and infrastructure, or 'financial sinks', result in unregulated use. Second, while social services and infrastructure can be designed at a country-wide scale, natural resources are location-specific, and include variations in biophysical characteristics: species types, growth rates, breeding and fruiting cycles, and harvest times. Kaimowitz and Ribot thus argue that these characteristics make natural resources 'less amenable to central standardization'.

Although natural resources, generally, are responsive to decentralization, forests and fish are different biophysically and thus have different transaction costs, or social, economic and political costs related to undertaking their management (Nielsen 2003). In Uganda, transaction costs are lower for forest management than fishery management. Given that forests have distinct borders, there is a greater potential for the community of a particular forest to interact with one another to establish regulations and conduct enforcement. In contrast, it is more complicated to physically delineate distinct management areas on a lake, especially in the absence of GPS technology, and the size of Lake Victoria is too large to have all fishing communities or fishers to

meet. There must be a greater effort, or higher level of coordination for effective management to take place. Without an effective mechanism to coordinate management (resulting in larger transaction costs), inefficiencies emerge and often lead to tragedy-of-the-commons-type (Hardin 1968) harvest of the resource. It is within this context of transaction costs that the ‘achievable scope’ against which the failures of the fishery and forestry sector should be judged.

Despite the importance of transaction costs, Ostrom (2007) posits that social-ecological problems are rarely due to a single cause and that the imposition of ‘standard optimal solutions’ is the problem rather than the solution. To determine success of a decentralization policy, the relationship between community, the resource, and the institutional arrangements that incentivize resource use, must all be assessed. Institutional arrangements that include local communities in natural resource management are crucial given that many people living in developing countries are often knowledgeable about, and directly dependent on, locally harvested natural resources for their livelihoods and subsistence needs, and for other ecosystem functions (Wilson et al. 1999; Béné 2003; Ostrom 2005; Agrawal and Chhatre 2006; Janssen et al. 2007). Active citizen participation can enhance input from those affected by the challenges of natural resource governance (Lemos and Agrawal 2006; Nunan 2006). Recognition of and reliance on institutions—and the ways in which several institutions interact and in some cases ‘nest’¹⁰—can promote management success and ensure the proper transfer of power (Eggertson 1996; Ostrom 2005). In other words, *the central government still has a crucial role in local-level natural resource management*, indeed, they hold the natural resources in public trust (Chapter 2: Gaden et al. 2012). The challenges, however, of defining and implementing decentralized management, and unwillingness or inability of central governments to relinquish control (Wunsch 2001; Ribot et al. 2006) to lower-level actors, has often

¹⁰ Become a part of, or more inclusive in, the institutions.

hindered the integration of community participation and rendered the management approach paternalistic and quasi-colonial (Twyman 1998).

While there are plenty of examples of failed or failing decentralized regimes (see, for example Vazquez and Vaillancourt 2011), there are also examples of successful, or at least partially successful, regimes (e.g. Gibson et al. 2000; Pomeroy 2001). Successful decentralization must include the transfer of sufficient and appropriate powers, accountable representation (Ribot 2002b) and an understanding of the extent to which fiscal, administrative and political control is transferred (Schneider 2003). Datta and Varalakshmi (1999) find that a forest co-management program in India is sustainable and successful because locals have developed institutions to generate and fairly distribute funds. Hayes and Persha (2010) suggest that successful resource management depends on institutional arrangements that:

- (1) establish local residential rulemaking autonomy,
- (2) facilitate flow of external financial and institutional assistance for monitoring and enforcement of local rules,
- and (3) buffer residents and their respective local institutions from more powerful, and at times corrupt, actors and agencies involved in forest exploitation.

When these conditions are not met, they argue, external non-government organizations (NGOs) can help support local institutions that are nested within larger central government systems.

Our analysis of Uganda's decentralized management program of forest and fishery resources reveal some of the challenges associated with the decentralization approach, likely associated with the unwillingness of central governments to relinquish total control: (1) failure to transfer an appropriate amount of authority to resource harvesters or representatives of those harvesters, (2) inefficient collection of revenue at the local level due to higher political-level authorities superseding this function, (3) inefficient distribution of revenue collected by higher political authorities returned to local communities and local resource management entities for development and further resource management, and (4) prioritization of market value of natural

resources over social development at the community level and sustainable management of the resource. The current institutional arrangements that govern Uganda's forestry and fishery resources allow for maximum resource extraction to take precedence over ecosystem health and resource sustainability and longevity.

Development and decentralization in post-independence Uganda

Post-colonial development and natural resource management in East Africa is heavily influenced by international aid agencies, such as the World Bank and International Monetary Fund (IMF) (Stein 2008). During the 1980s and 1990s, the World Bank and IMF instituted structural adjustment policies (SAPs) that sought to overcome development-limiting conditions in the market that many developing countries encounter. To procure loans, SAPs require that developing countries adjust their economies through stabilization, liberalization, and privatization¹¹ (Owusu 1998). The policies were designed to *reduce the role of government* by replacing state control with market incentives and by requiring political and economic reforms before loans from the IMF and the World Bank were released to the target country. SAPs, however, have been severely criticized for their failure to consider politics, demography, and institutions (Hauser 1999; Platteau 2000; Mwenda and Tangri 2005) and for their rationale that says those who consume services are those who should pay, which in developing countries often excludes the poor because of high costs (Stein 2008). SAPs have also been criticized for their failure to recognize developing countries ill-prepared state of development, a problem caused, in part, by the failure of colonial systems to carry

¹¹ These structural adjustment policies, based on economic models of developed countries and limited scope (e.g. two-country, two-good models) had the opposite effect intended. For example: stabilization, borrowing money to cover export deficit which reduces demand of exports and domestic jobs, ultimately reducing the quality of life for many; liberalization, where government intervention is removed, providing incentives for a prosperous private sector, creating user fees that the poor can't afford; and privatization, selling the government's assets to the private sector (see Stein 2008)

over to independent states (Bauer 1972). Thus, the ability, or willingness, of the central government to empower local resource management is embedded in post-colonial international ‘development’ programs.

Uganda’s fisheries and forestry resources share a common history rooted in a development trajectory from British protectorate to independent country to a ‘darling’ of the donor community (Cargill 2004). Uganda’s forest and fishery resources are biologically diverse, both types of resources were relied upon historically for subsistence, are wealth generators for local communities and the state and have cultural importance. The national-level government’s natural resource management policies, therefore, include contemporary wording that suggests sustainable management to benefit local communities (NFA 2008; LVFO 2011a). Through the two case studies below, however, we demonstrate that market value of natural resources (ultimately beneficial to the central government) continues to take precedence over these natural resources’ historical values and importance to local-communities, discourages sustainable resource harvest and inhibits development at the local level. As a result, devolution of power to the local fish and forestry management institutions is unsuccessful.

Case studies: decentralization of natural resource governance in Uganda

Uganda’s Decentralization Statute of 1993 and Local Government Act of 1997 promised to cede power to local officials and communities. The constitution calls for reduced central government control and increased local discretionary powers, including the creation of new local laws, revenue collection and the appointment of committees to carry out local-level priorities (Mugabi 2004). Despite multiple legislative efforts, however, the central government continues to suppress local capacity in several ways (Mugabi 2004): (1) local resource management institutions

and governments are funded by the central government, but grants must be used in ways deemed appropriate by the grantor, not the grantee; (2) local revenue collection is uneven, sporadic and unreliable, especially in rural areas and is often undermined by higher-level governments collecting revenue first at the local level (see Chapter 5); (3) ineffective distribution to local, regional, or interjurisdictional management organizations, of revenue collected—by the central government—through formal export lines; (4) external donor support often has the same restrictions that central government grants require; and (5) the judicial system is weak when pertaining to formal laws and regulations established to protect the natural resource, making community and government enforcement efforts impotent.

Case I: Uganda's forestry sector

Centralized forestry management was established by the British colonialists in 1898 under the Forestry Service, which became the Forest Department in 1927. Large swathes of land were declared Crown land via the Bunyoro Agreement of 1933, while smaller land blocks were kept private and were owned and controlled by their respective kingdoms. Crown land included forest vegetation, savannah grassland and woodland areas, the use of which required a permit (Hamilton 1984). In 1945, decentralized forest management was instituted via the creation of Local Forest Reserves (Turyahabwe et al. 2007). A 1948 statement by the governor of Uganda announced the main goal of the Forest Department: 'to foster, by education and propaganda, a real understanding among the people of Uganda of the value of forest to them and their descendants' (Forest policy 1948). This devolution of management was limited, however, to 'minor reserves of purely local significance' (Forest policy 1948) that were expected 'not to detract from the value of Central Forest Reserves', which still belonged to the colonial government (Hamilton 1984). Moreover,

although the colonial government's Forest Department encouraged tree planting and the establishment of local tree plantations as early as 1930 (Hamilton 1984), the exotic and water and nutrient depleting *Eucalyptus* was highly favored (Karani 1972). This choice suggests economic, rather than ecological priorities.

Decentralization continued after independence until 1966, when governance structures and management policy changed drastically (Mugabi 2004). The Forest Act of 1967 revoked local, decentralized power over forest reserves (Hamilton 1984; Turyahabwe et al. 2007). Then, as a result of country-wide political chaos during the 1970s, corruption within the Forest Department skyrocketed, widespread mistrust of the entire government ensued, and forest cover was lost (Hamilton 1984). With rampant local encroachment on government-owned forested land, provision of central government extension services (e.g. agricultural and livelihood support) was almost impossible, given the mistrust of the centralized management regime. Further, the planting of exotic species such as *Pinus*, *Cupressus* and *Eucalyptus grandis* continued to be encouraged by the Forest Department (Struhsaker 1987). Thus, while indeed reducing the pressure on highland forest, centrally imposed management policies aided in diminishing hundreds of indigenous species.

In 1998, the Forest Department became the National Forestry Authority (NFA) and the District Forest Services (DFS). Policies emerging after the split decreed that sustainable resource use and collaborative forest management between the NFA, local governments (DFS) and local communities were important priorities (National Forestry Policy of 2001, National Forest Plan of 2001, National Forestry and Tree Planting Act of 2003). Currently, 24 percent of the total land area (4.9 million ha) in Uganda is forested (MWLE 2002). About 70 percent of Uganda's forested area is private or customary land and contains the largest part of tropical highland forest (38

percent). Although this suggests that the majority of forests are in ‘the people’s hands’, very few individuals actually hold legal land titles and are thus susceptible to tenure security issues/removal (Place 1995; van den Brink et al. 2006). Perhaps due to this tenure insecurity, conversion to agriculture happens at a higher rate on customary land than on public land (Place and Otsuka 2002). The remaining 30 percent is considered Permanent Forest Estate (PFE), primarily managed by NFA, with the exception of 0.3 percent (5000 ha composed of small fragments) and is considered Local Forest Reserve and managed by the local DFS (Banana and Gombya-Ssembajjwe 2000; Kayanja and Byarugaba 2001).

The PFE is ‘held in trust’ by the government for the people of Uganda. Furthermore, PFE forest reserves are further demarcated into strict nature reserves (20 percent), low-impact buffer zones (30 percent) and areas managed for sustainable extraction of forest products (50 percent) (Howard et al. 2000) suggesting that the government is *still* managing ‘the people’s’ forests for economic gains, rather than with regard to biological characteristics of forested land and the socio-economic needs of resource-dependent peoples.

As a result of both colonial control and a period of ‘post-independence governmental adjustment’, decreased incentives and increased risks of punitive measures have led to an overall lack of local participation in resource management (Banana and Gombya-Ssembajjwe 2000). While there have been many attempts at collaborative forest management among communities, local governments, NGOs, CBOs and the central government, results have been consistently disappointing. Although partnerships enhance local management potential, financial and legal means to implement local resource extraction policies are lacking (Turyahabwe et al. 2006). There are weak relationships between local institutions and centrally devised policy (Turyahabwe et al. 2007; Hartter and Ryan 2010) and between people’s perceptions and actual uses of forest resources

(Watkins 2009a; 2009b). In regard to perceptions and uses, people, particularly women, did not know the full extent of their rights: not only did many wrongly believe firewood collection was illegal, they allegedly endured harassment by forestry officials for collecting it (Watkins 2009b). These findings support Ribot et al.'s (2006) conclusion that central governments in multiple developing countries 'erect imaginative obstacles' in front of decentralized institutions, such that downward accountability and local-level discretionary power are lacking.

Importantly, this period of intense vacillation between decentralization and recentralization of forest management policies coincides with World Bank and IMF investments marked by particularly strict conditionalities (1992–1998) (Banana et al. 2007). Years of policies that claimed to increase local control, yet reduced local funding, have no doubt impeded the effectiveness of local government forest services, let alone village-level management capacity. The NFA lacks the monetary means and manpower to monitor Uganda's forests effectively as many are patchy and scattered. Further, political will is lacking and the chain of command between the NFA and DFS is confusing: District Forest Officers (DFOs) are central government employees, yet local government council members supervise them. On the other hand, Forest Rangers and Forest Guards who provide technical support to the DFOs are employees of District Local Councils (Banana and Gombya-Ssembajjwe 2000). The World Bank's involvement in the forestry sector remains contentious, given its lack of attention to poverty, inequity, local capacity and issues of control and ownership of, and access to, forest resources (Seymour and Dubash 2000; Francis and James 2003; Stein 2008).

Although the NFA recognizes that policing forests is an ineffective management strategy and that the inclusion of harvesters and community members can increase sustainable resource use (MWLE 2001), less than 1 percent of the total tree-covered area in Uganda is managed under

collaborative initiatives between the central government and communities (NFA 2008). While 40 percent of profits made from revenues, licenses and permits generated from the sale of Central Forest products (0.3 percent of the PFE) is given back to local government, it is used in the general district budget rather than specifically on forest management activities (e.g. monitoring and enforcement), and even then it makes up only 10 percent (Banana and Gombya-Ssembajjwe 2000). The other 90 percent of local government budget comes from NGOs, which, although could act as an incentive for local governments to participate in collaborative management, is still unable to enact policy change at the central government level (Haley and Clayton 2003; Turyahabwe et al. 2007). Several studies have documented the importance, yet dearth, of forest use enforcement in Uganda (Banana and Gombya-Ssembajjwe 2000; Turyahabwe and Banana 2008).

According to Turyahabwe et al. (2007), collaborative forest management is limited in several ways. First, local organizations often lack technical and financial capacity to fully conduct management activities; confusion exists over who owns what type of land, which leads to disinterest in investing in tree planting and overall land management. Second, corruption and disrespect for formal laws undermine honest and legal attempts at collaborative management (Turyahabwe et al. 2007). Finally, the variety of forest benefits that people are concerned about (e.g. household consumable resources like firewood and water, economically advantageous resources like timber and ecological benefits such as wildlife habitat and climate control mechanisms) may hinder group consensus on the best forest management approach. All of these inefficiencies point to the lack of attention given to locale-specific needs and the local institutions that could enhance forest management—a task which otherwise is too large and diffuse for what is still essentially a centralized management approach.

While stakeholder linkages presumably may stimulate the movement of money to the local level, NGOs and CBOs do not have legal power to control forest-related activities. These responsibilities lie with the DFS, which is charged with the heavy burden of linking the legislative desires of the central government with the subsistence and livelihood requirements of local communities (Turyahabwe et al. 2007). The DFS, which, again, legally manages only 5000 ha (0.3 percent) of local forest reserves, is also responsible for the needs of, or at least seen as a liaison to the central government for, local communities and harvesters. Watkins (2009b) found one DFO defeated: ‘I feel useless. I have a cell phone but no motorcycle [with which to get to the villages] . . . even if I did go there, what could I do?’ This anecdote emphasizes the inability of the central government to facilitate local government capacity to manage forests and enforce policies.

Further evidence of the central government’s priorities on forest management can be found in the NFA mission, which purports ‘to contribute to a sufficiently forested, ecologically stable and economically prosperous Uganda’ and ‘to manage Central Forest Reserves on a sustainable basis and to supply high-quality forestry-related products and services to government, local communities and the private sector’ (NFA 2008). People use many types of trees (Watkins (2009a) documents over 20 types) for firewood, including exotic, indigenous, forest, woodland and plantation species (Tabuti et al. 2003; Watkins 2009a). To achieve the latter goal, however, the NFA continues to focus on a small set of species that are market-favored—mostly eucalyptus and pine (Uganda Policy, 2002, cited in MWLE (2009)).

In summary, forest management continues to be spread thinly across Uganda, leading to a disparate relationship between local and central governmental institutions and resulting in a lack of management in support of basic needs for livelihoods. Despite the necessary and ubiquitous need for firewood or charcoal at a local level, the central government has remained unable or

unwilling to share financial and judicial control of forests. As Banana and Gombya-Ssembajjwe (2000, p. 17) stress, after

four decades of minimal involvement of local institutions and communities in forest management . . . it is going to take a long time and a lot of effort for . . . local communities to organise locally, develop the rules, develop a sense of legitimacy, and put in place a mechanism to monitor and enforce forest rules.

Case II: Uganda's Lake Victoria fishery sector

The largest freshwater fishery in Africa, Lake Victoria is known for producing annual catches of around 1 million tons, contributing over USD 600 million to the East African Community annually (Njiru et al. 2008), and providing food security for over 20 million people (LVFO 2011a). Like many other freshwater systems around the world, Lake Victoria faces numerous threats, including environmental degradation, introduction of exotic species, eutrophication and overfishing. Recent stock assessments indicate that unsustainable fishing practices have caused a serious decline of fish populations (Mkumbo et al. 2007). Exacerbating these stresses is a high human migration rate (~3 percent per year, Njiru et al. 2006) into many of the basin's cities as a result of erratic rains, poor soils, crop failures and high unemployment outside of the basin. This migration threatens the integrity of Lake Victoria and other water-scarce areas of the world where populations are beginning to lose access to clean, freshwater resources.

Lake Victoria's fishery has been a part of Uganda's economic system for centuries, mainly as a local producer of a tradable commodity and of a major source of protein. During the 1950s, the commodity fishery began to grow and it continued to develop well into independence (Awange and Ong'ong'a 2006). During the late 1950s, the colonial government introduced the Nile perch (*Lates niloticus*) in the hope of making the lake's fishery an economically powerful export industry (Mkumbo and Mlaponi 2007). Lake Victoria's Nile perch populations reached commercial

viability in the late 1970s, leading to fish processing plant development in the 1980s, which allowed increased exports of Nile perch (World Trade Organization 2006) throughout the world, including to Israel, Japan, Australia, Hong Kong, Singapore and the United States, with the European Union accounting for up to 60 percent of fish exports (Awange and Ong'ong'a 2006). Exports of Nile perch have risen to the second largest export earner, second only to coffee, in Uganda (2004 and 2005 data (Uganda Export Promotion Board 2006)).

The introduction of this non-native, top-predator species, however, altered the Lake Victoria ecosystems upon which subsistence fishermen and the export fishery rely. This is evidenced by the decline of the endemic haplochromine (cichlid) fishes. These species constituted 80 percent of the estimated catch in the 1950s and 1960s but became less than 10 percent of the catch by 1987 as many of the haplochromines became extinct (Witte et al. 2007) or regionally extirpated within Lake Victoria. During that same period, Nile perch catches increased from non-recordable catches to 60–80 percent of total catches (Mkumbo and Mlaponi 2007). The economic benefits that the colonial government hoped the Nile perch fishery would provide included an increase in livelihood for many local fishermen and revenue for the state. Immigration of fishermen from outside the basin to the lake, promulgated by the promise of a share in riches of Nile perch, is another indicator of the economic success of the fishery. Immigration of large numbers of fishers created exploitative extraction practices that greatly stressed fish stocks, and Nile perch caused a major ecological shift in the native ecology of Lake Victoria (see AEHMS 2007). Further, although beneficial to the country's foreign direct investment and gross domestic product, the financial outcome of the fishery disproportionately benefits the national-level government over local fishing communities through higher returns on value added to the fish product up the commodity chain. Financial inequality is also caused by the inadequate return of

financial support of local management institutions by the national government. The government, in this case, does not have an incentive to return funds gained from the fishery sector back into fishery management, because the perception is that local communities are self-sufficient in managing the fishery as prescribed by the co-management program. It is this perception, however, that is creating ineffective management of the fishery, because inadequate finances or judicial power is given to local management institutions (Beach Management Units (BMUs)). Without proper funding or judicial power, BMUs lose the ability to effectively function. Livelihoods of those who depend on the fishery suffer as ineffective management causes a decline of fish stocks and therefore wealth generated from the fishery.

Prior to the late 1990s, fisheries management on Lake Victoria was centralized, determined on a country-by-country basis, with each country implementing separate and often conflicting fishing regulations, and included little or no community participation (Ogwang' et al. 2009). This parochial management approach is similar to management attempts described in Chapter 2, where individual jurisdictions on the Laurentian Great Lakes prior to the creation of the GLFC, implemented incongruent regulations, defeating the purpose of lake-wide fishery management. Extensive research suggests this approach failed to sustain the fishery for those who depend on the resource for their livelihood, which created a distrust of central government and of centralized fishery management (Abila et al. 2006; Mkumbo 2006; van der Knaap and Ligtoet 2006). This distrust, in addition to poor enforcement by the central government, led to a culture of illegal fishing, resulting in overfishing, use of illegal gear, and harvesting under-sized fish (Ebong et al. 2004). Fishing was pursued in a manner that contributed to exploitation at more than twice the sustainable level (Hecky 2003), devastating the resource and subsequently diminishing livelihoods of those who depend on it most.

Acknowledging the dire state of fish stocks of Lake Victoria and to address other factors that affect the lake, including increasing poverty among those dependent on it, Kenya, Tanzania, and Uganda developed national efforts to address common property fisheries problems. These efforts have been funded and influenced largely by the World Bank, including USD 77 million for fisheries management on Lake Victoria, of which the government of Uganda received almost USD 30 million to support its involvement in the first phase of the Lake Victoria Environmental Management Project, which includes establishment of a fisheries management program for the lake (The World Bank 2006).

With the financial assistance of the World Bank, in 1996 the three countries created the LVFO—the fisheries management arm of the East African Community—to coordinate management efforts around the lake. Under its umbrella, the fisheries department of each country, fisheries research institutes and other organizations have collaborated to manage the fisheries. In particular, development of institutions included *both* the central government and communities (co-management) in an attempt to avoid shortcomings of decentralization seen in past social and infrastructural programs (The World Bank 1996).

To manage the fishery, Beach Management Units (BMUs) were created at pre-existing fish landing sites (Ugandan Department of Fisheries Resources 2003). The BMUs are community-run governing bodies that manage the fishery and share policy development, enforcement and research duties with each state's fisheries department. The BMUs enforce the fishing regulations established for the lake, serve as data collection points for monitoring and increase community members' capacity to manage their fishing profits (Ebong et al. 2004). The BMUs were created to standardize the regulations of fisheries extraction throughout Lake Victoria, such that illegal practices are reduced and fish stocks remain sustainable. The LVFO was designed to coordinate

natural resource governance across national borders, between the three governments. The BMUs attempt to reduce constant external enforcement by the central government and to internalize patterns of behavior with roles, rules, regulations and goals that are created and clearly defined by communities (Stein 2008).

The establishment of Lake Victoria's fishery co-management program was meant to create an equitable climate for all stakeholders (specifically the local communities), and sustain the lake's fisheries. Nevertheless, illegal fishing has been continually observed around the lake (Abila et al. 2005; Abila et al. 2006; Njiru et al. 2006; Njiru et al. 2008; personal observations). The reasons for this governance failure are similar to those in the forestry sector: decentralization requires a downward movement of not only political authority, including enforcement and monitoring, but of revenue. The Government of Uganda—and the other Lake Victoria states—has failed to provide enough money to the already limited staff of the fisheries departments. This shortfall has caused a two-pronged problem regarding the fishery: (1) a lack of enforcement equipment (e.g. boats, engines and fuel) needed for patrolling by the communities and (2) weak incentives for fisheries officers not to take bribes from those fishing illegally, which in turn makes illegal fishing profitable. Further, the weak devolution of power and financial resources to BMUs does not allow them to effectively execute their programs, even though they were relegated to conduct the majority of fisheries management activities. National fisheries officers frequently let offenders go, which further undermines BMU power and often renders them financially and politically powerless (Lawrence 2013).

The failure to define clearly what co-management on Lake Victoria means, in terms of the specific roles of each level of government and of the community, is partially to blame for the inefficacy of governance. With communities charged with implementing management activities,

and thus given authority to manage their fisheries resource, the central government can claim effective implementation of decentralized policies. Co-management, however, requires that each partner has a role in resource management. While the Nile perch fishery on Lake Victoria provides the three countries with about USD 350 million in export earning per year (Ogwang' et al. 2009) (not including the dagaa and Nile tilapia fisheries, both provide substantial income), evidence of financial returns from the central government to the BMUs is notably lacking. A study conducted from 2009 to 2010 observed inadequate funding for the BMU committees to conduct enforcement patrols (Lawrence 2013). Data suggest that the national-level government inadequately finances the BMUs, and does not allow sufficient revenue collection by many of the BMUs to conduct their operations. The LVFO's annual budget, previously provided by international donors (ended in 2009), was USD 8 million, and thus management of Lake Victoria can easily be covered by revenue generated from each country through their Nile perch fishing industries alone.

In summary, the Nile perch fishery produces enough money for the government of Uganda to provide sufficient support for fisheries management at the local level. The money, however, is not effectively moved from the central government to the fisheries department (Lawrence 2013). Further, community-level revenue collection is riddled with corruption, inefficiency and disempowerment (Keizire 2002; Lawrence 2013). For example, BMU committee members are supposed to collect taxes and fines from fishing activities associated with their landing site. These monies, however, are often collected by higher-level government officials, the police or a representative of one or the other. The amount of money that BMUs are given in return is usually not enough to purchase proper patrol and safety equipment or fuel (Lawrence, unpublished data). While the LVFO can suggest an effective governance process, it cannot direct resources from the national governments to the BMUs or to national-level fisheries departments.

The formal regulations that are meant to foster legal fishing behavior and allow fish stocks in Lake Victoria to regenerate are not being followed. The fisheries example, in which a compelling management approach is failing, demonstrates the need to acknowledge context within a single resource sector. Further research must be conducted to understand how the market value traits of Nile perch alter the original intentions of fisheries management on Lake Victoria. Again, ‘simple blueprint policies do not work’ (Ostrom 2009) because markets, the lake itself, and the outlook of governing institutions change in unpredictable ways, often making governance ineffective.

Discussion

The above case studies demonstrate Uganda’s management approach to fisheries and forest resources by various stakeholders—communities and harvesters, local governments, the central government and NGOs. In both forestry and fishery cases, the central government remains overwhelmingly in charge of monetary resources and policy development and has failed to support local natural resource management organizations adequately.

Uganda’s central government has relinquished much of its management responsibility to community organizations, which reduces its cost while still retaining revenues generated by these high-value resources sold abroad. Local organizations, thus, have the potential to be effective in managing these natural resources. Uganda’s, however, have valuable international markets demanding its fish, which makes effective management difficult because of incentives to overfish, lax enforcement, and an influx of would-be fishermen seeking relief from poor economic conditions from outside the lake’s basin. As a result, management is challenging. In the case of forests, the state continues to perceive them as a potential source of economic prosperity, yet

similar to the fishery, fiscal support for local management is lacking. In both the forest and fish industries, the products go through formal government export channels, and thus the national government benefits. The national government, therefore, has less incentive to invest in lower-level governing entities. Only when resources face depletion does the national government work hard to sustain markets through increased management of resources, but often by recentralizing efforts.

Market pressures continue to influence decentralization approaches. Lake Victoria's Nile perch fishery became a high-value, internationally important export requiring need for a strong management system to govern multiple groups engaged in activities regarding these natural resource. Failure of the co-management institution to curtail illegal fishing is, we argue, a result of inefficient execution of the management program and *not* a weakness in a decentralized, co-management approach. Specifically, the central government failed to give appropriate financial support to lower levels of government and communities, as evidenced by fisheries officers often having incentives to cheat the system, take bribes and release offenders, and by their inability to conduct their own patrols for lack of resources. Both government entities and BMUs, therefore, are undermined authoritatively, which reduces their legitimacy in the eyes of fishermen (Ogwang' et al. 2009). Financial support should result in policy abiding officers that have enough equipment to patrol the lake and that do not provide incentives to undermine BMU activities.

Market pressures within the forestry sector, in contrast, are at sharp odds with household-level subsistence pressures (MWLE 2009). Failure to incorporate the vital role of fuel wood and charcoal at the household level, *for critical subsistence purposes only*, as well as the resources' link with subsistence agriculture practices, has profoundly weakened relevancy and effectiveness of decentralized management plans. One persistent trend, in particular, has contributed to this

failure. Although forestry export profits are low and subsistence use is high, exotic species are profitable. Thus, the central government refuses to allow resource harvesters to decide what species they want to plant, and planting exotics is credited as collaborative management. This trend is facilitated by two factors: One, the national government vacillates between centralized policy-making and enforcement and decentralized ‘community-based’ and collaborative management approaches, both of which can be favored by the waxing or waning of international interest, a cycle that has complicated and hindered successful local forest management. Two, enforcement personnel are in short supply at the local level, especially given the diffuse and heterogeneous nature of the forestry resource. Decentralized forestry management appears weak as the national government retains too much control over resource management, contrary to recommended decentralized natural resource management approaches.

Following many calls for the incorporation of multiple causal factors (Ostrom et al. 2002; Agrawal and Chhatre 2006; Janssen et al. 2007), our case studies suggest that decentralized management of Uganda’s fishery and forestry sectors has been ineffective because financial resource and judiciary power sharing between local management institutions and the national government is inadequate and hostile relationships between locals, local government and central government are prevalent. Blanket decentralization policies, often instituted in the face of faulty centralized policies, provide weak financial and institutional means for resource management at the local level to be as successful as intended.

Conclusion

Centralized management of natural resources in developing countries has largely failed in the past due to distrust of central governments by people who depend on the resources for their livelihoods. Based on these results, natural resource management evolved to include local

communities under the concept that ownership of the resource by those who extract that resource would lend local knowledge and reduce pressure on national government investment for support.

Although the success of decentralized management has not been conclusive (see Brooks et al. 2006; Larson and Soto 2008), we consider the theoretical premise is compelling, regardless of resource characteristics. Our case studies suggest that while Uganda's forestry and fishery sectors are distinct (e.g. transaction costs), given their shared history of colonial control, they both suffer from the same institutional weaknesses: the central government, although ostensibly participating in hybrid governance-type partnerships, has not allowed for equitable and sufficient power sharing (political or fiscal) (Datta and Varalakshmi 1999; Ribot 2002b; Schneider 2003; Hayes and Persha 2010).

We demonstrate that decentralized management of high-value natural resources has created incentives for the central government to manage each resource for profit over limiting extraction for sustainability. The high value of Uganda's fishery and forest resources has led to the inadequate distribution of judicial power and financial resources to local communities managing them, thus making successful decentralized resource management difficult to achieve. The high value of natural resources create weaknesses—in an otherwise theoretically sound management approach—including (1) inability of local communities to manage the resource because of outside pressures (e.g. increased number of harvesters seeking livelihood gains) and (2) demands for higher gross domestic product by the national government resulting in little incentive to invest in resource management.

Although difficult, the solution to overcoming poor natural resource management in Uganda and meeting objectives of decentralized programs enacted by Uganda's central government agencies, includes the careful development of institutions that limit extractions, for

the benefit of continuing cultural, subsistence and ecological values. Indeed, failure to manage based on sustaining the resource and providing for subsistence threatens future gains. The fishery and forestry sectors in Uganda illustrate how success of decentralization is dependent upon the extent that national governments empower community members and harvesters to manage their resources sustainably. The power relationship between the national government and lower-level political entities in natural resource management is unbalanced, as evidenced by the lack of trust by local communities of national government in addressing natural resource management. Decentralization has also often proven ineffective in Uganda's forest and fishery sectors because the national government has withheld funding and judicial power needed for local management entities to be effective. Moreover, the national government has little incentive to increase funding and authority at the local level because extraction of these resources benefits itself. Until the central government relinquishes some control and allows for development of nested institutions, ineffective natural resource management will continue.

CHAPTER 4:

**SELF-ORGANIZATION, COMMUNITY PARTICIPATION, AND THE
VALUE OF EXPERIENCE IN LAKE VICTORIA'S FISHERY CO-
MANAGEMENT PROGRAM**

Abstract

Uganda, Kenya, and Tanzania created fishery co-management institutions on Lake Victoria during the previous 20 years. Co-management is a partnership between government and local communities, whereby the latter are empowered to conduct fishery management. Communities on Lake Victoria are included in fishery management through organizations called Beach Management Units (BMUs) which are charged with administering fishery management at pre-existing fish landing sites around the lake. At some sites, fishery management existed through pre-existing fishery management organizations prior to the creation of each BMU. Pre-existing fishery management organizations made efforts to manage fisheries, and these efforts have many similar characteristics to co-management programs and, therefore, may enhance the chances of co-management success. Success is defined by the stated goals of co-management, which are the reduction in illegal fishing, the provision of benefits to the community as a result of fishing activities, inclusion in decision making, being treated equitably, and having the requisite mechanisms for resolving disputes. This chapter explores what self-organization characteristics are associated with pre-existing fishery management organizations, and if those characteristics exist at current BMUs. Results reveal that BMUs which had pre-existing organizations fared better than those that did not, exhibiting stronger self-organizing characteristics than BMUs that did not have pre-existing organizations.

Introduction

Community involvement has emerged during the last forty years as being critical for the success of fishery management in Africa. Historically, political theory assumed that local-communities were incapable of the self-organization requisite for effective management of common property resources, such as fish, without external authority because incentives to over-harvest were too great (Ostrom et al. 1992; Ostrom 2009). Recent research, however, has identified that the community, when faced with a social dilemma, may be able to self-organize in the absence of external authority, formal efforts, or incentives (Ostrom et al. 1992; Ostrom 1999; Andersson et al. 2010). Communities¹² have been shown to effectively self-organize to manage and maintain the natural resources on which they depend, including fishing communities on Lake Victoria (Ogutu-Ohwayo 2001; Odongkara et al. 2009; Ostrom 2009).

Self-organization is defined, in part, as a set of activities undertaken by a community to collectively manage or influence harvest behavior conducive to the management of a sustainable fishery. Self-organization has a voluntary component, where participation in fishery management activities are conducted by community members on behalf of the community and the fishery resource, with little or no external influence (Townsend and Shotton 2008). Communities which self-organize are seen to have a set of processes that reflect shared values created by levels of interpersonal trust and reciprocity, called social cohesion (Ostrom 2009; Kawachi and Berkman 2014). Social cohesion facilitates collective action by individuals and groups, which are likely more able to respond and adapt to disturbances—such as over-harvest of a natural resource (Fleischman et al. 2010). Characteristics of community social cohesion and self-organization include: participation of community members in decision making; enforcement of regulation

¹² “Communities” in this dissertation refers to a group, or groups of people who are engaged in fishery related activities and are those belonging to established BMUs on Lake Victoria. See page 11 for a complete description.

compliance of fishers; information flows among community members; equitable treatment of community members; ability to resolve disputes and conflict; and economic and social development with equitable distribution of benefits (Jentoft 1989; Pinkerton 1989; Pomeroy et al. 2001; Armitage et al. 2007; Pomeroy 2007).

The realization that communities self-organize and exhibit characteristics viewed as beneficial for the successful management of natural resources has led governments to include communities in fishery management programs. Current efforts in developing countries largely incorporate community participation in the administration and function of natural resource management (Jentoft 1989). A prevalent approach of community participation in natural resource management in developing countries is called co-management. Co-management programs use sets of institutions to facilitate community-government fishery management activities. Institutions are defined as rules and regulations defining harvest use, roles for community members to administer fishery management activities, and organizational structures to assist with interactions between various political entities.

Co-management is the devolution of authority and power to, and shared management responsibility between, local communities and governments in the management of a resource (Hara et al. 2002; Ribot 2002b; Carlsson and Berkes 2005; Armitage et al. 2007). Though most definitions of co-management include a higher political or administrative authority sharing responsibility with communities, administration of fisheries often falls exclusively or mainly to the community. Communities, in many cases, are considered the action arm of fishery management (Townsend and Shotton 2008). Regardless of the intent of community participation within co-management, there is a component of responsibility in the domain of fishery management: community participants must make management decisions and undertake actions without external incentives

or assistance (Townsend and Shotton 2008). Whether sharing responsibility or not, individuals and members of communities are expected to develop and administer a set of regulations and functions associated with fishery management, often with little or no incentive, oversight, or repercussions. Fishery management, in a co-management program, embodies the characteristics of self-organization and, therefore, a community's ability to effectively self-organize within co-management programs is vital. The necessary characteristics of community participation in co-management are, thus, also characteristics that a community demonstrates in self-organizing.

Prior to the establishment of formal co-management programs on Lake Victoria, some communities self-organized, undertaking fishery management external to formal management influences. Researchers have, thus, argued whether these pre-existing organizations (local fishery management efforts which pre-date co-management) should be a prerequisite for the establishment of formal co-management institutions (Geheb et al. 2002; Hara et al. 2002; Wilson 2002). A simple answer does not seem to exist, rather, answers are determined on a case-by-case basis. An example of pre-existing natural resource organizations undermining the efficacy of newly created co-management institutions was made by Hara et al. (2002) on Lake Malawi, where the power, benefits, and privileges of being a village headmen were interrupted by an artificial hierarchy of a new co-management program. On Lake Victoria, however, Geheb et al. (2002) and Wilson (2002), both found that pre-existing organizations have characteristics of self-organization and were necessary to enhance the chances of success of new co-management programs. Communities with pre-existing organizations are described as having past experience and social capital; both illustrating a community voluntarily (collectively) acting to address natural resource challenges. A community that has self-organized has:

- established a convention of cooperation that provides experience in which to act in comparable circumstances;

- the ability to address collective challenges and build trust required to confront future complex situations; and,
- a management system rooted in tradition favoring continuity of that scheme (Baland and Platteau 2000).

Effective implementation of formal co-management institutions, if not unreasonable, is expected when voluntary natural resource management efforts were already established by the community (Kooiman et al. 2005).

The research reported in this chapter focuses on the fishery co-management program on Lake Victoria, East Africa. This setting provides a unique opportunity to study co-management because co-management institutions have been implemented around the entire lake, with the intention of including all fishers and fishing community members. Lake Victoria highlights the self-organizational narrative which exists in both co-management and pre-existing organizations. The fishery management organizations that pre-date BMUs were voluntary and attempted to reduce harm to the fishery prior to the formal co-management program.

This chapter explores the relationship between self-organization and co-management to determine if self-organization, prior to the introduction of the formal co-management program, increases characteristics of success of the new co-management program. Success is defined by the stated goals of co-management, which are reduction in illegal fishing and provision of benefits to the community as a result of fishing activities. Additionally, co-management promises community members being a part of decision making and being treated equitably, and having requisite mechanisms for resolving disputes.

The intent of this chapter is to determine what characteristics increase the chances of self-organization within the Lake Victoria fishery management program. To do so, this chapter compares BMUs which had pre-existing fishery management organization to those that did not to determine the existence of such characteristics.

Lake Victoria: Background

Lake Victoria provides valuable fish resources for communities living on its shores. The lake is dominated by three major commercial fish species, the non-native Nile perch (*Lates niloticus*) and Nile tilapia (*Oreochromis niloticus*), and the indigenous sardine-like fish *Rastrineobola argentea*.

The top-predator, Nile perch, was introduced into the lake in the late 1950s and has emerged as a globally sought after and valuable fish, providing economic returns for the lake's national governments and local communities. The Nile perch has also caused what many consider (Witte et al. 1992; Goldschmidt 1998) the largest mass extinction event in modern history by destroying large numbers of the lake's endemic haplochromine fish species.

Though numerous factors such as overfishing and pollution have impacted fish populations on Lake Victoria, the decline of Nile perch populations was the impetus for revised management efforts on Lake Victoria in the 1990s. The demand for Nile perch caused increased fishing efforts as well as over- and illegal-fishing that depleted its populations (Mkumbo and Mlaponi 2007; Mkumbo et al. 2007; Njiru et al. 2007; Ojuok et al. 2007; Witte et al. 2007). Coordinated federal government efforts during this time focused on creation of co-management institutions with emphasis on community participation. Co-management efforts were a result, in part, of past failed centralized federal government efforts on Lake Victoria and, in general, efforts by governments in developing countries to move toward community engagement.

Fishery co-management on Lake Victoria was designed to motivate and reinforce legal and sustainable fishing behavior through the inclusion of communities. During 1994, the fishery co-management institutions on Lake Victoria were created. Community members—individuals engaged in fishery-related activities—were included through local organizations called Beach

Management Units (BMUs). BMUs were first implemented during 1998 through 2002 (LVFO 2005b) in each of the lake's three riparian countries: Kenya, Tanzania, and Uganda. Standardization of fishing regulations among the three countries, and harmonization between each country and their respective BMUs, is facilitated by the central fishery management entity called the Lake Victoria Fisheries Organization (LVFO). The LVFO's aim is to guide BMU committees in implementing and enforcing fishery management policies—deemed appropriate for sustainable fishery management—by encouraging fishing communities to adapt to the BMU committee structure; create required committee membership; conduct appropriate BMU administrative functions; establish new by-laws and guidelines for the fishery when appropriate; and, conduct enforcement operations.

BMUs are the lowest administrative entity in fishery co-management institutions. Located at pre-existing fish landing sites, BMU committees are legally empowered, community-run organizations responsible for the majority of fishery management activities, such as patrolling, enforcing regulations, and—to a lesser degree—punishing offenders on Lake Victoria (Ugandan Department of Fisheries Resources 2003)¹³. BMUs consist of two major components: the first is the BMU community, the second is the BMU committee. Though the term “community” can be abstract, BMUs were designed to be inclusive of all who are in one way or another engaged in fisheries on Lake Victoria, thus “community” is defined by those who are members of a BMU. BMU members, or community, include those who are “boat owners, fishing crew members, fish mongers, artisanal fish processors, local gear makers and repairers, boat builders, fishing input suppliers, and industrial fish processors' agents” (Ugandan Department of Fisheries Resources 2003, p. 18). To administer the activities which take place at the BMU, a BMU committee is

¹³ There are 1,069 BMUs around Lake Victoria consisting of more than 1400 landing sites (LVFO 2010).

democratically elected by the BMU community. The BMU committee consists of 9-15 members of the BMU community.

The BMU committee is charged with administering specific functions that include: monitoring and enforcement of regulations; assisting in collection of fish-catch data; improving sanitation and hygiene and other development projects; and making and enforcing fisheries by-laws. By-laws are rules that pertain to a specific BMU's area and community. By-laws are suggested by BMU community members in collaboration with BMU committee members; they are consistent with national fisheries regulations and cannot usurp them (e.g. illegal net-size) (LVFO 2005a).

BMUs are effectively the action arm of fishery management on Lake Victoria. BMUs were designed so that fishers and fishing communities could self-organize. Individuals, and the community as a whole, are asked to voluntarily act on behalf of the fishery and in collective interest of the community. There is no punishment if participants do not successfully administer the responsibilities rendered to them by the formal co-management program and, therefore, when self-organization does take place, it does so in lieu of coercive power.

Despite creation of BMUs, regulation-breaking continues around Lake Victoria (Mkumbo et al. 2009; Ogwang' et al. 2009). The evidence that members of BMUs do not, or are not able to, self-organize and administer management regulations and programs of the fishery co-management program is demonstrated by fishers from some BMUs engaging in considerably higher levels of illegal fishing activity than those from others (LVFO 2005a). Fishers at some BMUs persistently use illegal gear, possess illegal fish, and use illegal fishing methods around Lake Victoria (Ogwang' and Nunan 2008).

The impetus for this research were observations that administration of fisheries within BMUs is voluntary (community members are not punished for failure to administer functions

outlined for BMUs, there is only punishment to those who break the regulations). Both research and observations indicate that BMUs function on a spectrum from poorly run to well-run BMUs. My intention, then, is to compare characteristics of self-organization from BMUs which had pre-existing fishery management organization, and those that did not, to determine if patterns emerge, which would demonstrate sites with pre-existing organization are more successful managing their fisheries than those without.

Characteristics of co-management and self-organization

In pre-existing organization situations, like those at many of the landing sites on Lake Victoria, influencing behavior of community members depended on social cohesion, which relied on the extent of connectedness and solidarity among individuals or groups (Kawachi and Berkman 2014). Many studies that focused on natural resource co-management programs and their success evaluated many characteristics of community self-organization that might increase successful community participation (Ostrom 1990; Dietz et al. 2002).

Successful co-management therefore, depends on having the same characteristics as successful self-organization. The necessary characteristics of successful community participation within a co-management institutions include these six main characteristics:

- *Inclusion of community in decision making*

Participation in the planning and implementation process is directly related to the participants' sense of ownership and commitment to management arrangements, eliciting trust and respect among others in the community through these processes (Ostrom 2009). When participants have autonomy to develop and enforce their own regulations, "they face lower transaction costs as well as lower costs in defending a resource against invasion by others" (Ostrom 2009, p. 421). Further,

communities which engage in the successful creation of regulations, patrols, and enforcement are reported to have a decrease in illegal fishing activities (Wilson et al. 2003).

- *Enhanced enforcement of regulations and increased compliance*

Monitoring and enforcement of regulations are often cited as the most important characteristic for successful natural resource management. Researchers often focus on the ability of community members to create credible commitments to each other (regulations), monitor each other's behavior (patrols), and impose sanctions (enforcement and punishment) on individuals who break those commitments (Ostrom et al. 1992; Ostrom 1999; Andersson et al. 2010). The argument that if strong enforcement exists, other characteristics are less important is a fallacy. This fallacy is demonstrated by the stark example provided by failed management on Lake Victoria, where centralized management of the fishery—whereby fishery management consisted mainly of top-down enforcement, by the government, of the local-fishers—was rejected by many local communities during the colonial era and prior to independence (Abila et al. 2006), resulting in a culture of illegal fishing and subsequent exploitation at more than two times its sustainable level (Hecky 2003). State coercion of citizens into conservation is a limiting factor when the management of resources, such as fish and wildlife, are “intrinsic to everyday livelihood and household budgets” (Agrawal and Gibson 1999, p. 5). The limits of centralized management “are seen starkly when federal governments attempt to discipline resource [harvesters]”, causing spectacular failures of conservation programs (Agrawal and Gibson 1999, p. 5). Centralized approaches to resource management have placed humans outside the system (Walker and Salt 2006), ignoring the social, cultural, political, and economic climate and differences among communities.

Similarly, co-management institutions and pre-existing organizational efforts require more than strong enforcement capacity; for example, for resource harvesters to follow regulations, a mechanism for discussing and resolving conflict and infractions is needed (Pomeroy et al. 2001).

- *Improved information flows*

Community involvement increases an individual community member's belief in the legitimacy of regulations and commitment to them. This is accomplished through greater participation, where community members have a say in creating regulations. When this occurs, community members are more likely to uphold regulations and inform on others who violate regulations. If resource harvesters are not involved in modifying regulations over time, "the information about the benefits and costs as perceived by different participants is not fully taken into account in any efforts to adapt to new conditions and information over time" (Ostrom 1999, p. 145).

- *Mechanism for equitable treatment of constituents*

Equity has two meanings in the context of co-management. The first meaning of equity is the promise of inclusion of representatives from all community groups in natural resource management, especially those who have historically been less powerful, obsolete, or disenfranchised. The second meaning is equitable treatment of members of the community, which includes equal application of regulations, enforcement efforts, and punishment. On Lake Victoria, the traditionally neglected involvement of women, fish mongers, and boat and net makers or repairers has now been reversed in BMU guidelines, as these groups have representation on the BMU committee (LVFO 2005a).

- *Increased ability to resolve disputes and conflict*

Minimizing conflict is often given high priority because disputes often inhibit successful mitigation of over-use due to fracturing of social cohesion in natural resource management

settings; mechanisms for conflict management and resolution, therefore, need to be established formally in co-management institutions (Geheb and Sarch 2002). In many instances, co-management institutions have been effective in reducing and managing conflict among fishing groups by involving fishers in enforcement and development of fishing regulations (Pinkerton 1989a; Hara et al. 2002; Jul-Larsen et al. 2003; Wilson et al. 2003). The inclusion of community in natural resource co-management promises an increased ability to resolve disputes through increased social cohesion.

- *Improved economic and social development and equitable distribution of benefits*

By involving community in planning and protection of the fisheries, co-management enhances the community's economic development by circulating benefits back into the community (Pinkerton 1989a). Without distribution of benefits to community members, individual's costs—loss of potential economic benefit—of following regulations are often not realized by the community. This seems to be the outcome of most resource management institutions—benefits of actions taken are supposedly for the good of the community for which it was designed. Without realization of benefits, there is little incentive for fishers to comply with management institutions.

The above characteristics do not exist in isolation, they support and link to one another for self-organization and co-management to be effective (Pomeroy 2007). For example, improvement of information flows impacts other characteristics, notably, community decision making, compliance, and monitoring of regulations. Also, mechanisms for dispute resolution allow for other characteristics to function. Discovering indicators of the six characteristics of self-organization is a major step in better understanding the relationship between current co-management program, pre-existing fishery management organizations, and the experiences of fishing communities on Lake Victoria. The questions asked in this research evaluate components of the six characteristics of self-

organization and co-management. Determining if BMUs with pre-existing fishery management organization have these six characteristics associated with them, and BMUs that did not have pre-existing organization were less successful in these six characteristics, could influence better functioning BMUs on Lake Victoria, and motivate creation of new co-management programs for other natural resources.

Methods

The data collected in this chapter are a subset of a broader set of questions (see Appendices A and B) used in my questionnaires. This subset was used to determine which characteristics influence the ability of communities to effectively self-organize. Of the questions identified as self-organizing, some were excluded because of biases in either how the question was asked or the nature of the answers. The resulting 40 questions (Table 4.1) were then identified as being a component to, or reflecting the nature of, one of the six characteristics of co-management and self-organization presented above.

The data for this study were gathered between July 2009 and February 2010 at formally established Beach Management Units in Kenya, Tanzania, and Uganda on Lake Victoria. Because Nile perch was the impetus for creation of the co-management program on Lake Victoria, BMUs that had Nile perch as the main target fish species were selected for this study. For statistical significance, I estimated that a minimum sample size of 10 percent of the total number of BMUs in Each country was necessary, therefore, the study population was: Kenya n=35; Tanzania n=44; and, Uganda n=32 (Table 4.2).

#	Questions/Co-management characteristics	n
DV	Did a fish management or protection committee exist before the BMU was created?	216
1-Inclusion of stakeholders in decision making		
1	Do boat owners ever propose any rules (by-laws) to the BMU?	218
2	Is there a boat owners group at this BMU	443
3	Do you belong to the boat owners group at this BMU?	192
2-Enhances enforcement of regulations and rules compliance		
4	Has illegal fishing increased or decreased since the establishment of you BMU?	217
5	In your view, is your BMU successful in enforcing fishing rules?	215
6	Is your BMU successful at arresting offenders?	436
7	What action is taken if someone is caught with illegal gear or is illegally fishing?	371
8	Are there punishments if you catch someone using illegal methods (e.g. beating the water)?	423
9	Are there punishments if you catch someone with illegal sized fish	434
10	Are there punishments if you catch someone with illegal sized nets?	436
11	Is your BMU successful at confiscating illegal gear?	436
12	Do you know any boat owners at your BMU who have illegal gear?	435
13	Out of all the boat owners you know, how many illegally fish or have illegal fishing gear?	214
14	Does every boat owner have illegal gear?	250
15	What happens if illegal gear or fish is found in someone's boat by a community member?	441
16	Do you turn-in your fellow committee member if found illegally fishing or with illegal gear?	215
17	If someone has illegal fish at this BMU, are they able to sell it freely at this BMU?	438
18	Do you take action if you catch a fisher illegally fishing at your BMU?	443
19	Are patrols for illegal fish and gear conducted at this BMU by the BMU committee?	443
20	How often do these patrols take place?	369
21	Do (external) entities consult or involve you when conducting the patrols?	177
3-Improves information flows		
22	How often does the BMU Executive Committee meet formally?	414
23	Does the BMU committee hold assembly (BMU Beach) meetings with the BMU members?	442
24	How often do these meetings take place?	403
25	Do you keep records of illegal fishing activity at this BMU?	217
26	Do fishermen tell you if other fishermen are illegally fishing?	217
27	The BMU gets information on illegal gear and illegal fishing from other fishermen.	213
28	Can the fishery be protected with such fishing rules?	433
29	Why is fish data collected?	202
30	What do you see as the main purpose of the BMU?	440
4-Increases equitable treatment of constituents		
31	Are everyone's views/opinions valued at this BMU?	438
32	Is there unequal application of fishing rules to different people in the BMU?	434
33	Did all the BMU members have the opportunity to participate in the election?	215
5-Increases ability to resolve disputes and conflict		
34	Is your BMU successful in resolving disputes?	430
35	What is the reaction of the community when the BMU enforces rules	438
36	Do you fear retribution when you enforce the rules?	217
37	Is there any conflict within this BMU?	442
6-Improves economic and social development and equitable dist. of benefits		
38	From what sources does the BMU bring in revenue? Taxes.	189
39	From what sources does the BMU bring in revenue? Fines.	189
40	Does the BMU Committee provide services or infrastructure to the community	440

Table 4.1. Questions from the survey tested to evaluate characteristics of co-management and self-organization.

Four respondents per BMU were surveyed by questionnaire (Appendices A and B), including two committee leaders (n=218)¹⁴ and two boat

Country	BMUs		Respondents	
	Total #/country	10%/country	Committee Leaders	Boat Owners
Kenya	252	35	70	70
Tanzania	436	44	86	80
Uganda	317	32	62	67
Total	1005	111	218	225
n=111			n=443	

Table 4.2. Summary of site and respondent numbers for surveys conducted on Lake Victoria from July 2009 to February 2010.

owners (n=226)¹⁵. Leaders of the BMU committees (chair and secretary) were targeted for interviews because of their positions of authority, duties to perform within those positions, and subsequent knowledge of the BMU committee's workings. Boat owners were chosen because they are generally more aware of, and affected by, fishing regulations and punishment imposed on them by BMU committee leaders. These four respondents at each BMU were collectively chosen to reduce response bias due to group membership by comparing answers of boat owners, those typically being governed, and BMU committee leaders, those typically governing. Response bias can occur when participants self-report, and in this case, the two groups have potentially conflicting interests. BMU committee leaders might provide socially desirable responses of a successful BMU based on their positions as leaders; boat owners might provide answers contrary to success-oriented responses made by committee leaders, as boat owners might feel they are treated unfairly by committee leaders or have knowledge of fishing activities that BMU leaders might not be aware of. Comparing responses, thus, can provide a clearer representation of what might actually be occurring at a specific BMU.

¹⁴ At two sites in Uganda and two sites in Tanzania, a committee member of the BMU refused to show up or was unable to meet. Each BMU is therefore represented, but for two of the BMUs in Tanzania and two of the BMUs in Uganda, only one member is represented.

¹⁵ At the first site visited in Uganda, as methods and approaches were being refined, five boat owners were interviewed. All of their data is included in the analysis.

The questionnaires for BMU committee leaders and boat owners consisted primarily of binary answers, where the respondent could answer, “yes” or “no”, “more” or “less”, “increase” or “decrease”, “regularly” or “irregularly” (see questionnaires in Appendix A and B). Some questions asked categorical questions, for example, if the respondent thought fish populations were decreasing, what was the cause of this decrease (e.g. illegal fishing, pollution, other). Other questions were open-ended, allowing respondents to provide examples of services or infrastructure provided to the community by the BMU committee. Open-ended interview questions were asked about what each respondent thought the biggest challenges were to success of their BMU. Data from these questions were used in Chapter 5 and, when appropriate, will inform perspective in this chapter.

The nature of the data that required a multi-step process to prepare the data for statistical analysis. First, I determined which BMUs had a pre-existing fishery management organization. This step allowed me to run comparative analysis between BMUs that had a pre-existing organization, and those that did not. To determine if a BMU had a pre-existing organization prior to establishment of BMUs, I asked each BMU committee leader (half of the population) in my sample: “Did a fishery management or protection committee [organization] exist before the BMU was created?” The responses were coded “1” if the respondent replied that there was a pre-existing fishery management organization prior to the establishment of the BMU and “0” if not. Because these responses were dependent on the knowledge of individuals, responses sometimes differed between two members at the same BMU (one respondent indicated “yes” there was a pre-existing fishery management organization at the landing site prior to the establishment of the BMU, and one respondent indicated “no”). For analysis purposes, I combined responses within each BMU to get a single metric. Therefore, the dependent variable can have one of three values: a value of 0 (both respondents indicated there was not a pre-existing organization), 0.5 (one respondent

indicated there was, and one indicated there was not), and 1 (both respondents indicated there was a pre-existing organization).

The second step was a two-step process. Of the larger set of questions from my surveys (Appendices A and B), I identified those questions that characterize self-organization activities and excluded those questions which exhibited a bias that could be subject to other interpretations¹⁶. I then identified each question as relating to one of the six characteristics of self-organization and co-management. This process resulted in 40 questions, each one falling under one of the six categories of self-organization and co-management (see Table 4.1).

The third step was to determine which of the 40 questions defined as characteristics of self-organization were more strongly associated with BMUs that had pre-existing fishery management organization. This third step required statistical analysis. Two analytical procedures were conducted: First, a Pearson's chi-square test for independence ($\chi^2=0.05$) to determine whether there was an association between the dependent variable (pre-existence of fishery management organization) and the independent variables (40 questions associated with self-organization). Second, basic descriptive statistical analysis, to determine if strong patterns of responses (e.g. little variation) emerged.

For the Pearson's chi-square test for independence, analysis was conducted at the BMU-level (not the individual respondent-level). So that each BMU would have a single value, I added the responses (1=yes and 0=no) from each BMU respondent and recoded these responses into a single metric. Depending on the question, either two or four respondents answered (e.g. some questions only asked BMU committee leaders about BMU committee operations). If the question, for example, asked all four respondents "Does your BMU committee effectively arrest offenders?" any

¹⁶ Determination of bias included unclear questions that resulted in unclear or multiple-meaning answers;

one of five combinations could occur: all respondents could say “yes” = 4, three could say “yes” and one “no” = 3 and so on. Therefore, each BMU could have a score of between 0 and 4 for each question, with 4 indicating that all respondents believed their BMU committee effectively arrested offenders, and 0 indicating that all respondents believed their BMU committee did not effectively arrest offenders. To simplify the range of responses for analysis, I then translated the whole numbers I calculated into a fraction of 1 to represent the BMU respondent’s collective response (e.g. if all respondents answered “yes”, the total would = 4, and the metric for analysis would equal 1).

For the dependent variable (pre-existence of fishery management organization), I accepted only the values that equaled 1 and 0, meaning both respondents indicated that there was, or was not, a pre-existing fishery management organization. The BMUs that had metrics of 0.5, which indicated “unsure”, were not included in the statistical analysis because there was no way to determine which respondent was correct in answering if there was a pre-existing fishery management organization. Likewise, for the independent variables, where the metric could equal 0.5, indicating opposing responses (e.g. two respondents indicated “yes” and two respondents indicated “no” to an answer) there was no way to determine which respondents were correct. Therefore, 0.5 data was not included in the analysis unless relevant to a specific question; this would also reduce the likelihood that a statistical association would be determined based on data characterized as “unsure”. Response metrics for the independent variables included 0 and 0.25, and 0.75 and 1, where 0 and 0.25 indicate a majority of respondents indicated a negative response and 0.75 and 1 indicating a majority of respondents replied positively.

The descriptive statistics identified patterns of some responses where little or no variation occurred, for example, all respondents replied 1 at all BMUs. Results from the descriptive statistics were used to clarify, strengthen, or develop the existing data. To do this, I used frequency tables

with a threshold of 80 percent where 80-89 percent is considered a “majority”, and >90 percent is considered a “vast majority”. This was calculated by summing the responses of all individuals who answered a specific question and calculating the percentage of each response option. These data often provide additional explanation of the chi-square results.

The results of the analysis conducted in this study provide a comparison between BMUs with and without pre-existing fishery management organizations to determine if self-organizing characteristics are more prevalent in one or the other.

Results

Of the 111 BMUs, responses from 48 indicated fishery management organizations existed prior to the fishery co-management program, 44 were unsure, and 19 indicated no pre-existing fishery management organization. The 44 BMUs which indicated they were unsure were not used in the analysis, therefore, the study population for this chapter is 67. These 67 BMUs were subject to statistical analysis to determine if there are associations between BMUs which indicated presence of pre-existing organization and 40 questions on self-organization.

The Chi-square test of independence resulted in nine (Table 4.3) of the 40 questions asked in this study showing a statistical difference (association) between the two types of BMUs ($p < 0.05$). Fourteen of the 40 questions showed little variation, where a majority (80-89 percent) answered in one direction. Of these fourteen questions, six showed a vast majority (>90 percent) of respondents answered in one direction (Tables 4.4-4.8).

Of the statistically associated questions, committee leaders were asked if boat owners propose any by-laws to the BMU committee (question 1, Table 4.1), because the BMU committee leaders would be recipients of such requests. The results (Table 4.3) show that more boat owners

Q#		Pre-org.	0	1
1	Do boat owners ever propose any rules (by-laws) to the BMU [committee]?	0	43.8	56.3
		1	2.6	97.4
Note: $\chi^2=15.084$, $df=1$ $**p<0.05$ (0.001). Average=0.687, n=54.				
2	Is there a boat owners group at this BMU?	0	81.8	18.2
		1	45.7	54.3
Note: $\chi^2=4.397$, $df=1$ $**p<0.05$ (0.036). Average=0.313, n=46.				
3	Do you belong to the boat owners group at this BMU?	0	92.9	7.1
		1	61.1	28.9
Note: $\chi^2=4.837$, $df=1$ $**p<0.05$ (0.028). Average=0.224, n=50.				
19	Are patrols for illegal fish and gear conducted at this BMU by the BMU committee?	0	16.7	83.3
		1	2.5	97.5
Note: $\chi^2=3.88$, $df=1$ $**p<0.05$ (0.049). Average=0.806, n=58.				
21	Do these (external enforcement) entities consult or involve you when conducting the patrols?	0	47.4	52.6
		1	20.8	79.2
Note: $\chi^2=4.718$, $df=1$ $**p<0.05$ (0.03). Average=0.716, n=67.				
24	How often do these meetings take place?	0	30.8	69.2
		1	8.1	91.9
Note: $\chi^2=4.103$, $df=1$ $**p<0.05$ (0.043). Average=0.642, n=50.				
26	Do fishermen tell you if other fishermen are illegally fishing?	0	38.5	61.5
		1	3.2	96.8
Note: $\chi^2=9.656$, $df=1$ $**p<0.05$ (0.002). Average=0.567, n=44.				
34	Is your BMU successful in resolving disputes?	0	22.2	77.8
		1	0	100
Note: $\chi^2=10.678$, $df=1$ $**p<0.05$ (0.001). Average=0.881, n=63.				
40	Does the BMU Committee provide services or infrastructure to the community?	0	50	50
		1	17.1	82.9
Note: $\chi^2=5.539$, $df=1$ $**p<0.05$ (0.019). Average=0.537, n=49.				

Table 4.3. Self-organizing characteristics that are statistically associated against the dependent variable: “A fish management or protection committee [organization] existed prior to est. of BMU.” Analysis was conducted using Pearson’s chi-square test of independences $p < 0.05$. Comparisons of occurrences between BMUs with (1) and without (0) pre-existing fishery management organizations. Rows = 0 for a negative response and 1 for positive response.**

at BMUs that had a pre-existing organization proposed by-laws (97 percent) than boat owners at BMUs that did not have pre-existing organizations (56 percent).

Respondents at BMUs with a pre-existing organization reported that their BMUs more often had a boat owners group (54 percent) compared to respondents at BMUs without (18 percent). An associated question “Do you belong to the boat owners group at this BMU?” also showed significant differences, with a greater frequency of membership for respondents at BMUs with pre-existing organizations (29 percent), compared to 7 percent membership at BMUs without pre-existing organizations (question 3, Table 4.3).

One of the major objectives of BMUs is to ensure regulation compliance by fishers. Questions focusing on enforcement of BMUs were extensive (Questions 4-22, Table 4.1). Out of these questions, two showed statistical association with BMUs that had a pre-existing fishery management organization (questions 19 and 21, Table 4.3). Responses to question 19, “Are patrols for illegal fish and gear conducted at this BMU by the BMU committee?” indicated that more BMUs with pre-existing organizations conduct enforcement patrols (98 percent) than those without (83 percent). This question had little variation in responses with 84 percent of all respondents indicating that patrols are conducted regardless of pre-existing organizations (question 19, Table 4.4). Question 21 “Do [external enforcement] entities consult or involve you when conducting patrols?” was asked of only BMU committee leaders; 79 percent of BMUs with pre-existing organizations consulted by external enforcement entities compared to only 53 percent of BMUs without.

I identified nine of the 23 questions about enforcement that showed little variation in responses (>80 percent). Table 4.4 shows the percentage of all respondents. These questions

Q#	Question	n	yes/increase/action taken	no/decrease/no action
4	Has illegal fishing increased or decreased since the establishment of your BMU?	205	12.7%	87.3%*
5	In your view, is your BMU successful in enforcing fishing rules?	215	74.9%	25.1%
6	Is your BMU successful at arresting offenders?	436	72.9%	27.1%
7	What action is taken if someone is caught with illegal gear or is illegally fishing?	271	94.6%*	5.4%
8	Are there punishments if you catch someone using illegal methods (e.g. beating the water)?	423	85.3%*	14.7%
9	Are there punishments if you catch someone with illegal sized fish?	434	84.3%*	15.7%
10	Are there punishments if you catch someone with illegal sized nets?	436	87.6%*	12.4%
11	Is your BMU successful at confiscating illegal gear?	436	71.1%	28.9%
12	Do you know any boat owners at your BMU who have illegal gear?	435	see table 9	
13	Out of all the boat owners you know, how many illegally fish or have illegal fishing gear?	214	43.9%	23.4%
14	Does every boat owner have illegal gear?	250	28.8%	71.2%
15	What happens if illegal gear or fish is found in someone's boat by a community member?	441	81.2%*	18.8%
16	Do you turn-in your fellow committee member if found illegally fishing or with illegal gear?	215	89.8%*	10.2%
17	If someone has illegal fish at this BMU, are they able to sell it freely at this BMU?	438	41.6%	58.5%
18	Do you take action if you catch a fisher illegally fishing at your BMU?	443	84.0%*	16.0%
19	Are patrols for illegal fish and gear conducted at this BMU by the BMU committee?	443	84.2%**	15.8%
20	How often do these [BMU] patrols take place?	369	67.4%	65.48
21	Do [external enforcement] entities consult or involve you when conducting patrols?	177	32.64	34.52

Table 4.4. Enhanced enforcement of regulations and rules compliance as measured by calculating the response rate (percent) of all individuals in the study. * indicates a majority (80-89 percent) or vast majority (>90 percent) of respondents answering in one direction (e.g. positive or negatively) for one question. ** indicates that the question was also statistically associated (see Table 4.3) with the dependent variable.

indicated that respondents believe punishment or judicial action is taken against illegal fishing activities or people who have illegal-sized gear or fish (questions 7-10) regardless of BMU type. Questions 15, 16, and 18 indicate high rates of community or individual action. Question 4 embodies these questions by asking “Has illegal fishing increased or decreased since the establishment of your BMU?” A majority of respondents (87 percent) indicated that illegal fishing has decreased, again regardless of BMU type.

Question 23 (Table 4.1) asked “Does the BMU committee hold assembly (BMU Beach) meetings with the BMU members?” There was no statistical association with pre-existing organizations, but a vast majority (92 percent) of all respondents indicated that meetings for both BMU types took place (Table 4.5). The follow-up question “How often do these meetings take

Q#	Question	n	yes/often/correct answer	no/irregularly/incorrect answer
22	How often does the BMU Executive Committee formally meet?	414	88.6%*	11.4%
23	Does the BMU committee hold assembly (BMU Beach) meetings with the BMU members?	442	91.9%*	8.1%
24	How often do these meetings take place?	403	87.7%**	12.3%
25	Do you keep records of illegal fishing activity at this BMU?	217	89.4%*	10.6%
26	Do fishermen tell you if other fishermen are illegally fishing?	217	76.5%	23.5%
27	The BMU gets information on illegal gear and illegal fishing from other fishermen.	213	75.6%	24.4%
28	Can the fishery be protected with such fishing rules?	433	94.7%*	5.3%
29	Why is fish data collected?	252	80.2%*	19.8%
30	What do you see as the main purpose of the BMU?	440	94.6%*	5.5%

Table 4.5. Improved information flows as measured by calculating the response rate (percent) of all individuals in the study. * indicates a majority (80-89 percent) or vast majority (>90 percent) of respondents answering in one direction (e.g. positive or negatively) for one question. ** indicates that the question was also statistically associated (see Table 3) with the dependent variable.

place?” (question 24, Table 4.3), however, showed statistical association (the answer for this question was “regularly” and “irregularly” where the former was defined as having a regular frequency (e.g. “weekly”, “monthly”, or “every two months”). Unscheduled or unplanned meetings, or anything outside of two months, was considered irregular). More BMUs with pre-existing organizations had regular meetings (92 percent) compared to BMUs without pre-existing organizations (69 percent).

The other statistically associated question in this group of questions was “Do fishermen tell you if other fishermen are illegally fishing?” (Question 26, Table 4.3). This question was asked of BMU committee leaders and relates to enforcement, in that it provides information to the leaders; however, this question is an improvement of information flow about illegal activity. Fishers at BMUs with pre-existing organizations reported more often (97 percent) than those at BMUs without (62 percent).

Seven of the nine questions asked about improved information flows showed little variation with a majority or vast majority of respondents answering positively to the questions. The first four questions (22-25, Table 4.5) indicate that both types of BMUs held meetings regularly, with the community, and kept records of illegal activities¹⁷. Questions 29-30 also had high positive response rates for why fish data is collected and the main purpose of the BMUs (each question was unprompted and the researcher waited to hear key words (e.g. fishery protection, sustainability, fishery management)). Question 28 showed that 95 percent of all respondents from both types of BMUs believe the fishery can be protected with the established fishing rules (Table 4.5).

¹⁷ The sensitive nature of asking to see records with names associated with illegal activities, and the inability to then verify the extent of the records, prevented the researchers from verifying that illegal records were actually kept.

To determine perceived fairness and equality in the co-management program, three questions were asked about value and participation (questions 31-33, Table 4.1). None of the three questions showed a statistical association, but question 31 and 33 showed little variation, with the

Q#	Question	n	yes	no
31	Are everyone's views/opinions valued at this BMU?	438	89.7%*	10.3%
32	Is there unequal application of fishing rules to different people in the BMU?	434	22.1%	77.9%
33	Did all the BMU members have the opportunity to participate in the election?	215	94.9%*	5.1%

Table 4.6. Equitable treatment of constituents as measured by calculating the response rate (percent) of all individuals in the study. * indicates a majority (80-89 percent) or vast majority (>90 percent) of respondents answering in one direction (e.g. positive or negatively) for one question. ** indicates that the question was also statistically associated (see Table 4.3) with the dependent variable.

Q#	Question	n	yes/supportive	no/unsupportive
34	Is your BMU successful in resolving disputes?	430	88.6%**	11.4%
35	What is the reaction of the community when the BMU enforces rules?	438	68.0%	32.0%
36	Do you fear retribution when you enforce the rules (arrest people, impose fines, or confiscate their equipment/fish)?	217	54.4%	45.6%
37	Is there any conflict within this BMU?	442	41.4%	58.6%

Table 4.7. Ability to resolve disputes and conflict as measured by calculating the response rate (percent) of all individuals in the study. * indicates a majority (80-89 percent) or vast majority (>90 percent) of respondents answering in one direction (e.g. positive or negatively) for one question. ** indicates that the question was also statistically associated (see Table 4.3) with the dependent variable.

first question “Are everyone’s views/opinions valued at this BMU?” showing a vast majority (90 percent) positive response rate, and the question “Did all the BMU members have the opportunity to participate in the election?” receiving a vast majority (95 percent, Table 4.6). The latter question was asked of only the BMU committee leaders.

To determine a BMUs’ ability to resolve conflicts or disputes, the question “Is your BMU successful in resolving disputes?” was asked. There was a positive statistical association; BMUs

with pre-existing organizations (100 percent responded positively) had significantly higher responses than BMUs without pre-existing organizations (78 percent, Table 4.3). There was also little variation, with 89 percent of all respondents reporting that their BMU is successful in resolving disputes (Table 4.7). The remaining three questions did not show statistical associations, nor any other pattern in responses.

Of the three questions (Q38-40, Table 4.1) asked concerning benefits, two showed statistical or descriptive trends. The first question “From what sources does the BMU bring in revenue?” shows that a vast majority of respondents (97 percent) indicated “taxes” (Table 4.8).

Q#	Question	n	yes/taxes/fines	no/taxes/fines
38	From what sources does the BMU bring in revenue? Taxes.	189	96.8%*	3.2%
39	From what sources does the BMU bring in revenue? Fines.	189	51.9%	48.2%
40	Does the BMU Committee provide services or infrastructure to the community	440	65.5%	34.6%

Table 4.8. Equitable distribution of benefits as measured by calculating the response rate (percent) of all individuals in the study. * indicates a majority (80-89 percent) or vast majority (>90 percent) of respondents answering in one direction (e.g. positive or negatively) for one question. ** indicates that the question was also statistically associated (see Table 4.3) with the dependent variable.

The answer of “fines” showed no trends. More BMUs that had pre-existing organizations reported the BMU providing services or infrastructure to the community (83 percent) compared BMUs without pre-existing organization (50 percent, Table 4.3).

Discussion

Results from this research show that half of the questions about self-organization activities showed little variation, demonstrating that all BMUs, to some degree, have characteristics

identified with increasing success in co-management. BMUs that had pre-existing organizations, however, demonstrated higher rates for nine additional characteristics of self-organization, mirroring the characteristics identified as being important in successful co-management programs: inclusion of stakeholders in decision making, enhancing enforcement of regulations compliance, improving information flows, increasing equitable treatment of constituents, increasing ability to resolve disputes and conflict, and improving equitable distribution of benefits.

Inclusion of stakeholders in decision making

Co-management promises to include community members in management of the fishery. By design, Lake Victoria's fishery co-management program tries to include all community members engaged in the fishery into the BMU. To get an indication of whether boat owners were included in community decision making and not simply included as rhetoric, it was important to determine if they participated in creating by-laws. As proposing by-laws is voluntary, and captures the spirit of involvement, I expected that BMUs with pre-existing organization would have higher rates of boat owner participation in the form of proposing by-laws and indeed, they did. The ability of boat owners to propose by-laws is an indicator that members of the BMU are listened to and that their opinions are valued (this is also supported by question 31 (Table 4.6) which asked if everyone's views and opinions are valued at their BMU). A vast majority (90 percent) of respondents indicated that everyone's views/opinions were valued at their BMU, regardless of whether a pre-existing organization existed or not. The initial purpose of question 31 was to determine equity among BMU community members and whether they felt the environment of participation was such that they could contribute. These two questions (regarding proposal of by-laws and value of opinions) indicated that members of all BMUs felt they were able to give their

opinions or views; those at BMUs with a pre-existing organization propose by-laws more than those at BMUs without. These results are expected, as social cohesion of the community would give the capacity and legitimacy to their views at these BMUs. Supporting the notions of boat owner participation are the results of the existence of boat owners groups.

Community inclusion through informal groups was determined by asking participants whether a boat owners group existed and whether they participated in the group. A boat owners' group is not a formal construct, and the existence of one demonstrates a level of local self-organization and is more common in BMUs with pre-existing organizations. The presence of boat owner's groups was affirmed by determining if most of the boat owners were members of the group. Both were significant, showing that boat owners groups with high-levels of active participation occur at BMUs with pre-existing organization.

This set of questions builds support for the notion that pre-existing organizations contribute to the effective participation of stakeholders in decision making. The creation of informal boat owners groups and participation in that group, show the strongest level of self-organization out of the set of self-organizing characteristics in this study. Inclusion of stakeholders in decision making, and their participation in creating groups that assist in doing so, likely facilitate other self-organization characteristics, such as enhancement of enforcement, improved information flows, equitable treatment of each other, and the ability to resolve disputes.

Enhances enforcement of regulations and rules compliance

A BMU's ability and willingness to conduct monitoring for illegal fishing is a major component of fishery management on Lake Victoria. One of the most important components of the Lake Victoria fishery management program is to provide authority and means for BMUs to

administer enforcement activities. Without enforcement activities (e.g. patrols and punishment), and in the absence of strong social norms that would prohibit illegal behavior, I posited that illegal fishing would take place at a greater rate and with a lack of consistent enforcement in BMUs without pre-existing organizations. The set of questions, therefore, was developed to determine the degree to which BMUs conducted enforcement or other judicial action. Notably, the question “Are patrols for illegal fish and gear conducted at this BMU by the BMU Committee?” was critical in determining if the BMU committee took it upon themselves to conduct patrols for illegal fishing. BMUs with a pre-existing organization had higher levels of reported patrols than BMUs without one. This is likely one of the more important questions with a significant association. Patrolling for illegal activities at the local level by the local level, is a primary purpose of co-management. Conducting patrols, in a way, is a signal that community participation is established as intended. Over reporting likely took place because the socially acceptable response for a successful BMU committee would be to patrol for illegal gear. Though, statistical association reveals that, patrols do take place not by chance, and pre-existing organizations likely have an impact on whether BMUs patrol. The difference between patrolling and enforcement, however, are important. Patrolling for illegal activity is vastly different than punishing community members for breaking the regulations. Indications of discordant responses were noted between questions 7-10 (Table 4.4), which indicated that legal action or punishment takes place (response rates above >80 percent) if fishers are caught illegally fishing, using illegal methods, or in possession of illegal sized fish or nets and questions 5 and 6, which asked respondents if they believe their BMU is successful at enforcing the rules and arresting offenders. Questions 7-10 had high rates of respondents indicating action and punishment took place for illegal activities, gear, and fish, but questions 5 and 6 did not indicate success at enforcing fishing rules and arresting offenders. The discrepancy in these answers might be due to

the degree of enforcement that takes place at each BMU. For example, when an enforcement entity punishes someone in the fishing community, the fishers and the community often disagree with those actions because preventing fishery harvest is often seen as taking away someone's livelihood. Retaliation, therefore, takes place. If the enforcer is a community member (from the BMU), then punishment might be mitigated by that community member in fear of retaliation or other social consequences. I tried to address this in the survey by asking the reaction of the community when BMU committee leaders enforces the rules, whether the BMU committee leader fears retribution. I also asked if there is any unequal application of the fishing rules to different people, anticipating that community leaders might have to be lenient on members of their family or friends (or community members in general if community members disagree with enforcement). None of these questions had any statistical associations. It is difficult to infer these contrary data, though the wording of the questions might have had some effect on the responses. For example, questions which asked if "punishment" and "action taken" if illegal gear, activity, or fish are discovered, could have been interpreted as any informal punishment (e.g. scolding, temporarily seizing gear, or paying small fines). However, any formal punishment (as worded in questions 5-6 (where words such as "enforcing fishing rules" and "arresting offenders") connotes punishment beyond what the community would find acceptable. Arresting offenders and confiscating illegal gear are actions associated more with formal enforcement agencies and might have influenced the lack of statistical power.

Another important factor in enforcement of the fishery is the proposed relationship between higher levels of government and BMUs; the relationship between the two should be clear and consistent so as not to create confusion within the system. As I show in Chapter 5, confusion takes place mostly between members of the BMUs and mid-level government (those entities such as the

DOF and police) whose authority in fishery matters is not always well defined (see Chapter 5). Having clear and consistent lines of authority are necessary at this level because: 1) having the proper authority allows the BMUs to act as legitimate management entities, and 2) a strong relationship between authorities historically deemed legitimate and the BMUs demonstrates that BMUs are regarded as legitimate management entities. The question to determine if external enforcement entities consulted or involved the BMU committee when conducting their patrols was targeted to test this relationship. I expected to see a strong and clear relationship between the appropriate higher entities and the BMU, particularly for BMUs with pre-existing organizations. These BMUs had a higher level of coordination with external entities during enforcement operations, indicating external, higher level enforcement entities, more often consulted with, and jointly conducted patrols with these BMU committees. A BMU that had a pre-existing organization and, thus, from the previous responses, punish those members who have illegal fish, nets, or gear, likely also have lower levels of illegal fishing. Along with lower levels of illegal fishing might come some degree of credibility from external enforcement entities. Regardless, external enforcement entities coordinate at a higher rate with BMUs that had pre-existing organizations than those that did not. This relationship likely has multiple attributes that are positively associated with successful fishery management.

Associated with the previous questions about illegal activity and punishment is the question: “Has illegal fishing increased or decreased since the establishment of your BMU?” (Question 4, Tables 4.1 and 4.4). I did not independently determine if illegal fishing actually decreased or increased at a particular BMU; perception of members of a BMU was the only indication. The high response rate of all respondents (87 percent) indicate that there is a belief that illegal fishing has decreased. Determining the degree to which illegal fishing decreased on Lake Victoria is another matter. Bi-annual surveys, conducted at each BMU by the LVFO, departments of

fisheries, and research institutes of each country indicated in their summary report that levels of illegal gear (specifically illegal nets (determined by mesh size) and illegal hooks (determined by hook size)) have decreased from their 2008 to 2010 surveys (LVFO 2010a). The perception of a decrease of illegal fishing activity could certainly be a function of pre-co-management arrangements that led to the establishment of the BMUs. As previously noted, overfishing took place to a degree that was unsustainable; numerous fish factories closed, and the imminent collapse of the fishery was reported (Abila 2002; Abila 2004). Though reports of illegal fishing continue, fisher's report enforcement (whether formal or informal) where enforcement previously exist, or did so in a weakened state.

I suspect, however, that over-reporting of a decrease in illegal fishing could be taking place, and two examples highlight this suspicion. First, when asked if the BMU is successful at decreasing illegal gear on their beach, 71 percent of BMU committee leaders indicated that they are successful (question 11, Table 4.4). In one instance, a committee member indicated he and his fellow BMU committee members were successful at confiscating illegal gear. When asked why active illegal gear was sitting on the beach, in plain sight of the survey takers, one committee leader responded that the BMU guidelines state that, by a certain date, the BMUs will have decreased the amount of illegal fishing gear by 70 percent. The BMU committee leader then indicated that they had successfully reduced illegal fishing gear by 70 percent, and what the surveyors were seeing was the remaining 30 percent. This anecdote can still be an accurate indicator of decreased illegal gear at a beach, or an indicator of bias and cover-up. In addition to this single anecdote, during collection of data for this research, my team and I observed numerous sites with illegal gear drying, being repaired and made, or lying prepared in boats for fishing. The interviewees often cited that

appropriate actions took place to confiscate or punish people with illegal gear, which may be a sign that informal, community level punishment takes place.

Another indicator of over-reporting was observed from BMU Committee responses to the question “Out of all boat owners you know, how many illegally fish or have illegal gear?” and were given options: “none”, “only a few”, “less than half”, “half”, “more than half”, and “all”. When these results were aggregated, 23 percent of respondents indicated that they knew “none” who had illegal gear or illegally fished, leaving 77 percent of respondents knowing at least one person who did (Table 4.9 and question 12, Table 4.4). The aggregate indicates a large number of BMU Committee members acknowledged existence of illegal gear, but contradicts the higher numbers of both BMU and boat owners who indicate that enforcement and punishment at their BMUs takes place (Table 4.6). I associated all “punishment” or “action taken” to be a formal construct. As in most institutions that are trying to change human behavior, it appears that a margin of acceptance of illegal gear is allowed; responses do not necessarily indicate a high degree of illegality at a BMU, but rather, an acceptable level of fishing practices. A parallel example might be speed limits. Breaking the letter of the law means going even one mile an hour over the speed

Question	None	A few	<half	half	>half	All	Ttl
Do you know any boat owners at your BMU that have any fishing gear?	23	44	19	5	5	4	100

Table 4.9. Reporting rates—percentage table—of responses from BMU committee members only. Seventy-seven percent of respondents know at least one boat owner who has illegal fishing gear.

limit, but it can be argued that going over the speed limit by 5mph is acceptable, both socially, and by formal law enforcement officials.

Improves information flow

Institutional continuity is one measure to determine success in administering a fishery management program. BMU committees are designed to meet formally among themselves, and also to hold assembly meetings with all BMU members. Whether there was over-reporting or all BMU committees meet in one manner or another was not clarified during data collection, so the high response rates could be an indication that each respondent witnessed at least one meeting of the BMU committee and BMU committee with assembly. A better measure was to determine if BMU committees meeting with the assembly took place on a regular basis. Again, a high rate of respondents indicated that these meetings took place regularly, but this question was also statistically associated, meaning that BMUs with pre-existing organizations met more regularly than those that did not have one. Combined with the first three questions in this study (boat owner proposing by-laws, a boat owners group, and high rate of boat owners belonging to the boat owners group) indicate that, at the least, meetings of organized groups (boat owners and BMU community) take place and do so regularly. Social cohesion likely cannot take place without the ability of its members to participate, and these meetings and their frequency facilitate such cohesion.

The degree of reporting of illegal gear and activity, and the source of reporting (e.g. formal patrols or informal community reporting) can be a part of determining community support and self-organization. It is necessary to have multiple vectors of information about illegal fishing activities beyond formal mechanisms such as patrols. It is also necessary to have the authority to enforce fishing rules so that punishments can be vetted consistently by the BMU committee. Both of these increase legitimacy of the BMU, because violators understand that the BMU will not only learn about their illegal behavior but will also be able to take action (from questions 7-10). The question “Do fishermen tell you if other fishermen are illegally fishing?” is a critical component

in self-organization and fishery co-management. This question was initially asked to determine if community members within a BMU were comfortable enough reporting fellow community members (without reprisal). The weaknesses of this question occurs when determining who the fishers might be reporting. Fishers often regard other fishers in their community as one group, and fishers who do not belong to their community as “outsiders”. This question is statistically associated with BMUs that had a pre-existing organization, however, the realization that respondents likely report outsider fishermen still indicates social cohesion within a BMU (especially one with a pre-existing organization (protecting their interests in their area of fishing)), and supports the notion that regulations transgressions by members of your own BMU is not the same as regulations transgressions by outsiders.

Increases equitable treatment of constituents

I expected that each of the three questions about equitable treatment of constituents would be more strongly associated with BMUs which had pre-existing organizations because of potentially stronger social cohesion within those communities. The questions were developed to determine if BMU committee members were neither able nor willing to administer fishery management because of fear of retribution from individuals for dispensing punishment. The questions about equity address observations by Hara et al. (2002) on Lake Malawi, where new co-management institutions were infringing on the powers and privileges that village headman had prior to co-management implementation. Similar concerns of abuse of power and privilege on Lake Victoria are present and whether favoritism towards a BMU committee leader’s friends or family members—leniency regarding enforcing regulations or punishment—undermines the fishery management program.

But leniency might be necessary: the LVFO (2005) found that, in Tanzania, elected BMU committee leaders that were committed to eradicating illegal fishing gear, specifically the removal of beach seines, may become involved in sustained and often personal conflict with many of their relatives, neighbors or friends. Therefore, to avoid conflict, and retribution for enforcing the “letter of the law”, everyone is treated equally, that is leniently.

I believe over-reporting of equal views and opinions occurred, it is likely that these are valued because they conform to the community’s acceptance of socially acceptable breaking of regulations. These management actions might not be the intended actions of the co-management program, but are a form of social-cohesion, a manner in which behavior is influenced to a degree that is possible.

The question “Did all the BMU members have the opportunity to participate in the election?” was only asked of BMU committee leaders. Over reporting here is in the best interest of the respondents, as the elections are a democratic mechanism for their position. It looks good for the BMU committee members to answer positively to this question. High response rates of participation in elections could, however, be accurate. BMUs are relatively recent constructs and thus community members might be eager at the opportunity to elect leaders to an organization that, from the findings in this research, can protect the fishery, includes them in decision making, increased information flows, and improves equitable distribution of benefits.

Increases ability to resolve disputes and conflict

The LVFO found that conflict among members and between other BMUs was a contributing factor to the early collapse of some BMUs in Tanzania (LVFO 2005a). The LVFO’s findings support the notion that conflict between members of a BMU could decrease the likelihood

of successful administration or enforcement. As with the other characteristics, I expected that BMUs with pre-existing organizations would also have higher success at resolving disputes because of social cohesion. As with the other self-organizing characteristics in this study, this characteristic is linked to other attributes of the BMU, for example, equal application of rules, valued opinions, ability to participate in decision making, and information flow. That respondents at BMUs with pre-existing organizations reported conflict resolution at higher rates than BMUs that did not have pre-existing organizations is congruent with what was expected.

That the two other questions concerning community support and fear of retribution when rules are enforced were not statistically significant nor had low variation, might be cause for concern. Both of those aspects of community-run resource management programs have been cited as causing conflict (e.g. LVFO (2005) caused by enforcement of rules by BMU leaders).

An optimistic interpretation of the findings of the questions under conflict resolution is that BMUs that had pre-existing organizations have experience resolving disputes, even those caused by enforcing rules that are not popular by the fishers. Strength of community through social cohesion, and the inclusion of stakeholders in decision making, improved information flows, equitable treatment of community members, and improved distribution of benefits all result in the ability to also resolve conflict. It must be recognized, however, that conflict resolution may have been over reported. Conflict or disputes, at least concerning fishery matters, might not be an issue because BMU committee leaders can only enforce rules to a degree that does not prompt negative reaction from the community (thus keeping their support) nor breed contempt by the fishers. This may require BMU committee leaders to weaken enforcement efforts. Data from the enforcement characteristics indicate that, while their BMUs punish fishers with illegal gear or fish, or conducting illegal activities, they do not arrest offenders nor confiscate illegal gear at as high of

rates as expected. Dispute resolution, therefore, might be a function of tempered enforcement by the BMU committee.

Improves economic and social development and equitable distribution of benefits

The result of high response rate of tax collection is likely due to the high use of established landing sites where fish are brought to be weighed and sold on the market; when this is done, taxes are collected. Though movements of fish to illegal, unregistered sites takes place, most fish are transferred to processing plants and regulated, through landing sites. BMUs are thus able to collect taxes more often than fines. Fines are likely not a major contributor to BMU funding as a result of punishment at the BMU-level taking place in the form of confiscation or destruction of fishing gear or fish and not the collection of monetary fines.

One of the expected outcomes of a successful co-management program is sharing in the benefits resulting from collective action of the community through revenue generation from the fishery. Many of the benefits realized by BMUs come from improvements (physical and concerning welfare) at the BMU by the BMU committee leadership. To determine if such benefits were being realized, I asked three questions about social development and revenue generation. Two questions (Table 4.1, questions 39, 40) were about revenue generation and where the most revenue was generated. These questions also gauged the degree to which BMU committee leaders were administering their duties as leaders by conducting revenue generating activities (e.g. collecting taxes or fines during patrols).

The third question directly asked respondents whether “the BMU committee provided services or infrastructure to the community?” It was expected that BMUs that had pre-existing organizations would have higher reported rates of services and infrastructure for the community

and the data shows this association. Examples of benefits include social benefits, such as beach cleaning (by paid beach cleaning crews), security patrols (to protect nets and equipment from being stolen at night), and welfare and education programs for poorer community members and orphans. Infrastructure included: latrines, water collection systems, and other fish processing related structures or areas. These benefits could be misreported by some respondents because improvements at some BMUs were provided by external entities, such as the government, NGOs, and multi-national organizations. Such improvements are often noted by signs or plaques affixed to the structures (e.g. latrines, medical facilities, or fish processing areas). It is also unclear how these benefits are reported to BMU community members.

Conclusion

The purpose of this chapter was to determine if pre-existing organizations at fish landing sites on Lake Victoria contributed to the successful implementation of the current formal, fishery co-management program on the lake. This chapter demonstrates that self-organization is critical for successful fishery co-management to take place at the local level. My results indicated that BMUs which had pre-existing organizations fared better than those that did not, exhibiting nine self-organizing characteristics more often than BMUs that did not have pre-existing organizations.

Though overall success of the BMUs, as measured by a reduction in illegal fishing, a major component of the co-management program on Lake Victoria, could not be measured, these self-organizing characteristics demonstrate a level of self-organization that is often attributed to social cohesion and a communities' ability to change fisher's behavior. In terms of "successfully" administering a fishery management program, or adapting to formal institutions, this research determines that those communities which had a pre-existing organization, seem to function well.

Additionally, there were indications that some of these characteristics contributed to the success of the current co-management program through a reduction in illegal fishing and improved economic and social benefits.

An unexpected finding in this research emerged with 20 of the characteristics associated with self-organization being attributed to a majority of BMUs in this study, regardless of pre-existing organizations and might be an indication that communities within the co-management program, regardless of pre-existing organizations, are effective in many ways. This finding refutes the notion that communities are unwilling to self-organize held by some studies, the media, and some politicians (for example Matovu 2007). This was most evident in questions relating to taking judicial action, or some form of punishment, against fishers who have illegal gear, are illegally fishing, or have illegal sized fish. Further, respondents indicated that they believe the fishery can be protected with the fishing rules that have been created within the fishery co-management program.

The downside of these findings is that illegal gear and fish have been observed on the lake to a degree that scientist's feel is not sustainable (Mkumbo and Mlaponi 2007; Mkumbo et al. 2007; Njiru et al. 2008), leading to a few possible conclusions. One possible conclusion is that illegal fishing might be acceptable to a degree over what is intended by the fishery co-management program. Responses indicating successful control of illegal fishing might be based on unacceptable fishing practices established by the communities, which may be well beyond the co-management program's established rules. Also, some results from this study might have been over-reported due to respondents providing socially desirable responses. Regardless of these biases, I show that self-organizing characteristics exist at BMUs that had pre-existing organization and contribute positively to the co-management program.

One measure of success for BMUs was the inclusion of community members in decision-making, equitable treatment of all members, and mechanisms to effectively resolve conflict. Additionally, success was defined as the reduction in illegal fishing and providing benefits to the community (both major purposes of fishery co-management). Both of these characteristics were reported by members of BMUs which had pre-existing organizations on Lake Victoria. In the case of Lake Victoria, the components of successful co-management are represented by characteristics of self-organization, and were associated with those communities who had fishery management efforts prior to co-management being established formally.

The results of this research have identified that pre-existing organizations are associated with self-organizing characteristics and positively influence fishery co-management on Lake Victoria, however, it was not determined why BMUs with pre-existing organizations contributed to this phenomenon. The literature used in this study identified communities who self-organized prior to a formal management program being a result of communities experiencing similar activities prior to BMUs. Similarly, it could be because there is greater social cohesion and norms institutionalized from previous organizations that allow BMUs to operate better. Or, communities might have a smaller learning curve due to having experience in management-type experience? There are hypotheses that BMUs that self-organize might have access to better education, or have higher economic status. Or are we looking at a path-dependent effect which shapes the BMUs so they are more successful? With no detail on the nature of pre-existing organizations, or the effort that was put into fishery management prior to co-management, it is difficult to determine what elements contributed to the characteristics in this research.

To enhance the findings of my research, future efforts should focus on characteristics of communities who have or had informal management efforts prior to a formal management

program, to determine what characteristics allow them to be more effective. Such an approach would focus on whether communities become legitimate because of greater social cohesion, or norms of self-organizing become institutionalized in those communities. Possibly increased success is because experience in managing provides a smaller learning curve when a formal program is implemented. Such information could be gathered through semi-structured interviews with communities familiar with their histories

Though there still needs to be work done to reveal the characteristics of self-organizing communities, my research reveals that there is a relationship. I recognize, however, that the nature of my results make it difficult to implement these findings ex post facto. Revealing that a management program will benefit from circumstances that existed prior to the creation of the program seems to have limited applicability. But the results have led to three realizations:

- 1) Future co-management programs should focus on communities who have had pre-existing organizations of management; future research will hopefully reveal the specific characteristics that determine success in a formal program;
- 2) The current Lake Victoria program is, at this moment, creating experience for communities on Lake Victoria. Therefore, if past experience is a variable for future experience, then Lake Victoria's fishery co-management program will improve as long as the management program exists; and,
- 3) Future research to determine the characteristic that make pre-existing organizations or experience beneficial to self-organization.

Policy recommendations:

The very nature of the co-management program, where communities are currently engaged in fishery co-management—whether successfully or not—has value in creating experience of this paper reveal circumstances of existing BMUs—those that had pre-existing organizations—a number of strategies can still be used to inform successful community self-organization in the current program. The LVFO, in partnership with the lake's national governments, must ensure that the characteristics of self-organization are functional at each BMU. Through surveys, similar

to those used in this chapter, identification of such BMUs could be accomplished. Where deficiencies in self-organization are observed, incremental efforts to gradually build experience in self-organization, or social cohesion, could be conducted. The characteristics of self-organization should be viewed as mechanisms to help community members to pursue a particular course of behaviors to accomplish tasks (Agrawal and Gibson 2001). Ensuring elections or training leaders to be competent is likely a good step in this process and ensuring equal application of the fishing rules to the BMU communities. This characteristic, combined with successful resolution dispute mechanisms appear to drive much of the successful BMUs on the lake and might then lead to a decrease in illegal fishing and increased benefits.

Management and policy implications from this study can certainly inform future co-management approaches in Africa's great lakes region. Notably, practitioners on Lake Tanganyika are discussing fishery management approaches with the intention of implementing a co-management program (van der Knaap 2013). Researchers have noted that communities around the lake have been instigating efforts to manage the fishery in their geographical areas, with village and other community organizations addressing overfishing specifically. Though it is likely impossible for practitioners implementing a co-management program to integrate only communities that have or had pre-existing, community-led, resource management organizations, this research urges the consideration that pre-existing organizations can benefit formal co-management programs. Practitioners, governments, and the communities themselves should focus on the strengths of community inclusion, strengthening stakeholder decision making, enhancing enforcement, improving information flows, increasing equitable treatment of stakeholders, increasing conflict resolution, and improving distribution of social and economic benefits.

CHAPTER 5:

**TAKING THE “CO” OUT OF “CO-MANAGEMENT”: INVESTIGATING
LEGITIMACY AND FISHING COMMUNITIES ON LAKE VICTORIA,
EAST AFRICA¹⁸**

Abstract

The creation of the fishery co-management program on Lake Victoria is intended to manage the lake’s fisheries while providing livelihood and development opportunities for those engaged in the fishery. Co-management’s major tenet is the sharing of authority between the central government and community organizations in an effort to manage natural resources. Fishery co-management, therefore, requires a strong relationship between the national-level government and local communities, realized through organizations called Beach Management Units (BMUs). The co-management program on Lake Victoria, however, has been ineffective in many regards, specifically challenges to the legitimacy and accountability of BMUs which have been delegated to conduct fishery management. Weakness in this relationship can cause the management by BMUs to be ineffective because legitimacy of BMUs is, in part, the acceptance by fishers of the authority of BMUs. This chapter studies the state of Lake Victoria’s fisheries co-management program at the community-level. Findings indicate that two major problems exist: (1) lack of support from higher political authorities undermines enforcement power at the local level; and, (2) lack of financial returns from both the fishery and higher political authorities reduces the BMU’s ability to function. In many cases, these two weaknesses caused de-legitimization of BMUs, rendering them ineffective in implementing the proposed fishery management duties.

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Introduction

Fishery co-management institutions—rules of fishing created through the relationship between central governments and local resource users—have been created to manage freshwater fisheries in developing countries. Despite the creation of these institutions, or programs, many factors inhibit them from being fully effective (Pomeroy and Berkes 1997; Kaimowitz and Ribot 2002; Jul-Larsen et al. 2003). Factors of legitimacy and accountability are cited as being critical aspects of a successful fishery management program. Legitimacy and accountability include state accountability to the local level (Ribot 2002a); legitimacy of local-level crafted rules by higher-level government (Ostrom 2009); legitimacy of the whole institution as viewed by all stakeholders; and legitimacy of the rules by the users. Understanding legitimacy, however, is weakest when determining the legitimacy of local organizations (the lowest political enforcement entity (Beach Management Units)) by the resource users. In the course of study on institutions, legitimacy of local organizations within the larger fishery co-management program does not receive the attention necessary to develop a suitable explanation of why these institutions fail.

On Lake Victoria, East Africa, a co-management program was established to create a relationship between national governments and community organization called Beach Management Units (BMUs) to manage the lake's important and valuable fishery. As in many co-management programs, authority was devolved to the BMUs and their major charge is to enforce fishery regulations. The effectiveness of fishery management, therefore, largely relies on the legitimacy of BMUs by the fishers (those who are governed). Negative perceptions by fishers of the BMU's authority have emerged, however, threatening the legitimacy of BMUs and, thus, the efficacy of fishery management. Legitimacy is defined as the acceptance by fishers of the regulations, rules, and authority that govern the fishery (Tyler 1990). Legitimacy, as the power or authority at the

interface of the enforcer (managers) and the enforced (resource extractors), is one of the most critical aspects of resource management institutions. Without legitimacy, fishers will have no reason to assume ramifications for circumventing the regulations. Legitimacy has two important components: personal experiences by the fisher and procedural fairness (Nielsen 2003). This chapter identifies two factors on Lake Victoria that undermine legitimacy at the local level: (1) lack of support from higher political authorities; and, (2) lack of financial returns from both the fishery and higher political authorities, reducing the BMUs' ability to function. Each of these two weaknesses causes delegitimization of the BMUs, rendering many of them ineffective in their charge to sustainably manage the fishery resources.

While legitimacy is a necessity at all levels of fishery management, the relationship between higher levels of government and community is essential for legitimacy to exist, because management authority has been transferred to the communities where the majority of enforcement and management activities are expected to occur. Legitimacy, however, is often negatively affected at the local level by higher levels of government, because national governments often transfer insufficient judicial authority and financial resources to lower levels of government (cf. Ribot et al. 2006; Chapter 3; Lawrence and Watkins 2012).

The 2010 biennial lake-wide survey, administered by the Lake Victoria Fisheries Organization (LVFO), indicated that, while fishers and numbers of boats have decreased since 2008, use of illegal gear and fishing techniques continues (LVFO 2010a); additionally, 77 percent of the study sites in this research, were observed or had reports of illegal fishing or fishing gear. Qualitative data from this research shows that not all individual fishers around Lake Victoria comply, or are able to comply, with the management regulations designed on Lake Victoria; data from this research indicates that illegal fishing by individuals is due to weakness at some BMUs resultant from mid-

level government entities either interfering with, or not providing enough support to the BMUs. This causes delegitimization of the BMUs, decreasing the ability of the BMUs to clearly and consistently enforce regulations and conduct management activities.

To understand the notions of legitimacy on Lake Victoria, I examined the relationship between higher levels of government and the BMUs. Higher levels of government include the ministries of fisheries, departments of fisheries (DOF), and other non-local, mid-level, enforcement agencies such as police, army, and village committees. Using data collected on Lake Victoria during 2009-2010, this chapter describes two major factors that undermine legitimacy of BMUs within Lake Victoria's co-management institutions: a lack of support from higher political authorities—in the form of unclear lines of authority—and, a lack of financial returns from fishery and higher political authorities. The lack of clear judicial authority in Lake Victoria's fishery co-management institutions leads to delegitimization of BMUs when mid-level enforcement entities (police, army, DOF officers) interfere with BMU committee enforcement, creating inconsistent procedures, consequences, or unrecognized or confusing authority. The inability of fishermen to determine who the authority is, leaves offenders in the system to continue illegally fishing and the act of allowing fishermen to continue fishing illegally (defined as using illegal-sized gear or practices or harvesting illegal-sized fish) undermines and delegitimizes the BMU's authority, thus rendering the BMU impotent. The lack of financial resources is a weakness in that: (1) BMUs lack the ability to conduct patrols, administer their functions, or conduct other business because of a lack of money, which (2) leaves offenders in the system to continue illegally fishing, thus (3) undermining BMU legitimacy and rendering the BMU impotent. Judicial weakness and financial insufficiency by higher level government, undermines the BMUs' authority over the fishers, thus rendering the BMU ineffective at implementing fishery management duties.

In the following sections, legitimacy is defined and its conceptual basis given, its place within co-management, and its importance at the local level are detailed and characterized. Then the concepts of community participation and co-management and how each inform the Lake Victoria fishery co-management institutions and the historical process and factors that led to its creation, including current theoretical notions of cooperation between national government and local communities, are described. Data is then presented and synthesized to determine how legitimacy of the BMUs is affected through the current relationship with higher levels of government on Lake Victoria and how these relationships affect how fishery management is conducted.

Methods

Because of the prominence and importance of the Nile perch—the species that has most heavily influenced the current fishing co-management institutions on Lake Victoria—study sites were selected based on fishing beaches on which the majority of fishing activity targeted Nile perch.

Data were collected using semi-formal qualitative interviews and a combination of ethnographic research methods including quantitative participant surveys and site observations.

A structured interview-survey instrument was created to gain data on multiple variables. The survey instrument is primarily quantitative, with a short section of open-ended interview questions to gain richer qualitative data (Appendices A and B). The qualitative data were particularly useful in revealing important information about authority, funding, and legitimacy within the BMUs. Participants were asked: “What changes need to take place at your BMU for a healthy fishery?”, “Mention the most important problems at your BMU”, and “How would you fix these problems?” All qualitative data were entered into Nvivo computer software and coded for numerous variables

that emerged from primary data analysis. Data from the qualitative data were used to inform this study.

Using Nvivo software, several analytic tools were used, including constant comparison analysis, text search, and comparative matrix queries (Leech et al. 2011). Word search and comparative matrix queries were conducted to determine the number of respondents stating specific problems and the reasons why the problems occurred. Coding of the accumulated qualitative data was undertaken to establish patterns of financial and authoritative weaknesses.

All interviews were confidential due to the nature of information gathered, specifically addressing knowledge of illegal fishing activity and performance of BMU committee leaders in regard to interaction with boat owners and other community members and these activities. The names and other identifying information¹⁹, therefore, are withheld.

Legitimacy in institutions

Participation in the regulation-creating process, leads to fishers who are more likely to adjust and follow those regulations (Nielsen 2003). Acceptance of the regulations is created through fishers' perceptions of legitimate regulations and regulations-making. Co-management institutions often include numerous mechanisms for all stakeholder inclusion, as is the case on Lake Victoria. In particular, democratic decentralization allows fishers to participate in elections of local organizations, and, therefore, engage in the management program of their natural resources. Personal experience and involvement by the harvester is essential to improving legitimacy (Jentoft 1989; Ribot 2002a).

¹⁹ BMU names are also withheld since it would be easy to identify BMU committee leader respondents using this information.

To be perceived as fair by the resource harvester, procedures need to be consistent and transparent (Nielsen 2003). Procedural fairness is necessary so that resource harvesters understand that breaking the regulations result in administrative or judicial action. If executed correctly, the co-management institutions are perceived as legitimate because authority through action has been executed by the relevant (legitimate) authority. Procedural fairness often determines the personal experiences of the harvester, and, thereby, resource harvest behavior. Procedural fairness, then, determines legitimacy.

Incentives are generally essential in guiding resource harvest behavior. Most incentives in natural resource management involve punishment and enforcement (or the disincentive to break regulations). Punishment is the direct consequence of harvesting natural resources outside of established regulations, and enforcement is the action of catching regulation-breakers. Procedural fairness is the ability to enforce regulations. Transparency and consistency is determined by the perceived judicial authority that the enforcement entity has and the financial resources available for that entity to execute the enforcement procedures authorized for them to administer. Procedural fairness, therefore, is the determining factor in the success of many co-management institutions, and is influenced, in large part, by the strength of the national government's willingness to provide resources and clear lines of authority to local entities, thus allowing the local organizations themselves to conduct transparent and consistent procedures.

Legitimacy and authority

Without delegated authority, local governments will not be downwardly accountable—the obligation or responsibility to report or justify actions to higher level authorities—and will not have legitimacy to effectively represent harvesters (Ribot 2002a). Without legitimacy, local governments

cannot compel fishers to follow the regulations and, who may therefore, try and find ways around the regulations. In this case, coercion becomes the only basis for local involvement in natural resource (Therkildsen 1992 in Ribot 2002a). Within a strong, legitimate system, resource harvesters are less likely to try and find ways around the regulations or to cheat the system.

Authority can be described in two ways. First, as the legal (judicial) authority bestowed upon an entity or individual to administer punishment or reward upon others, and second, as the *perceived* authority that the entity or individual has over others. The first is provided through legal arrangements and can be implemented instantly and has been done so on Lake Victoria. The second requires the recognition of that authority by the people upon whom it is delegated or imposed.

Judicial authority is the power pertaining to the administration of punishment or reward. Here, judicial authority is framed as the authority to administer punishment where it has been legally granted to the lowest-level of fishery management organization that will implement patrols and enforcement. In the case of Lake Victoria, the BMUs are the lowest political authority. Legitimacy of the BMUs requires that there are clear lines of authority between the fishers (those who can be punished) and the BMU committee (those who enforce the regulations and punish offenders) allowing recognition of consistent and transparent authority.

The perceived authority of the BMUs by the fishers is of greater concern, because having the legal authority to punish fishers does not necessarily mean having the *ability* to use that authority. As will be shown below, although the BMUs have the legal authority to punish offenders vested in them by the national government, many of the fishers do not always recognize this authority, because of a lack of legitimacy often resulting from interference by higher levels of government.

Legitimacy and financial resources

Sustaining the fishery resources on Lake Victoria depends somewhat on how the fisheries co-management institutions are funded. Without proper, sustainable financial resources, it is difficult or impossible to administer management activities, especially those activities which create legitimacy and allow regulations to be enforced. Therefore, financial resources are a key component to legitimacy of fisheries co-management institutions, especially at the local level where the administration of enforcement activities occurs (using personnel, boats, engines, fuel, and safety equipment).

Therkildsen (1993, p. 76) takes the ability of local authorities to collect tax as an indication of the local authorities' legitimacy: “. . . if local authorities cannot mobilize local revenues it indicates a lack of legitimacy which, in turn, constrains their ability to be effectively involved in NRM [natural resource management] on a consensual basis.” Moore (1997) makes a complementary argument that taxation engages the resource harvester with the acting authority, creating a basis on which to legitimately expect the authority to provide services (in Ribot 2002a, p. 43). Similarly, allowing the local organizations to collect taxes on their own, demonstrates that authority has been given by higher level government and trust to execute those activities exists.

On Lake Victoria, the primary source of funding for BMUs is collection of licensing, taxes, and fines at the local level through legal authority vested in the BMU committee. As will be shown below, BMU funding is insufficient and dependent on the will of a higher government authority. This lack of funding prevents BMUs from conducting routine procedures, and the government's unwillingness to allow BMUs to collect the requisite funds, compromises the legitimacy of the BMU.

Challenges of decentralization and co-management institutions

Despite the compelling notions of inclusiveness and cooperation inherent in co-management, weaknesses within the approach have been observed and often lead to failure of natural resources management.

Legitimacy is an integral component of successful fishery co-management. Without proper resources to implement decisions and create authority, “then discretionary powers have not been effectively transferred” (Ribot et al. 2006, p. 1866). Successful co-management depends on the political commitment of the national government of each partner country, including the appropriate legislation and adequate technical and financial resources (Bwathondi et al. 2001; Lawrence and Watkins 2012). “Seldom, however, is adequate attention given to the establishment of administrative and policy structures that define the legal status, rights, and authorities essential for the effective performance of local organizations” (Pomeroy and Berkes 1997, pp. 469-470). National government shortcomings on Lake Victoria’s fishery co-management institutions reduce the legitimacy of the BMUs, undermining the intent of their existence.

Lake Victoria’s fishery and co-management institution

Summary of Lake Victoria fishery co-management

Each partner state on Lake Victoria has a BMU statute defining the powers of the BMU committee. At the local level, legitimacy is critical to the success of BMUs. Lake Victoria’s co-management institutions were developed to give authority and ownership to the community while reducing costs of enforcement to the government. The mechanisms for allowing BMU committees to collect taxes, however, are ineffective because mid-level governmental entities interfere with what would normally be a clear and consistent tax collection operation by the BMU committee. This

redirects the BMU committees' ability to administer clear and consistent operations, and, thereby, rendering them illegitimate by the fishers. Of the 111 BMUs, respondents from 106 BMUs (95 percent) indicated that a lack of funding of the BMU and lack of equipment were the biggest barriers to carrying out successful operations of the BMU. The problems with the fishery co-management institutions on Lake Victoria appear to emanate from the mid-level entities the expropriation of tax collection duties (either directly or through tenders) that these entities possess. The BMU guidelines state that “[t]he BMU Committee shall in the performance of its functions consult and cooperate with local governments, relevant agencies of national government and lead agencies”, it goes on to say that “for effective participation of various stakeholders in fisheries co-management, each party must understand its own role, that of others and the relationship and links between them” (LVFO 2005d, p. 15). Guidelines provide no further clarification of who local entities should cooperate with.

Results

The following data reveal two components that cause delegitimization of BMUs: unclear judicial authority and financial insufficiency. In 2005, participants of the Regional Workshop on Legal and Operational Framework for BMUs in East Africa noted that fisheries officers viewed the newly established BMUs as “enemies” and that one of the challenges to the success of BMUs was the failure to welcome them by government and local leaders (ILEG 2005, p. 17). Perceptions of BMUs being illegitimate organizations by higher level government persisted in 2009-2010, the time of this study. The fishing communities are often viewed as being ill equipped and unable and unwilling to manage the fishery effectively, even under the current fishery management program (pers. comm. with fishery officers; regional newspaper articles). Indicative of research conducted

by Ribot, Agrawal et al. (2006) perceptions of legitimacy like those stated above, often lead to distrust of, and insufficient granting of authority to, local organizations by the national government. More than 78 percent of respondents in this study indicated that illegal fishing takes place at their BMU, and frame surveys (LVFO 2010b), conducted by the fisheries departments and LVFO, indicate high levels of illegal gear (a quarter of all nets) are present around the lake.

Authority real and perceived:

Lake Victoria's fishery is high-value and there is incentive for other authoritative entities, such as the police, army, or others to relatively easily gain from the fishing industry. Three attributes of conflict between BMU committee authority and higher authority exist, thus reducing the BMU's legitimacy: (1) lack of clear or consistent lines of authority by police or army force; (2) inconsistent or corrupt relationship between BMU and fisheries officers, and (3) inconsistent lines of authority between village committee and BMU (mostly in Tanzania). These attributes delegitimize the BMU in relation to the fishers, reducing effective fishery management activities.

Lack of clear and consistent lines: None of the policies guiding the development of the fisheries co-management institution on Lake Victoria address the participation of police or army personnel (see example of organizational structures of fishery management, Kenya, Tanzania, Uganda in Bwathondi et al. 2001, pp. 53-55). Inconsistent lines of authority in Lake Victoria fishery co-management institutions have created a failure to execute enforcement at the local level. The BMUs were given authority, but intervention by police and army personnel confuses and delegitimizes that authority. Where authority confusion exists between higher authorities, punishment imposed by these entities sets precedent over lower authorities, such as BMU committee members. Such actions, both procedurally and authoritatively inconsistent, decrease

the authority and legitimacy of BMU committee members, as a BMUs punishment will likely never be stricter than that of a higher-authority. A BMU committee member in Tanzania described an instance where the BMU committee arrested illegal fishers and took them to the police, but “the police took a bribe and released them. We now don't have any punishment at our BMU because we have been disempowered by the police.” (Respondent T17-CM-01). In Kenya, a boat owner said that “police are not entitled to prosecute fisheries offenses and, thus, most of them take bribes” (Respondent K23-BO-01). Others agree, stating that police are corrupt and take bribes instead of prosecuting the offense, and that the police do not consult the BMUs (Respondent K30-CM-01). In Uganda too, a committee member expressed that the police take bribes and “suck the morale from the BMU” (Respondent U04-CM-01).

Inconsistent and corrupt relationships: District fisheries officers are able to arrest offenders (or as discussed above, BMUs have to consult with DOF to institute punishment). There are numerous instances from BMU committee interviews where corruption from higher political levels, mostly department of fisheries officers, was cited. One of the most common complaints among committee members was that actions taken from higher political levels delegitimized their efforts to control illegal fishing, collect taxes, or have any influence overfishing activities in general. “We are disempowered . . . last year in March, we caught 28 illegal gears (sic) and took them to fisheries officers, the day after, the gear was being sold to other fishermen by the department” (Respondent T17-CM-01). Another committee member said that “it is discouraging to arrest illegal fishers because they are released by fisheries officers after taking bribes; illegal fishers are not prosecuted due to corruption at the department of fisheries” (Respondent T11-CM-03).

Inconsistent lines of authority: In addition to unclear lines of authority between higher political levels and BMUs, there was confusion as to who has authority at the local level, specifically in Tanzania where village committees exist to govern local social and political issues. Often, newly established BMU committees and village authorities conflict in Tanzania, similarly, instances were recorded less frequently in Uganda and Kenya. Village committees appear politically stronger in Tanzania than Uganda and Kenya most likely due to legislative powers granted them by the Local Government (District) Authorities Act of 1982 and other acts that outline a well-designed, formal system for community involvement (Lawyers' Environmental Action Team 2012). This formal recognition gives village committees authority through electing local members as officials who then comprise a village assembly (forming the village committee) which govern local social and political affairs including planning, finance, economic, social services, security and some resource management (e.g. forest protection and water resources) (Lawyers' Environmental Action Team 2012; Commonwealth Local Government Forum 2012a). Though Uganda has similar efforts to involve the village level, it appears that the village level is “consulted” by the next higher political level, the parish or ward, and not a strong political entity itself (see Ministry of Local Government 2003; Commonwealth Local Government Forum 2012b), and Kenya has no constitutional provisions for local government and no recognition of village political entities outlined in its structure of government (see Commonwealth Local Government Forum 2012c). Formal recognition of village communities, by the national government, may be the difference between increased conflict between village committees and BMU committees in Tanzania and not in Uganda and Kenya.

In numerous interviews in Tanzania, both boat owners and committee members stated that village authority overrides BMU committee authority. Boat owners and committee members also

stated that efforts by BMU committee members to punish fishers for illegal activity were often negated by village chiefs or elders, especially those village authorities who were involved in the fishery (e.g. owned illegal nets). Village committees also often own lake-front land, which is used for BMU activities. Land ownership becomes contentious, taxes or rent must be paid by the BMU committee to the village committee, or the village committee supersedes tax collection and collects fishery-related monies themselves (Respondent T34-CM-02). Other respondents—both committee members and boat owners—simply explained that “the village government doesn’t want to cooperate with the BMU committee on [the village government’s] premises” (Respondent T32-CM-01), there is “conflict between local [village] leadership and [the] BMU” (Respondent T17-BO-01), and “the village committee criticizes the BMU and disempowers the BMU” (Respondent T40-CM-01).

Specific lines of authority need to be clearly determined so that BMU authority is not undermined, whether accidentally or on purpose. Whether it is during patrol or judiciary action, any activity or situation that reduces the legitimacy of the BMU undermines the purpose of the fishery management institutions. In the case of Lake Victoria, legitimacy is being challenged because the government often undermines BMU efforts. Ninety three percent of all respondents in the study believe that the Lake Victoria fishery is in trouble, and of those respondents, 76 percent indicated that the reason was because of illegal fishing activities. Yet, participants in the fishery are willing and wanting to have effective co-management institutions – they see the benefits of legal fishing and sustainability, but are unable to control illegal fishing because of the circumstances (e.g. delegitimization and a lack of resources from the government). Indeed, 75 percent of fishermen indicated that to protect the fishery, stronger enforcement measures, including increasing law enforcement activities, patrols, punishment, and preventing the sale of

illegal gear, are necessary. Of the total number of respondents, 92 percent believe that the fishing regulations (preventing illegal fishing gear and practices) are important, and 95 percent believe that the fishery can be protected with the established fishing regulations, if they are enforced and followed.

Financial systems, real and perceived:

The BMUs receive income generated from the fishery at the local level (e.g. licensing, fish tax, fines). This source of revenue is, theoretically, an indicator of legitimacy, demonstrating that the government trusts the BMUs to conduct their operations, and in that the BMU can be trusted with their own revenue generation, legitimacy is created by those that expect services—the fishers. Though the BMUs on Lake Victoria have been designed to fund their own operations through the collection of taxes and fines, they are largely underfunded and perceived to be so by both BMU committee members and boat owners. Three factors result in, and support, this view (1) with poor fish catches, there are fewer taxes to collect, (2) taxes that *are* collected, are done so by higher government representatives, or (3) taxes are collected by the BMUs who then are required to hand over all taxes to higher level government, and then receive in return a percentage of those taxes.

Government, at district, regional, and sub-county levels, are identified by the national governments of Kenya, Tanzania, and Uganda as the level of government “collecting the revenues necessary to ensure sustainable local government, and to reinvest in fisheries development.” (Ugandan Ministry of Agriculture Animal Industry and Fisheries 2004, p. 17). In the interview-surveys, however, there was no mention of financial assistance from higher levels of government, other than that money which is collected by a government representative (tender) at the BMU and circulated back to the BMU as a percentage of total collection (money from the local level

redistributed by higher level government). While this tender-collected money is “contribut[ing] to the revenue required by *local government* to fuel the development and administration processes” (Ugandan Ministry of Agriculture Animal Industry and Fisheries 2004, p. 18. Emphasis added) 61 percent of the respondents in this study (34 percent BMU committee members), stated that the money that is obtained by the BMU committees is insufficient to run BMU operations, including enforcement activities. Furthermore, the portion of the taxes returned to the BMU is often only 25 percent of the total revenue collected at the beach. In effect, this creates a negative cycle: The BMU committee is supposed to, in part, collect taxes and fines at the beach; from the monies collected, the BMU conducts patrols with purchased patrol equipment (fuel, boat, engine) in which the BMU committee can further collect fines. However, a large percentage (or all, in some cases) of the money the tender collects is not returned, thus reducing the efficacy of the BMU’s ability to patrol and collect fines.

The Department of Fisheries, which is understaffed and has limited equipment, is funded, in part, by taxes and fines collected at the BMUs. Corruption by higher political entities (e.g. the Department of Fisheries) was reported by 21 percent of the BMU committee members and boat owners. Out of 25 regions studied, only four regions reported no corruption from higher level government. Five regions (one in Tanzania, and two in Kenya and Uganda each) reported non-existent fishery management activities, such as patrols, meetings, or any other management activity, and high levels of bribery and corruption by officers and politicians.

A BMU committee member at a Tanzanian beach said that “the [district] government tenders a person to collect taxes from fisheries activities and he [the tender] keeps half and gives half to the government. The BMU used to collect taxes and were planting trees and educating orphans, but that has stopped” (Respondent T04-CM-02). At another BMU, the committee

chairman again explained that there is no collection of taxes because the “district council does not return the percentage that it is supposed to return”. This member explained that the BMU is required to, at minimum every month, collect and provide to the government, 177,000 TSh to receive 5 percent in return. If the BMU provides the government with less than 177,000 TSh they will not receive their share, however, in this case, the committee member also said that “whether we make the 177,000 or not” we never get our percentage returned (Respondent T15-CM-01). Another committee member concluded: “No taxes are being collected for fishing activity by the BMU, [the councilor (through an agent) does the collection]. “Our BMU’s only source of revenue is a monthly fee for members. The police and department of fisheries officers conduct patrols to collect bribes; the government has let us down” (Respondent T15-CM-01). The fact that the national government has a hand in collecting and dispersing the fish catch taxes and fines reduces the local-level ownership of the fishery, and lessens the notion of responsibility by the fishing communities. Intended or not, political delegitimization of the BMUs occurs.

The balance between unsupported BMUs and over-supported BMUs

Legitimacy lies in the balance, in part, of fisher’s perceptions of the BMUs relationship with the higher level government. Appropriate authority must be carefully delegated so that clear lines of authority are present, and consistent punishment exists. When BMUs are under-supported through either lack of financial resources or unclear lines of authority, their legitimacy is undermined. Undermined authority results for two reasons: first, procedural fairness is absent if a BMU committee cannot conduct critical operational functions from lack of financial resources. Second, authority is absent when higher level government (e.g. police or DOF officers) inappropriately interfere with BMU authority, confusing the line of authority.

Discussion

Legal authority has been delegated to the BMUs. This authority, however, is often not recognized by the harvester (fishers) for reasons emanating from weaknesses observed in the Lake Victoria fishery co-management institutions' higher level authority, where:

- a) weak judicial action is taken by higher level officers as seen when fisheries officers undermine BMU efforts by releasing offenders with little or no punishment;
- b) corruption by higher level officers and others in authority, demonstrated when fisheries officers are corrupt and take bribes or sell confiscated illegal gear;
- c) unclear lines of authority, where police, army, department of fisheries officials, or village authority confuse fishery management actions reserved for BMU committee members; and,
- d) circumventing tax and fine action of the BMU by higher level authority tenders who collect money at the local level, undermining the BMU committee's authority and reducing their capacity to administer consistent enforcement procedures, this leads to insufficient financial resources to the BMUs which creates the inability to conduct consistent enforcement procedures.

The governments of Lake Victoria have provided some judicial authority to the BMUs, but the actions of higher political authority have subsequently taken that same authority away. Higher level government actions, and unclear lines of authority, have undermined the authority of the BMUs; no matter what stated authority the BMU committee members have, that authority is often not realized. Revisiting Ribot et al. (2006), they explain that “effective decentralization requires the construction of accountable institutions at all levels of government and a secure domain of autonomous decision making at the local level”.

The central argument of legitimacy comes from the answer of a Tanzanian BMU committee member who stated that “the district council should give the revenue collection activities of the beach to the BMU [committee]” and that fisheries management “patrol[s] should be conducted jointly with the department [DOF] since they have better equipment” (Respondent T11-CM-03). For the local level to have legitimacy, there appears the need for balance between autonomy—granted to the BMUs by higher level government as a demonstration that the

government values and trusts the BMUs—and government support—a demonstration that the government is in a partnership with the BMUs to effectively manage the fishery.

The result of giving BMUs power of tax and revenue collection is the perceived legitimacy of the BMUs by the fishers, because it is also perceived that the government realizes the BMU as a legitimate entity. Further, with joint patrols between the BMU and higher level authorities (e.g. police or DOF officers), demonstrates the legitimacy of the BMU through the partnership, as the DOF provides protection of the BMU committee and allows effective execution of regulations when rule-breakers are caught.

Disallowing the BMU committee to collect taxes can be perceived as a lack of faith in the BMU by higher authorities. The inability to collect their own taxes and fines means that the BMU does not have enough financial resources to then conduct patrols and enforcement activities; therefore, the BMU committee is unable to conduct consistent enforcement activities, reducing the committee's legitimacy by the fishers. Further, there is no promise that a more effective BMU is delegated more money if a tender is in place, as the amount of money collected by higher level authorities is often less than that which is returned to the BMUs. This is a case of a lack of transparency in the tax system. Allowing BMUs to collect their own taxes creates incentive for the BMUs to patrol and enforce more effectively because taxes and fines would be collected as the BMUs become more effective.

In the case of Lake Victoria's fishery co-management institutions, lake-level revenue collection and control must be in the hands of the BMUs and patrols, arrests, and judicial activities, executed by the BMU must be supported by higher level government in the form of appropriate punishment through laws, security of BMU patrols, and equipment and fuel in partnership with the appropriate higher political authority.

Conclusion

Where government was once viewed as an obstacle for its unpopular, coercive, top-down fishery management arrangements, today the *lack* of appropriate government engagement is the obstacle. Insufficient financial resources and unclear judicial authority have delegitimized the local management arm of co-management on Lake Victoria.

Insufficient and unclear power transfer by the national government leads to the delegitimization of the BMUs. While the members of the BMUs have the will to administer fishery management, they lack the ability, precisely because of insufficient and unclear judicial authority and insufficient financial support. Effective fishery co-management institutions require a strong positive relationship between the national government and the local level. Within Lake Victoria's co-management fishery institutions, relationships between those who are governed and those who govern are strengthened by legitimacy, or fishers' acceptance of the regulations and authority that governs the fishery; and legitimacy is created by the strong positive relationship between the national government and the local level.

Legitimacy is a critical component of co-management. When fishers do not believe that consistent and transparent socio-political natural resource management institutions exist, illegal resource harvest behavior may not change and the resource will be compromised.

A transparent system will reduce incidences of corruption at the mid-political levels. The fishery earns enough money, both at the local level and at the national level, to fund the management program. But a clear tax structure must be created, with local taxes being collected at the local level and higher-level taxes being collected at the appropriate levels (e.g. taxation of exporters through national exportation tax structures). Additionally, a clear responsibility structure must be created—if BMU committees are in charge of fishery management then it must be made

clear what authority others (e.g. police, army) have, so that their involvement does not undermine BMU efforts, but rather, compliments it.

BMUs need to control revenue collection, but patrols should be conducted in conjunction with the appropriate government entities (police or DOF officers). Both actions demonstrate that government is invested in protecting the fishery, provides legitimacy and support to the BMUs, and allows effective execution of regulations when it comes to arresting offenders.

The government must share in the responsibility as well as the management of the resource. The fishery resource should be viewed as a tool for the development of the communities around the lake and can serve, if managed appropriately, as a sustainable source for economic growth. Weakness at the top will surely create weakness at the local level. With the loss of legitimacy comes the failure at all levels to successfully manage the resource.

While this chapter investigates factors that weaken the co-management institution on Lake Victoria, it must be acknowledged that co-management indeed, has had an overall positive benefit to Lake Victoria's fishing communities, national development, and to some extent, reducing over-harvest. Results, observed by the author and well documented by others (see Odongkara et al. 2009; personal observations; Ogwang' et al. 2009), demonstrate that the Lake Victoria fishery contributes to each of the partner country's GDPs; income and revenue generation at local and regional levels; provides employment and produces foreign exchange (Odongkara et al. 2009); increases fisheries infrastructure and development; alleviates poverty among fishing community members; includes the disenfranchised (Ogwang' et al. 2009), and has likely prevented the collapse of Lake Victoria's Nile perch fishery.

CHAPTER 6:

**EVALUATION OF FISHERY CO-MANAGEMENT ON LAKE VICTORIA,
EAST AFRICA: CONCLUSIONS, IMPLICATIONS, AND SUGGESTIONS
OF A COMMUNITY-PARTICIPATION APPROACH**

Abstract

Lake Victoria's fishery management program is based on broad approaches influenced by international aid agencies that provide financial and technical assistance to developing countries. These approaches—including decentralization and co-management—were created using paradigms from economic theory that predominately ignored the basic tenants of economic change in developing countries largely resulting in failed African states. These same approaches, however, have been used in the creation of Lake Victoria's fishery management program with some success. This chapter compares the differences in applying decentralization to social and infrastructural programs and natural resource programs to determine if a) they are mutually exclusive, where the approach works well on one set of programs, and not another; b) there are inherent faults in decentralization and co-management, relegating Lake Victoria's fishery management program to a predetermined failure in the future, and c) if failed status of social and infrastructural programs had an effect on the fishery and subsequent management efforts. Because the research contained in this dissertation approached decentralization by looking at the existing fishery management program, finding both weaknesses and strengths, it was necessary to determine if any weaknesses emanated from the theoretical construct of the program. Therefore, this chapter compares implementation with theoretical notions of these programs; looks at the practical applications and limits of the programs and the entities within (especially the BMUs); and determines success and the potential for other stressors influencing success. This chapter concludes by discussing the applicability of the co-management program on Lake Victoria, how some of the challenges identified in this study might be addressed, and how co-management might be replicable on other common property resources.

Part I: Introduction

Approaches to Lake Victoria's fishery co-management program emanate from the recognition that the lake's fishery contributes to the income, food security, development, and employment of millions of people in the region and contributes millions of dollars annually to the East African Community. The lake's management program emerged from the crisis of overfishing of a highly valuable fish—the Nile perch—and previous failed attempts of centralized management to rectify this crisis. Similar to the Laurentian Great Lakes, there were multiple attempts at lake-wide fishery management programs (Gaden et al. 2012). It was not until, in part, the imminent collapse of the highly valued Nile perch, with investments and interest from the international community, that the current program launched in 1996.

Much of the promise of my research depends on the notion that decentralization is an effective approach to Lake Victoria's fishery management program. Therefore, in this section I revisit (from Chapter 2 and 3) decentralization and focus on community participation. Up until this chapter I have been casual in my acceptance of the concept of decentralization. I did not ask whether decentralization is an approach with inherently faulty notions, or whether decentralization has influenced how Lake Victoria's fishery management program has been developed. For example, decentralization is a major concept that has been implemented in developing countries since the 1980s to help alleviate poverty. However, decentralization has been criticized as an ineffective approach because it used economic models that did not transfer well to developing countries' social, economic, and political systems (Stein 2008). In this research I have approached decentralization as a compelling arrangement without investigating whether there might be inherent weaknesses that cannot be overcome. In this chapter, therefore, I look at how decentralization has been developed and applied in East Africa to determine if small changes in

the current fishery management program can overcome the challenges identified in this research, or if there are intrinsic problems with the approach that might not be improved through institutional fixes. I conclude this chapter by synthesizing my findings from the entire dissertation and by providing suggestions for future management and research based on these findings.

Part II: Revisiting decentralization

Decentralization: Failure of economy

Development in East Africa, and specifically on Lake Victoria, has been heavily influenced by international aid agencies such as the World Bank and International Monetary Fund (IMF) that provide financial and technical assistance to developing countries with the goal of reducing poverty. These two organizations have strong economic backgrounds²⁰, and their approaches to development and poverty alleviation emerged from the dominant paradigm of neoclassical economic theory and focused largely on free-market programs called structural adjustment (Stein 2008).

Structural adjustment is based on free-market programs and characterized by conditionalities to ensure that money lent to developing countries would be spent in accordance with the overall goals of the World Bank and IMF. Conditionalities, as the term implies, are restrictions placed on the receiving country, constraining the country to implementing programs and policies dictated by the donor agency in return for continued assistance. Conditionalities, and the structural adjustment programs, were intended to reduce poor fiscal decision making by developing countries to assist in their long-term economic growth using privatization and deregulation measures (Stein 2008).

²⁰ A more in depth discussion of the historical background of economic influences forming World Bank policies and approaches can be found in Stein (2008), Platteau (2000), and Bauer (1972).

Literature criticizing structural adjustment programs often focus on conditionalities and free-market-like approaches not applying well to developing countries. Structural adjustment policies generated a set of tools that ignored characteristics of developing countries necessary for understanding the process of economic change and are seen as a major cause of many social and infrastructural sectors failing in Africa (Platteau 2000; Stein 2008). For example, structural adjustment is an approach that neither understands the problems occurring in developing countries, nor comes up with viable alternatives; structural adjustment addresses theoretical problems with solutions that emphasize financial variables in a hypothetical, axiomatic²¹ world (Stein 1995; Stein 2005a; Stein 2008).

The misgivings of structural adjustment programs are often associated with health, social, and infrastructural programs. Such programs are seen as uniform and thus amenable to delivery-oriented approaches, with regular, recurring activities and the need of foreseeable investment, regular planning (usually annual), and programming cycles; characteristics that can in general be prescribed by a central planning process (Kaimowitz and Ribot 2002). Recall, contrastingly, that a centralized approach to management failed when applied to natural resource management on Lake Victoria (Chapter 2, p. 42); but when decentralization was applied as a market-based approach to social well-being, such as health care, education, roads, and agriculture, the market began excluding those who could not afford it (Stein 2008). Decentralization led to inaccessible education and healthcare, and agriculture emphasized mono-culture and cash crops²² which did

²¹ A self-understood truth; exists because it exists.

²² The argument against structural adjustment policies, mono-culture, and cash crops involves the ramifications of liberalization on local farmers. Since structural adjustment policies call for reduction of subsidization of fertilizers and pesticides by the state (the market will take care of this), farmers must pay, and thus reduce their profit margin from successful crops. In many developed countries (e.g. the U.S.) farmers are still subsidized, and can out develop country farmers with quality of product. Further, World Bank and IMF approaches to crops were to urge countries to grow specific crops (e.g. coffee, tea); when it was time, each country put their product on the market, flooding the market and driving the price down, because global demand did not increase in relation to increased supply.

not function well in the international market (Bauer 1972). Decentralization was supposed to enhance delivery of social services and markets (Ndegwa 2002), but it instead led to unemployment, a reduction in education and preparation for future employment, and a reduction in crops and other livelihoods. Structural adjustment programs misread and mis-conceptualized the problems, solutions, and abilities in Africa (Stein 2005b).

The result of structural adjustment's failed policies is, in part, attributed to many of the stressors that threatened the ecological sustainability of Lake Victoria. For example, the poor economic conditions created by the curtailment of formal sector employment opportunities, the reduced production within the agricultural sector due to poor market performance, and decreasing youth opportunities in rural areas led to populations seeking employment opportunities. These dire circumstances occurred during the 1980s, concurrent with domestic and international growth in demand of the highly valued Nile perch²³. The fishing industry created opportunities for those seeking better economic conditions, jobs, or simply natural resources to sustain their livelihoods. All of these circumstances contributed to a general human migration toward freshwater resources as access to clean water, alternative livelihoods, and other resources became limited (Stein 2007) in other sectors. The resulting annual growth rate of human populations in many of Lake Victoria's cities was high—approximately three percent (Njiru et al. 2006). Lake Victoria, an open-access²⁴ resource, provided large numbers of people escaping poor economic conditions valuable fish that benefited them immediately through payments at the beach, and led to overfishing of the lake at more than two times the sustainable level (Hecky 2003).

²³ The beginning of the lucrative Nile perch fishing effort took place at the beginning of the 1980s (see p. 66)

²⁴ Lake Victoria is not strictly "open-access" (see p. 49), but the cost of accessing the resource is minimal, and restrictions to enter not inhibiting.

Increased human populations around Lake Victoria also contributed to other environmental stressors which led to a decline in fish populations, such as environmental degradation of wetlands and other spawning areas (Njiru et al. 2008), introduction of exotic species (Njiru et al. 2005), and eutrophication (Njiru et al. 2008). These contributions to the decline in the fisheries have been acknowledged by fishers, scientists, and other stakeholders in Lake Victoria's fishery program (LVFO 2005c); the Entebbe Declaration (LVFO 2005e), for example, indicated that the East African Community "should take measures" to address these concerns. Though fishery populations have declined because of these other factors, the apparent lack of authority of the fisheries sector towards other sectors (e.g. agriculture, a major cause of eutrophication) is minimal. Efforts to address these issues are not a formal component of the co-management program, though disparate efforts to reduce their impacts have taken place²⁵.

The failure of decentralization of social and infrastructural programs in East Africa contributed to the failure of poverty alleviation efforts. The economic and social stressors that resulted from these failed efforts led large human populations to seek easily accessible employment and food security. They did so by accessing Lake Victoria, leading to overfishing and the increased need for fishery management efforts as the incentives to sell fish were high. At the same time decentralization programs were failing on social and infrastructural programs, they were also being implemented on natural resource management programs, including Lake Victoria's fishery.

²⁵ For example, see LVBC (2007), which addresses country-level attempts at controlling the invasive plant Hyacinth. Hyacinth has led to a decline in fish species.

Decentralization: Promise of natural resource management

Though decentralization has been criticized as a failure for social and infrastructural programs, other studies have focused on the notion that decentralization is a necessary approach to sustainable resource management (Kaimowitz and Ribot 2002; Ribot 2002b). The differences between decentralized approaches for social services and infrastructure—described above in terms of health care, education, and agricultural sectors—and natural resource management, diverge in many respects and can thus be treated differently. First, social and infrastructure programs can be defined as uniform, where national curriculums, health programs, and construction prototypes can be designed at scale for an entire country. To the contrary, natural resources are considered variable, where the nature of natural resources requires greater local knowledge for their management as they vary spatially and temporally, making them less amenable to central standardization (Kaimowitz and Ribot 2002). These spatial and temporal variations lead to a need for greater degree of local knowledge in their management, planning and implementation (Kaimowitz and Ribot 2002). Management decisions must be made in response to variations or fluctuations in the resource, flexibility and “responsiveness to cope with the contingencies of nature” is necessary (Kaimowitz and Ribot 2002, p. 2) making them more amenable to localized, or community management. Second, differences between social programs and natural resources can be defined by their financial characteristics. Social services and infrastructure are net sinks for financial resources (e.g. payment for a road), whereas natural resources are sources of income and wealth for national governments as well as local populations (Kaimowitz and Ribot 2002). Natural resources that are wealth generators create incentives for those who benefit directly from the resource to manage it sustainably.

In addition to the arguments that Kaimowitz and Ribot (2002) make concerning the necessity of community participation in natural resources management, and Lake Victoria meeting those requirements, past centralized management efforts have failed on Lake Victoria. The lake's fishery, because of its varying nature, does not appear to be amenable to centralized management, and thus the alternative of decentralization is a compelling approach.

The goals of Lake Victoria's decentralized, fishery co-management program are to create more employment opportunities, alleviate poverty, and sustain the fishery. The benefits of sustainable fishing practices were intended to benefit the fishers through continued catches of the valuable Nile perch and the central government would benefit too from foreign exchange. To gauge success based on these goals, it must be determined whether poverty has been alleviated, foreign exchange earned, and fisheries sustained, and to what extent. Fishery yields and subsequent income around the lake has been substantial, with fisheries contributing significantly to the national economy through export, employment, and food security (Nunan and Scullion 2004). In 2002, for example, the highest contribution to the Ugandan economy (over the usually highest coffee export) was fishery exports, bringing in USD 90 million (Ugandan Department of Fisheries Resources 2003). Production of fish within Uganda contributed to the economy more than exportation of fish, equaling 12 percent of the GDP (Ugandan Department of Fisheries Resources 2003). The fishery directly supports 3-6 million people in the basin (Awange and Ong'ong'a 2006) while fish from the lake provide nutrients and protein to 17 million Ugandans. Similarly, on the Kenyan side of the lake, fishery exports earned USD 125 million (Awange and Ong'ong'a 2006). The Nile perch fishery is a multi-million dollar export industry supporting about 20 fish filleting factories on Lake Victoria (Geheb et al. 2007). Lake wide, Nile perch yields are between 700,000 to 1,000,000 t (see FAO 2010a-e; LVFO 2012) and valued between USD 350-

450 million at the local level beaches and USD 250 million in export earnings (LVFO 2012). Speaking only of the fishery, an argument can be made that alleviating poverty and foreign exchanged earned has worked to some extent.

Determining success based on community empowerment can be done through observations of BMUs and co-management. The BMUs are not only the action arm of Lake Victoria's fishery co-management program, these organizations are also the personification of the co-management approach. Chapter 4 demonstrates that BMUs are implementing co-management through participation in fishery management activities. Their implementation ranges from designed roles, such as those established by the program (e.g. elections); to broader notions of self-organization and implementation of the fishery management program (e.g. conflict resolution). Chapter 4 established that, among the characteristics of co-management, BMUs with pre-existing organizations showed stronger notions of self-organization, including increased decision making, enhanced enforcement of regulations, improved information flows, equitable treatment of constituents, ability to resolve disputes, and distribution of benefits. Regardless of pre-existing organizations, many of the BMUs are successfully implementing, to some degree, co-management activities.

It is unclear what would have occurred on Lake Victoria if donor agencies did not push a fishery co-management program. It is difficult to imagine a program without a coordinating organization like the LVFO; if the past is any indication, disparate efforts by various jurisdictions sharing the same resource often result in uncoordinated fish management attempts (Chapter 1). Without multi-jurisdictional harmonization, each separate country likely would have established their own centralized fishery management program (as in the past) and two inefficiencies would likely have emerged: 1) the often observed incongruences of separate sovereign states attempting

to manage a single, common-property resource, leading to disparate policies and unequal fishing efforts; and 2) the previously observed failure of top-down managerial approach which saw a backlash by resource users towards the government, leading to overfishing. Either way, continued failed management would likely have taken place based on past experience. If these are the likely outcomes of management without co-management, then the observed successes of BMUs is a positive outcome.

Conclusion of decentralization and co-management

Decentralization has inherent flaws when applied to social programs in developing countries. In East Africa, these flaws caused social and economic circumstances that led to a general human migration toward Lake Victoria and its freshwater resources. The resulting overharvest of the lake's valuable fish was an impetus for improved management. Because of the varying nature of the fishery, because the fishery is a wealth generator, and because of proven failed approaches of centralized management on Lake Victoria, decentralization appears to be an appropriate approach for fishery management.

I have concluded that successes and challenges in the fishery management program on Lake Victoria are not inherent weaknesses of decentralization, but rather, institutional in nature, where inappropriate devolution of resources or unclear roles need to be addressed (see Chapters 3 and 5). In other words, decentralization will not necessarily create an atmosphere of failure for fishery co-management on Lake Victoria, but rather has inefficiencies that can be overcome through institutional solutions. The following section proposes some of those solutions based on findings in Chapters 3 through 5.

Part III: Synthesis-Recommendations

The literature on decentralization and co-management lacks many empirical studies, instead often addressing theoretical problems and hypothetical variables. This study improved the understanding of some of the critical variables that affect fishery co-management. Though numerous variables exist, many researchers categorize them into causal classes, reflecting the notion that these numerous variables influence management programs in predictable ways. For example, Bene (2003), Ostrom (2005, 2009), and Agrawal and Chhatre (2006) created diagnostic approaches with broad causal classes relating to biophysical (resource mobility, visibility, reproductive capacity), institutional (enforcement capability, level of authority), infrastructural (access to markets), demographic (human populations, education), economic (value of fish, alternative livelihoods), and socio-political and cultural (community response and awareness to fishing regulations and enforcement) characteristics.

My studies looked at variables and characteristics in each of the above causal classes and determined specific weaknesses and strengths based on the responses of the resource harvesters. Though many more variables exist which challenge Lake Victoria's co-management approach²⁶, my findings demonstrate there is a need to: strengthen conventions of formal transfer of authority, create accountability, and focus on local-level institutions; use the capacity afforded by existing socially cohesive community engagement to inform and strengthen the co-management program; and clarify roles of all entities engaged in fisheries.

²⁶ Future analysis will reveal more variables that are critical, but without attending to some of the findings in this dissertation, progress at many BMUs is inhibited.

1. Formal conventions, accountability, and, local level institutions:

In Chapter 3 I demonstrated that for decentralization of fishery co-management to function properly, adequate authority and financial resources must be devolved or distributed to lower-level administrative entities and to the BMUs. It is the government's responsibility to distribute appropriate revenue to entities and organizations to function in a cooperative manner as defined by the co-management program (LVFO 2001). My findings, however, demonstrate that central government kept disproportionately more financial resources than lower level management entities, and the central government remained overwhelmingly in charge of policy development. These weaknesses resulted in decreased ability to conduct fishery management activities due to limited resources to enforce regulations or participate in policy development. I determined that successful natural resource decentralization requires strengthening and empowering the BMUs with increased cash flow, enforcement, monitoring, and judicial powers. To accomplish these, central government priorities toward BMUs must change, but changing priorities of government entities seems impractical. Therefore, I suggest strengthening mechanisms of accountability between stakeholders as a reasonable approach. Similar to findings in Chapter 5 on legitimacy, accountability entails expectations of actions taken by collaborating partners. Accountable representation, and an understanding of the extent to which fiscal, administrative, and political control is transferred, strengthens expectations (Schneider 2003). To do this, Ribot (2002) suggests that securing authority transfer through formal conventions (e.g. constitutional, judicial, or decrees) enhances the means to which authority transfer occurs. I suggest, therefore, that the stakeholders on Lake Victoria, led by the LVFO:

- Ensure that mechanisms of authority and resource transfer are improved so that financial resources can be effectively distributed, and

- Identify accountable representation (also similar to Chapter 5, in which roles must be clarified) so a specific entity or individual is accountable when inadequate distribution occurs.

The intent of Lake Victoria's fishery co-management program is sustainability of the resource for development and benefit of communities, and if the co-management program is to rely on communities to be the action-arm of resource management, then proper authority and resources must be delegated to the community level (Chapter 3). A strong relationship between higher-level government entities and communities is critical (Ribot 2002b).

2. Harness experience, familiarity, and social cohesiveness of communities:

Chapter 4 focuses on BMUs and the fishing communities. These communities, through the BMUs, are charged with administering fishery management. At some sites, fishery management efforts were in place through pre-existing organizations prior to the creation of each BMU. These pre-existing organizations made efforts to manage the fishery, and these efforts had many similar characteristics to co-management programs. I found that BMUs that had pre-existing organizations also had enhanced community involvement in the administration of fishery management, such as inclusion in decision making, equitable treatment of others, having mechanisms for resolving disputes, and increasing valuation of member's opinions and views. The results of such involvement include the reduction in illegal fishing and the provision of benefits derived from fishing activities to the community. Results reveal that BMUs which had pre-existing organizations fared better than those that did not, exhibiting stronger self-organizing characteristics.

The results of this research identified that pre-existing organizations were associated with self-organizing characteristics and positively influenced fishery co-management on Lake Victoria, however, I did not determine why BMUs with pre-existing organizations contributed to this phenomenon. The literature used in this study identified pre-existing organizations as likely

contributing to enhance co-management performance due to similarities between previous efforts of management and management efforts of the BMUs. Similarly, enhanced performance could have resulted from greater social cohesion and norms institutionalized from previous organizations that allow BMUs to operate better. Possibly BMUs that self-organize had access to better education, or had higher economic status. With no detail on the characteristics of each community where BMUs were established, the nature of pre-existing organizations, or the effort that was put into fishery management prior to co-management, it is difficult to determine what elements contributed to enhanced administration of BMUs.

Though my research could not determine the reasons why pre-existing organizations led to enhanced administration of the co-management program, I determined that a relationship exists. The nature of my results make it difficult to implement these findings *ex post facto*. Revealing that a management program will benefit from circumstances that existed prior to the creation of the program seems to have limited applicability on Lake Victoria, but the results have led to three realizations:

- 1) Future co-management programs should focus on communities which have had pre-existing organizations of management, while future research may reveal the specific characteristics that determine reasons for success of these communities;
- 2) The current Lake Victoria program is creating experience for communities on Lake Victoria. Therefore, if past experience leads to more effective future management, then Lake Victoria's fishery co-management program will improve over time; and,
- 3) Future research is necessary to determine which characteristic make pre-existing organizations or experience lead to increased self-organization abilities and better performance in co-management programs.

The characteristics of self-organization should be viewed as mechanisms to help community members to pursue a particular course of behaviors to accomplish tasks (Agrawal and Gibson 2001). To enhance the findings of my research, future efforts should focus on characteristics of communities that have or had informal management efforts prior to a formal management program to determine what characteristics allow them to be more effective.

Management and policy implications from this study can certainly inform future co-management approaches in Africa's great lakes region. Notably, practitioners on Lake Tanganyika are considering fishery management approaches with the intention of implementing a co-management program (van der Knaap 2013). Researchers have noted that communities around the lake have been instigating efforts to manage the fishery in their geographical areas, with village and other community organizations specifically addressing overfishing. Though it is likely impossible for practitioners implementing a co-management program to integrate only communities that have or had pre-existing, community-led, resource management organizations, I urge managers to consider that pre-existing organizations can benefit formal co-management programs. Indeed, prior experience enhances community inclusion, strengthens stakeholder decision making, enhances enforcement, improves information flows, increases equitable treatment of stakeholders, increases conflict resolution capabilities, and improves distribution of social and economic benefits in the co-management program.

3. Clarifying roles of all stakeholders

Co-management's major tenet is the sharing of authority between the central government and community organizations in an effort to manage natural resources. Fishery co-management, therefore, requires a strong relationship between higher authorities and BMUs. Weakness in these relationships can cause the management by BMUs to be ineffective because BMUs need acceptance by fishers of their authority to administer management. Findings in my research indicate that two major problems exist: (1) lack of support from higher political authorities undermines enforcement power at the local level; and, (2) lack of financial returns from both the fishery and higher political authorities reduces the BMU's ability to function.

While legitimacy is a necessity at all levels of fishery management, the relationship between higher levels of government and community is essential for legitimacy to exist, because management authority has been transferred to the communities where the majority of enforcement and management activities are expected to occur. Legitimacy, however, is often negatively affected at the local level by higher levels of government, because national governments often transfer insufficient judicial authority and financial resources to lower levels of government. The three main culprits in the delegitimization of BMUs were:

- 1) Unclear lines of authority, where police, army, department of fisheries officials, or village authorities confuse fishery management actions reserved for BMU committee members;
- 2) Corruption by higher level officers and others in authority, demonstrated when fisheries officers are corrupt and take bribes or sell confiscated illegal gear. These weaknesses often lead to weak judicial action, such as releasing offenders with little or no punishment, thus undermining stricter BMU efforts; and,
- 3) Circumventing tax and fine action of the BMU by higher level authority tenders who collect money at the local level, undermining the BMU committee's authority and reducing their capacity to administer consistent enforcement procedures. This leads to insufficient financial resources to the BMUs which creates the inability to conduct consistent enforcement procedures.

Legitimacy is created through consistent ability to function, whether the collection of taxes and fines, or functioning as an enforcement entity. The interferences listed above interrupt the consistent functioning of BMUs, often delegitimizing BMUs. As maintained in Chapter 5, consistency must include recognizable and consistent authorities. Remedies for these interruptions must create clear roles, and in the case of corruption, better oversight. Recommendations, then, focus on:

- 1) Entities that have historically had authority, such as the police, must be given clear roles within the fishery co-management program. This research identifies local police officers as being one such entity that must be deterred from rogue enforcement unless called upon to conduct official fishery enforcement duties.
- 2) A clear tax structure must be created, with local taxes being collected at the local level and higher level taxes being collected at the appropriate levels (e.g. taxation of exporters through national exportation tax structures). Similar to suggestions for the national level, it is likely necessary to identify accountable representation so a specific

- entity or individual is accountable when inappropriate collection and distribution occurs.
- 3) To address conflict between village committees and BMU committees, I suggest a formal “bridge” be created, where members of one committee becomes a member or advisor on the other’s committee. Facilitation of communications would likely be a first step in reducing conflict.

Part IV: Conclusion

This dissertation serves as a case study to contribute to prevailing research on common-property natural resource management with inclusion of communities in developing countries. I focused much of my efforts on looking at various works, such as those done by Ostrom, Agrawal, Pinkerton, Platteau, Ribot, and others in advancing the knowledge and approaches for understanding these complex, social-ecological systems, and transferring them onto large-freshwater fishery systems. I recognize that there is no quick fix for solving natural resource and community dilemmas. The fishery management program on Lake Victoria, however, is an ongoing experiment that has demonstrated both strengths and weaknesses. Findings in the final chapter of this work demonstrate that the weaknesses in the program are not inherently detrimental, and thus, there is not an apparent need to disband current co-management efforts.

The findings in this research also indicate that without thoughtful and careful creation of fishery management institutions, conflict can arise and the institutions designed to influence harvest behavior can be inefficient. This is evidenced by the level of inefficiency observed on Lake Victoria, with illegal fishing and resulting decline of the Nile perch. Even when carefully crafted and implemented, co-management results will rarely produce the intended results (Geheb et al. 2007), reflecting the discordant nature of relationships between the community and government levels, the varying challenges at the community level, and the complexity of communities themselves. Success has been observed on Lake Victoria, however, and

inefficiencies are representative of any program that consists of such complex relationships as those on Lake Victoria.

Though fishery co-management on Lake Victoria to date has flaws, it must be acknowledged that these management efforts have likely prevented the total collapse of the current fishery. Respondents throughout my research indicated that, without BMUs, fishing effort would be chaotic and unsustainable. Efforts of the LVFO, the fishery research institutes, the communities, and the national governments of each country should be met with commendation. Inefficiencies exist, but most often because of unforeseen considerations. In fact, the fishery co-management program on Lake Victoria is remarkable, as beaches around the lake are part of an established BMU, fishers are largely a part of the fish management program, and those historically disenfranchised have been included. Though there is a range of successful and unsuccessful BMUs around the lake, most often, those BMUs that are less successful suffer from a lack of ability, not will. Whether BMUs administer the program as intended, or in a manner suitable for their own needs, co-management on Lake Victoria has successfully changed behavior to decrease unfettered and chaotic fishing practices. Co-management, if nothing else, has been a mechanism that allows those who are engaged in the fishery to be a part of management operations of their fishery. Sometimes this approach overlaps with the overall intended purpose of Lake Victoria's fishery management program, and sometimes it does not, or cannot. Regardless, the spirit of management takes place.

APPENDIX A:

QUESTIONNAIRE FOR BMU EXECUTIVE COMMITTEE LEADERS

-----QUESTIONNAIRE FOR BMU EXECUTIVE COMMITTEE MEMBER(S)-----
Survey Questionnaire for Investigating Lake Victoria's Beach
Management Units, Uganda, Kenya, Tanzania: Behavioral assessment of
Lake Victoria Fishers.

Names of enumerators: _____

Date: _____

Country (UGANDA KENYA TANZANIA)

Name of the District _____

Name of Beach Management Unit _____

Executive Committee Member Information:

1. Respondent number _____

2. The respondent's position on the BMU Executive Committee

3. Sex

_____ M) _____ F)

GX: General information:

GX1: How many boats are currently registered at this BMU?

_____ #
_____ Don't know

GX1.1: Were there fewer boats registered at this BMU five years ago?

_____ y) _____ n) _____ same) _____ don't know)

GX2: How many committee members are there on the BMU executive committee?

_____ #

GX3: How many women are committee members of the BMU committee?

_____ #

GX4: How many Boat Owners are on the BMU committee?

_____ #

GX5: When was the BMU formed at this landing site?

_____ Year of formation

GX6: When were the last committee elections? _____ month/year

_____ correctly identified
_____ incorrectly identified

GX7: did all the BMU members have the opportunity to participate in the election?

_____ y) _____ n)

GX8: When are the next committee elections? _____ month/year

GX9: Among the boat owners, is there a predominant tribe (more than 50%)?

_____ y) _____ n) _____ don't know

GX10: How many different tribes are at this BMU?

_____ # _____ don't know

GX11: What are the major tribes at this BMU

_____ 1
_____ 2
_____ 3

PX: Personal Information

PX1: How old are you?

_____ age in years _____ refuses

PX2: Education level of participant:

- None
- Primary
- Secondary
- Tertiary or above

PX3: What tribe do you belong to?

_____ name of tribe (e.g. Luo)

PX4: How long have you lived at this landing site?

0-5 years 6-20 years >20 years

PX5: Was your father in the fishery?

y) n)

PX5.1 Have you been in the fishery since childhood (16 years of age)?

y) (go to PX5) n) (go to PX4.2)

PX5.2 What did you do before you were involved in the fishery?

- Farmer/herder
- Business
- Civil servant
- Student
- Other (not fishing)

PX6: Do you own any boats?

y)(go to PX6.1) n) (go to PX9)

PX6.1: How many?

_____ #

PX6.2: Who fishes with these boats?

- self
- family
- friends; specify relationship _____
- Renters (not friends)
- employed fishermen

PX6.3: On an average day, how many kilos of N. perch fish do your boats bring in?

- over 100 Kilos
- 61 - 100 Kilos
- 31 - 60 Kilos
- 10 - 30 Kilos
- Under 10 Kilos
- not sure
- refuse to answer

PX7: Are any of your boats used for N. perch fishing?

_____ y) _____ n)

PX7.1: What gear is used in your boats for N. perch fishing?

_____ nets _____ long lines/hooks

PX8: Do you fish now?

_____ y) _____ n) (go to PX10)

PX8.1: How often do you fish?

_____ daily

_____ per week

_____ per month

PX9: Did you fish when you were not on the committee?

_____ y) _____ n)

Biophysical

A1: How has the N. perch catches changed compared to the past two years?

_____ improved from the past

_____ remained the same

_____ become worse

A2: Have fish catches increased compared to last year?

_____ y) _____ n) _____ the same) _____ don't know

A2.1: five years ago?

_____ y) _____ n) _____ the same) _____ don't know

A3: Do fishermen fish more this year than last?

_____ more _____ less _____ the same _____ don't know

A4: Do fishermen fish more this year than they did 5 years ago?

_____ more _____ less _____ the same _____ don't know

A5: Do you think there are more fish in the lake than last year?

_____ more _____ less _____ the same _____ don't know

A6: Do you think there are more fish in the lake than 5 years ago?

_____ more _____ less _____ the same _____ don't know

A7: Do you think there will be more fish to catch next year?

_____ more _____ less _____ the same _____ don't know

Demographic

B1: Are there more fishermen at this BMU than two years ago?

_____ more _____ less _____ the same _____ don't know

B2: Do you think there will be more fishermen on LV next year?

_____ y) _____ n) _____ the same) _____ don't know

B3: Do you think an increasing number of fishermen will put the fishery in trouble?

_____ y) _____ n) _____ don't know

Economic

C1: Are there other major income generating activities in this BMU?

_____ y) _____ n) (go to C2)

C1.1: What activity or activities?

_____ 1
_____ 2
_____ 3

C1.2: Are fishermen involved in any of these income generating activity outside the fishery?

_____ y) (Go to C1.3) _____ n) (Go to C1.4)

C1.3: What activity or activities?

_____ 1
_____ 2
_____ 3

C1.4: If the fishery was closed, would the fishermen become involved in these other income generating activities?

_____ y) _____ n) _____ don't know

C2: If the fishery were closed, would the fishermen still fish?

_____ y) _____ n) _____ don't know

Infrastructure

D1: If someone has illegal fish at this BMU, are they able to sell it freely at this BMU?

_____ y) _____ n) _____ don't know _____ refuses

Socio-political I

E1: Do you think that the fishery is in trouble?

_____ y) _____ n)

E1.1: What is the biggest threat to the fish population of N. perch?
 over fishing
 pollution (water hyacinth, factory effluence)
 illegal fishing
 other; specify _____

E2: Do you think that the Nile perch fishery will provide you benefits after the next ten to fifteen years?
 yes if management does/not work
 no

E3: How do you picture your child's connection/involvement in the fishery in fifteen years to come?
 a) future
 b) no future (go to E3.1)

E3.1 Why no future?
 they mention fish collapse
 other

Socio-political II

F1: Is there a boat owners group at this BMU?
 y) n) (go to F2)

F1.1: Do you belong to the boat owners group at this BMU?
 y)(go to F1.2) n) (go to F2)

F1.2: Are all boat owners members of this group?
 y) n)

F2: Do you know any boat owners at your BMU who have illegal gear?
 y) n)

F3: Does every boat owner have some illegal gear?
 y) n)

F4: Do you take action if you catch a fisher illegally fishing at your BMU?
 y) (go to F5) n) (go to F4.1) refuse

F4.1: Why would you not take action on illegal fishing?
 fear of retribution
 family or friend (relation)
 No enforcement
 everyone is doing it
 other _____

F5: What happens if illegal gear or fish is found in someone's boat by a community member?

- reporting takes place
- no reporting takes place

F6: What is the reaction of the community when the BMU enforces rules?

- supportive
- non-supportive

F7: Do you encourage your community to legally fish?

- y) n)

**F8: Do you turn-in your fellow committee member
If found illegally fishing or with illegal gear?**

- y) n)

Institutional I

G1: Are patrols for illegal fish and gear conducted at this BMU by the BMU committee?

- y) n) (go to G2)

G1.1: What equipment do you use in the patrol? (check all that apply)

- boat w/motor
- boat w/o motor
- boat w/sail
- foot
- land observations

G1.2: How often do these patrols take place?

- frequently (go to G1.5)
- Not frequently (go to G1.3)

**G1.3: What is the limiting factor for not patrolling frequently?
(check all that apply)**

- cost of fuel
- lack of equipment
- lack of personnel
- other; specify _____

G1.4: What action is taken if someone is caught with illegal gear or is illegally fishing?

- nothing, no legal ramifications
- legal action (arrest, fine, gear or fish confiscation)

G2: In the last year, how many people has the committee punished for illegal fishing or gear?

- none
- 5 or fewer
- between 6 - 30
- over 30
- don't know

G3: Do other entities like the police, department of fisheries, or army conduct patrols here?

- y) Independently of BMU (go to G3.1)
- y) Jointly with BMU (go to G3.1)
- n) (go to G5)

G3.1: Who conducts these patrols (check all that apply)?

- Dept. of Fish
- Police
- Army
- sub-county BMU
- Other

G3.2: How often is the patrol undertaken?

- regularly irregularly

G3.3: Do these entities consult or involve you when conducting the patrols

- y) n) sometimes

G3.4: What happens if they catch someone with illegal gear or fish?

- nothing, no legal ramifications
- legal action (arrest, fine, gear or fish confiscation)

G3.5: In the last year, how many people have other entities punished for illegal fishing or gear?

- none
- 5 or fewer
- between 6 - 30
- over 30
- don't know

G4: Do the fishermen know when fish patrols will occur?

- y) n) don't know

G5: Are there punishments if you catch someone with:

G5.1: Illegal sized nets:

- punishment no punishment don't know

G5.1.1 Is this punishment:

- Too severe
- Fair
- Too lenient

G5.2: Illegal sized fish:

punishment no punishment don't know

G5.2.1 Is this punishment:

- Too severe
- Fair
- Too lenient

G5.3: Illegal methods (beating the water - tycoonng)

punishment no punishment don't know

G5.3.1 Is this punishment:

- Too severe
- Fair
- Too lenient

G6: Do fisherman tell you if other fishermen are illegally fishing?

y) n)

G7: Do you fear retribution when you enforce the rules (arrest people, impose fines, or confiscate their equipment/fish)?

y) n)

G7.1: From who?

- That specific fisherman whom you turned in
- other fishermen?
- the boat owner?
- other: specify _____

G8: Out of all of the Boat Owners you know, how many illegally fish (or have illegal fishing gears)?

- none
- only a few
- less than half
- half of them
- more than half
- all of them

G9: Does the Chairman (or other people on the BMU Executive committee) have the power to enforce the fishing rules?

- Yes, full powers to enforce (can arrest)
- Yes, some powers to enforce (cannot arrest)
- Yes, but only limited powers to enforce are present
- No, no enforcement powers are present

G10: How does the BMU get information on illegal gears and illegal fishing (other than patrols)? (check all that apply)

- other fishermen tell
- observations
- patrols by BMU
- patrols by fisheries or police dept.
- at collection points
- Sting operation

Institutional II

H1: Does one have to be a member of this BMU to land fish here?

- y) n)

H2: What are the minimum mesh sizes for the N. Perch net?

- correctly identified
- incorrectly identified
- don't know

H3: Is beach seining allowed?

- y) n) don't know

H4: What is the legal sized N. perch you can catch?

- correctly identified
- incorrectly identified
- don't know

H5: What is the purpose of the fishing rules?

- mentions fishing sustainability or health
- doesn't mention fishing sustainability

H6: Are the rules important?

- y) n)

H7: Can the fishery be protected with such fishing rules?

- y) n) don't know

C3: Do the fishermen earn less because of the fishing regulations?

- y) n) same) don't know

C4: Do you think the fishermen will earn more or less in the future because of the BMUs and the fishing regulations?

- more less same don't know

H8: Is there unequal application of the fishing rules to different people in the BMU?

- y) n)

H9: Have the fishing rules made the fishermen's life better, the same, or worse?

- better (go to H9.1)
- same
- worse (go to H9.2)

H9.1: Why better: mentions fisheries health/financial gain

H9.2: why worse: mentions restrictions to fishing

H10: Would you like some rules to be changed?

y) n)

H10.1. Which ones would you change?

- change mesh size
- change mesh type
- change fish size
- change method
- other; specify _____

H11: How did you learn the fishing rules and regulations for Lake Victoria?

- government (or other outside org) sponsored workshop
- BMU sponsored workshop or meeting
- BMU Committee
- Pamphlets or signs
- Word-of-mouth
- don't know
- other; specify _____

H12: Have you been a part of any training session that concerns fishing practices?

1) yes (go to H11.1) 2) no

H12.1: How many trainings?

#

Institutional III

J1: Does the BMU Executive Committee formally meet?

y) n)

J1.1: How often does the BMU Executive Committee formally meet?

- regularly (daily, weekly, monthly, quarterly)
- irregularly (yearly, every six months, does not meet)
- don't know

J1.1.1: Do you attend the meetings?

- y, always
- y, sometimes
- n, never

J1.2: Does the committee maintain records of its meetings?

y) n) don't know

J1.2.1: Are they available for everyone (all community)?

y) n) don't know

J2: Does the BMU committee hold assembly (BMU Beach) meetings with the BMU members?

y) n)

J2.1 How often do these meetings take place?

- regularly
- irregularly
- don't know

J2.2: Is everyone invited to the meetings?

y) n)

J2.2.1: Why are these meetings called?

- BMU business
- enforce rules
- when concern arises

J2.2.2: Who calls the meetings?

- BMU chairman
- anyone with concern
- committee as a whole
- when necessary _____ explain which circumstances

J3: How do you communicate the BMU fishing rules to the fishermen and Boat Owners?

- by holding group meeting
- by other means; specify _____

J4: How often do you communicate with the BMU Boat Owners?

- in every meeting
- when there are concerns

J5. Are everyone's views/opinions valued at this BMU?

y) n)

J6. What is the degree of boat owners participation in fisheries management at this BMU?

- Zero: no participation in resource management
- Low: some people participate but mostly elite
- Widespread participation

J7: How often does the committee take fish weight for data collection purposes?

- daily
- weekly x
- monthly x
- they are not weighed
- don't know

J8: Why is fish data is collected?

- mentions management of fishery
- does NOT mention management of fishery

J9: Do the Boat Owners ever propose any rules (by-laws) to the BMU?

- Y) N) (go to J9.1)

J9.1 what limits them?

- don't attend meetings
- their views not considered
- others specify _____

J10: Do you ever propose any rules (by-laws) to the BMU committee?

- y) n)

Institutional IV

K1: In your view, is your BMU successful in enforcing fishing rules?

- y) n)

K2: Is your BMU successful at resolving disputes?

- y) n) don't know

K3: In your view, is your BMU successful in receiving visitors?

- y) n) don't know

K4: Is your BMU successful at arresting offenders?

- y) n) don't know

K5: Is your BMU successful at confiscating illegal gear?

- y) n) don't know

K6: Does the BMU Committee provide services or infrastructure to the community?

- y) n)

K7: Has the existence of the BMU made life better, the same, or worse for people here?

- better
- same
- worse

K8: How much revenue does the BMU bring in monthly?

	UGANDA	KENYA	TANZANIA
<input type="checkbox"/> 0		0	0
<input type="checkbox"/> under 100,000		Under 4,000	Under 70,000
<input type="checkbox"/> 100,001-500,000	4,001-20,000	70,001-350,000	
<input type="checkbox"/> 500,001-1,000,000	20,001-40,000	350,001-685,000	
<input type="checkbox"/> 1,000,001-5,000,000	40,001-200,000	685,001-3,430,000	
<input type="checkbox"/> over 5,000,000	Over 200,000	Over 3,430,000	
<input type="checkbox"/> don't know	don't know	don't know	don't know

K8.1: From what sources does the BMU bring in revenue?

- taxes (on fish, licensing of boat, etc)
- fines for illegal activity
- other _____

K8.2: Where does this revenue go?

- to BMU committee
- to treasure
- buy equipment (boats, engines)
- other; specify _____

K8.3: Are there examples of revenue investment?

- y) n) (go to K12)
- Give examples _____ (e.g. new office, office furniture, sanitation (latrines, landing for fish), patrol boat, motors, docks, shelters, equipment, etc.)

K9: If the BMU did not exist, how would the well being of the community be affected?

- negatively
- positively
- it would not be affected
- don't know

K10: Are you paid to be on the BMU Committee?

- y) n) refuse to answer

K10.1: how much per month?

- amount refuse to answer

K11: Do you keep records of illegal fishing activity at this BMU?

- y) n)

K12: Has illegal fishing increased or decreased since the establishment of your BMU?

- increased
- decreased
- stayed the same
- don't know

Institutional V

L1: What do you see as the MAIN purpose of the BMU?

- Mentions fish management or control illegal fishing
- Does not Mention fish management or control illegal fishing

L2: Did a fish management or protection committee exist before the BMU was created?

- y) n) don't know

Institutional VI

M2: Do you know who the following are?

M2.1: Lake Victoria Fisheries Organization is?

- y) n)

M2.2: (Na, KM, Ta) Fisheries Research Institute is?

- y) n)

M2.3: Fisheries Department is?

- y) n)

M2.4: Has any of these organizations been involved in the development or function of your BMU?

- y) n)

M2.4.1: Which one(s):

- LVFO
- Fisheries Research Institute
- Fisheries Department

M2.4.1.1: How often does this/these organizations visit your BMU?

- regularly irregularly LVFO
- regularly irregularly FRI
- regularly irregularly Fish. Dept.

M2.4.1.2: Does this/these organizations take into account your opinion and interest?

- y) n) LVFO
- y) n) Fisheries Research Institute
- y) n) Fisheries Department

M2.4.2: Has any other organization been involved in the development or function of your BMU?

_____ y) _____ n)

M2.4.3: Name them: (e.g. OSIENALA)

_____ name 1

_____ name 2

M2.4.3.1: How often does this/these organizations visit your BMU?

_____ regularly _____ irregularly name 1

_____ regularly _____ irregularly name 2

M2.4.3.1: Does this/these organizations take into account your opinion and interest?

_____ y) _____ n) _____ name 1

_____ y) _____ n) _____ name 2

Institutional VII

N1: Is there any conflict within this BMU?

_____ y) _____ n) _____ don't know

N1.1: What is the level of conflict at this BMU?

_____ 1) There is violence among subgroups or individuals

_____ 2) There is no violence but significant tensions that can erupt into violence sometimes

_____ 3) There is limited conflict: No violence has been witnessed, but some tensions among some groups exist

N2: Is there any conflict between this BMU and other BMUs?

_____ y _____ n _____ don't know

N2.1: What kinds of conflicts take place between this BMU and other BMUs?

_____ violent conflict with other BMUs occurs

_____ significant tensions that can erupt into violence sometimes

_____ limited: no violence has been witnessed, but some tensions with some other groups exist

N3: Have there been any conflicts between the committee and other government agencies?

_____ y) _____ n) _____ don't know

N3.1: If yes, on what issues have there been conflicts?

Qu. Qualitative questions

Qu1: What are the benefits of illegally fishing?

Qu2: What changes need to take place for a healthy fishery?

Qu3: Mention the three most important problems of your BMU.

Qu4: How would you fix these problems?

QU5: If the BMU did not exist, would people fish differently?

- yes, they would fish more
- yes, they would fish with different gear
- no, they would fish the same

--END SURVEY--

APPENDIX B:
QUESTIONNAIRE FOR BOAT OWNERS

----QUESTIONNAIRE FOR BOAT OWNERS/MANAGERS----

Survey Questionnaire for Investigating Lake Victoria's Beach
Management Units, Uganda, Kenya, Tanzania: Behavioral assessment of
Lake Victoria Fishers.

Names of enumerators: _____

Date: _____

Country (UGANDA KENYA TANZANIA)

Name of the District _____

Name of BMU: _____

Boat Owner Information:

1. Respondent number _____

3. Sex
_____ M) _____ F)

PX. Personal Information:

PX1: How old are you?

_____ age in years
_____ refuses

PX2: Education level of participant:

_____ None
_____ Primary
_____ Secondary
_____ Tertiary or above

PX3: What tribe do you belong to?

_____ name of tribe (e.g. Luo)

PX4: How long have you lived at this site?

_____ 0-5 years _____ 6-20 years _____ >20 years

PX5: Was your father in the fishery?

_____ y) _____ n)

PX5.1 Have you been in the fishery since childhood?

_____ y)(go to PX6) _____ n) (go to PX5.2)

PX5.2 What did you do before you were involved in the fishery?

_____ Farmer/herder
_____ Business
_____ Civil servant
_____ Student
_____ Other (not fishing)

PX6: Are you a member of this BMU?

_____ y) _____ n)

PX7: How many boats do you own?

_____ #

PX8: How many of your boats are used for N. perch?

_____ #

PX9: What gear is used for N. perch fishing?

_____ nets _____ long lines/hooks

Biophysical

A1: How have the N. perch catches changed compared to the past two years?

_____ improved from the past
_____ remained the same
_____ become worse

A2: Are you catching more fish this year than last?

_____ y) _____ n) _____ same) _____ don't know

A3: Are you catching more fish this year than 5 years ago?

y) n) same) don't know

A4: Have you increased the number of gear you own in the past two years?

yes (go to A4.1)

no (go to A4.3)

A4.1: Why have you increased the number of gear you own in the past two years?

because of decreasing fish catches

money/business decision

Other

A4.2: Have you caught more fish because you have increased the number of gear in the past two years? (check all that apply)

y) n)

A4.3: Why have you not increased the number of gear you own in the past two years? (check all that apply)

because of decreasing fish catches

get more money/business decision

Other

A5: Have you increased the number of boats you own in the past two years?

yes (go to A5.1)

no (go to A5.3)

A5.1: Why have you increased the number of boats you own in the past two years? (check all that apply)

because of decreasing fish catches

get more money/business decision

Other

A5.2: Have you caught more fish because you have increased the number of boats in the past two years?

y) n)

A5.3: Why have you not increased the number of boats you own in the past two years? (check all that apply)

because of decreasing fish catches

money/business decision

Other

A6: Do you think there are more or fewer fish for you to catch now, than last year?

more fewer the same don't know

A7: Do you think there are more or fewer fish for you to catch now, than 5 years ago?

_____ more _____ fewer _____ the same _____ don't know

A8: Do you think there will be more fish to catch next year?

_____ y) _____ n) _____ don't know

Demographic

B1: Are there more or fewer fishermen than two years ago?

_____ more _____ fewer _____ the same _____ don't know

B2: Do you think there will be more fishermen on LV next year?

_____ y) _____ n) _____ don't know

B3: Are you worried about more fishermen catching your fish?

_____ y) _____ n)

B3.1: Will you buy more gear or boats this year, knowing that there will more fishermen on the lake next year?

_____ y) _____ n)

Economic

C1: Why do you fish for N. perch and not other species?

_____ higher return
_____ don't know anything else
_____ no other alternatives

C2: Are you involved in other major income generating activities?

_____ y) (go to C2.1) _____ n)(go to C3)

C2.1: What activity or activities?

_____ 1
_____ 2
_____ 3
(Go to C4)

C3: If the fishery was closed, are there other major income generating activities that you could become involved in?

_____ y) (go to C3.1) _____ n) (go to C4)

C3.1: What activity or activities?

_____ 1
_____ 2
_____ 3

C3.2: Would you become involved in these income generating activities if the fishery was closed?

_____ y) (go to C2.2.2) _____ n) (go to C2.2.1)

C4: If the fishery was closed, would you still fish?

_____ y) (go to C5) _____ n)(go to 4.1)

C4.1: What would you do with your boats?

- Sell boats
 use for different purpose (not fishing)

C5: On an average day, how many kilos of N. Perch fish do your boats bring in?

- over 100 Kilos
 61 - 100 Kilos
 31 - 60 Kilos
 10 - 30 Kilos
 Under 10 Kilos
 not sure
 refuse to answer

C6: How often are your fish weighed and data collected?

- daily
 weekly x _____
 monthly x _____
 they are not weighed
 don't know

C7: Where do you invest your money? (Check all that apply)

- saving/bank
 school fees
 buy animals
 buy land
 more fishing equipment
 pay employees
 other

Infrastructure

D1: If someone has illegal fish, are they able to sell it freely at this BMU?

- y) n) don't know refuses

Socio-political I

E1: Do you think that the fishery is in trouble?

- y) (go to E1.1) n) (go to E2)

E1.1: What is the biggest threat to the fish population of N. perch?

- illegal fishing
 pollution (water hyacinth, factory effluence)
 over fishing (too many boats, too many gear)
 other; specify _____

E2: Do you think that the Nile perch fishery will provide you benefits after the next ten to fifteen years?

- yes, a lot of benefits
 yes, some benefits
 no, it will not provide any benefits

E3: How do you picture your child's connection/involvement in the fishery in fifteen years to come?

- a) future
- b) no future (go to L8.1)

E3.1 Why no future?

- they mention fish collapse
- other

E4. Do you think that your child will be involved in the fishery in 10 years?

- y) n)

Socio-political II

F1: Is there a boat owners group at this BMU?

- y) n)

F1.1: Do you belong to the boat owners group at this BMU?

- y) (go to F1.2) n) (go to F2)

F1.2: Are all boat owners members of this group?

- y) n)

F2: Do you know any boat owners at your BMU who have illegal gear?

- y) n)

F3: Does every boat owner have some illegal gear?

- y) n)

F4: Do you report illegal fishing or gear at your BMU?

- y) (go to F5) n) (go to F4.1)

F4.1: Why would you not report illegal fishing?

- patrols or someone else does it
- fear of retribution
- family or friend (relation)
- weak enforcement
- everyone is doing it
- other

F5: Do other community members report illegal gear or illegal fish?

- reporting takes place
- no reporting takes place

F6: What is the reaction of the fishing community when the BMU enforces rules?

- supportive
- non-supportive

Institutional I

G1: Are patrols for illegal fish and gear conducted at this BMU by the BMU committee?

y) (go to G1.1) n) (go to G2)

G1.1: What happens if they catch someone with illegal gear or fish?

legal action (arrest, fine, gear or fish confiscation)

nothing, no legal ramifications

G1.2: How often do patrols take place?

daily

weekly

monthly

yearly

G2: Do other entities like the police, department of fisheries, or army conduct patrols here?

y) Independently of BMU (go to G2.1)

y) Jointly with BMU (go to G2.1)

n) (go to G3)

G2.1: Who conducts these patrols?

BMU members

Dept. of Fish

Police

Army

Other

G2.2: What happens if they catch someone with illegal gear or fish?

legal action (arrest, fine, gear or fish confiscation)

nothing, no legal ramifications

G2.3: How often do patrols take place?

frequent

not frequent

not at all

G3: Is there punishment if you are caught with:

G3.1: Illegal sized nets:

punishment no punishment don't know

G3.1.1 Is this punishment:

Too severe

Fair

Too lenient

G3.2: Illegal sized fish:

punishment no punishment don't know

G3.2.1 Is this punishment:

- Too severe
- Fair
- Too lenient

G3.3: Illegal methods (beating the water)

punishment no punishment don't know

G3.3.1 Is this punishment:

- Too severe
- Fair
- Too lenient

G4: In the last year, how many people has the committee punished for illegal fish or gear?

- none
- 5 or fewer
- between 6 - 30
- over 30
- don't know

G5: In the last year, how many people have other entities punished for illegal fish or gear?

- none
- 5 or fewer
- between 6 - 30
- over 30
- don't know

Institutional II

H1: What are the minimum mesh sizes for the N. Perch net?

- correctly identified
- incorrectly identified
- don't know

[minimum mesh size 5 inches (12.7cm)]

H2: Is beach seining allowed?

y) n) don't know

H3: What is the legal sized N. perch you can catch?

- correctly identified
- incorrectly identified
- don't know

[Above 20 inches (127cm)]

H4: What is the purpose of the fishing rules?

- mentions fishing sustainability or health
- doesn't mention fishing sustainability

H5: Are the rules important?

_____ y) _____ n)

H6: Can the fishery be protected with such fishing rules?

_____ y) _____ n) _____ don't know

H7: Do you earn less because of the fishing rules/regulations?

_____ y) _____ n) _____ don't know

H8: Do you think you will earn more or less in the future because of the BMUs and the fishing regulations?

_____ more _____ less _____ don't know

H9: Have the fishing rules made your life better, the same, or worse?

_____ better (go to H9.1)

_____ same

_____ worse (go to H9.2)

H9.1: Why better:

_____ mentions fisheries health/financial gain

H9.2: why worse:

_____ mentions restrictions to fishing

H10: Would you change the rules if you could?

_____ y) _____ n)

H10.1. How would you change them?

_____ change mesh size

_____ change mesh type

_____ change fish size

_____ change method

_____ other; specify

_____ get rid of them

H11: How did you learn the fishing rules and regulations for Lake Victoria?

_____ government (or other outside org) sponsored workshop

_____ BMU sponsored workshop or meeting

_____ BMU Committee

_____ Pamphlets or signs

_____ Word-of-mouth

_____ don't know

_____ other; specify _____

H12: Have you been a part of any training session that concerns fishing practices?

_____ 1) yes (go to H11.1) _____ 2) no

H12.1: How many trainings?

_____ #

H13: Did you personally have a part or say in making the current BMU rules?
_____ y) _____ n)

H14: Is there unequal application of the fishing rules to different people in the BMU?
_____y) _____n)

Institutional III

K1: Does the BMU Committee formally meet?
_____ y) _____ n)

K1.1: How often does the BMU committee formally meet?
_____ regularly
_____ irregularly
_____ don't know

K2: Does the BMU hold assembly (BMU beach) meetings?
_____ y) _____ n)

K2.1 How often?
_____ daily
_____ monthly X_____
_____ yearly X_____

K2.2: Is everyone invited to the meetings?
_____ y) _____ n)

K2.3: Do you attend the meetings?
_____ y, always
_____ y, sometimes
_____ n, never

K2.4: Does everyone attend the meetings?
_____ y) _____ n)

K3. When were the last elections for the BMU committee officials held?
_____ Month/Year

K3.1: Did you participate in the election?
_____ y) _____ n)

K3.2: Do you think the elections were fair?
_____y) _____n)_____ refused to answer

K4: Who is your representative on the BMU Executive Committee?
_____ Correctly identified
_____ Incorrectly identify
_____ Does not know

K4.1: Does your BMU representative inform you of BMU Committee business?

_____y) _____n)

K4.1.1: How often

_____ regularly

_____ irregularly

K5: Does the committee maintain records of its meetings?

_____ y) _____ n) _____ don't know

K5.1: Are they available for you to see?

_____ y) _____ n) _____ don't know

K6. Are the fishermen (boat crew)'s views/opinions valued at this BMU?

_____ y) _____ n)

Institutional IV

L1: Is your BMU successful at resolving disputes?

_____ y) _____ n) _____ don't know

L2: In your view, is your BMU successful in receiving visitors?

_____y) _____n) _____ don't know

L3: Is your BMU successful at arresting offenders?

_____ y _____ n) _____ don't know

L4: Is your BMU successful at confiscating illegal gear?

_____ y) _____ n) _____ don't know

L5: Does the BMU Committee provide services or infrastructure to you and the community?

_____y) _____n)

L6: Has the existence of the BMU made your life better, the same, or worse?

_____ better

_____ same

_____ worse

Institutional V

M1: What do you see as the MAIN purpose of the BMU?

_____ Mentions fish management or control illegal fishing

_____ Does not Mention fish management or control illegal fishing

M2: Who is the BMU chairman?

_____ successfully identified

_____ unsuccessfully identified

M3: When was this BMU formed?

_____ (Year of formation) _____ don't know

Institutional VI

N1: Do you know who the:

N1.1: Lake Victoria Fisheries Organization is?
_____ y) _____ n)

N1.2: (Na, KM, Ta) Fisheries Research Institute is?
_____ y) _____ n)

N1.3: Fisheries Department is?
_____ y) _____ n)

N1.4: Has any of these organizations been involved in the development or function of your BMU?
_____ y) _____ n)

N1.4.1: Which one(s):

_____ LVFO
_____ Fisheries Research Institute
_____ Fisheries Department

N1.4.1.1: How often does this/these organizations visit your BMU?

_____ regularly _____ irregularly LVFO
_____ regularly _____ irregularly FRI
_____ regularly _____ irregularly Fish. Dept.

N1.4.1.2: Does this/these organizations take into account your opinion and interest?

_____ y) _____ n) LVFO
_____ y) _____ n) Fisheries Research Institute
_____ y) _____ n) Fisheries Department

N2: Has any other organization been involved in the development or function of your BMU?

_____ y) _____ n)

N2.1: Name them: (e.g. OSIENALA)

_____ name 1
_____ name 2

N2.1.1: How often does this/these organizations visit your BMU?

_____ regularly _____ irregularly name 1
_____ regularly _____ irregularly name 2

N2.1.2: Does this/these organizations take into account your opinion and interest?

_____ y) _____ n) _____ name 1
_____ y) _____ n) _____ name 2

Institutional VII

01: Is there any conflict within this BMU?

_____ y) _____ n) _____ don't know

01.1: What is the level of conflict within this BMU?

_____ there is violence among subgroups or individuals

_____ there is no violence but significant tensions that can erupt into violence sometimes

_____ there is limited conflict: No violence has been witnessed, but some tensions among some groups exist

02: Is there any conflict between this BMU and other BMUs?

_____ y) _____ n) _____ don't know

02.1: What kinds of conflicts take place between this BMU and other BMUs?

_____ violent conflict with other BMUs occurs

_____ significant tensions that can erupt into violence sometimes

_____ limited: no violence has been witnessed, but some tensions with some other groups exist

Qualitative questions

Qu1: What are the benefits of illegally fishing?

Qu2: What changes need to take place for a healthy fishery?

Qu3: Mention the three most important problems of your BMU.

Qu4: How would you fix these problems?

Qu5: If the BMU did not exist, would you fish differently (check all that apply)?

yes, I would fish more

yes, I would fish with different gear

no, I would fish the same

--END SURVEY--

BIBLIOGRAPHY

- Abel, T. D. and M. Stephan (2000). The limits of civic environmentalism. American Behavioral Scientist **44**(4): 613-627.
- Abila, R., R. Lwenya, K. Geheb and K. Crean (2005). An assessment of co-management potentials in the lake victoria fisheries in kenya. The state of the fisheries resources of lake victoria and their management. Proceedings of the regional stakeholders' conference 24th-25th february 2005, entebbe, uganda. R. Ogutu-Ohwayo, R. Lwenya, K. Geheb and K. Crean: Swift Commercial Establishment, Kampala, Uganda.
- Abila, R., P. Onyango and K. Odongkara (2006). Socio-economic viability and sustainability of bmus: Case study of the cross-border bmus on lake victoria. Great Lakes of the World IV. Bagamoyo, Tanzania.
- Abila, R. O. (2002). A socio-economic analysis of the fishery co-operatives of lake victoria (kenya), The University of Hull. **Doctor of Philosophy**: 423.
- Abila, R. O. (2004). Impacts of international fish trade: A case study of lake victoria fisheries, Commissioned by Food and Agriculture Organization of the United Nations.
- Acheson, J. M. (2003). Capturing the commons. Devising institutions to manage the maine lobster industry. Hanover and England, University Press of New England.
- Acheson, J. M., J. A. Wilson and R. S. Steneck (1998). Managing chaotic fisheries. Linking social and ecological systems: Management practices and social mechanisms for building resilience. F. Berkes, C. Folke and J. Colding. Cambridge, U.K. New York, NY, USA, Cambridge University Press: 390-413.
- AEHMS (2007). Special issue: Great lake victoria fisheries: Changes, sustainability, and building blocks for management. Ed. M. Munawar. Aquatic Ecosystem Health & Management **10**(4).
- Agrawal, A. (2002). Common resources and institutional sustainability. The drama of the commons. E. Ostrom, T. Dietz, N. Dolsak, P. C. Stern, S. Stonich and E. U. Weber. Washington, D.C., National Academy Press: 41-85.
- Agrawal, A. (2003). Sustainable governance of common-pool resources: Context, methods, and politics. Annu Rev Anthropol **32**: 243-262.
- Agrawal, A. (2006). Forests, governance, and sustainability: Common property theory and its contributions. Ann Arbor, MI, School of Natural Resources and Environment, University of Michigan: 36.
- Agrawal, A. and A. Chhatre (2006). Explaining success on the commons: Community forest governance in the indian himalaya. World Development **34**(1): 149-166.
- Agrawal, A. and C. C. Gibson (1999). Enchantment and disenchantment: The role of community in natural resource conservation. World Development **27**(4): 629-649.

- Agrawal, A. and C. C. Gibson (2001). Introduction. Communities and the environment: Ethnicity, gender, and the state in community-based conservation. A. Agrawal and C. C. Gibson. New Jersey, Rutgers University Press: 224.
- Agrawal, A. and M. C. Lemos (2007). A greener revolution in the making?: Environmental governance in the 21st century. Environment **49**(5): 36-45.
- Agrawal, A. and J. C. Ribot (1999). Accountability in decentralization: A framework with south asian and west african cases. Journal of Developing Areas **33**(4): 473-502.
- Andersson, K., J. P. Benavides, R. Leon and P. Uberhuaga (2010). Local self-governance of forests in bolivia: Why do some communities enjoy better forests than others? Working Paper.
- Anonymous (1873). A compilation of all the treaties between the united states and the indian tribes. Washington, DC, USA.
- Ansell, C. and A. Gash (2008). Collaborative governance in theory and practice. Journal of Public Administration Research and Theory **18**: 543-571.
- Armitage, D., F. Berkes and N. Doubleday (2007). Introduction: Moving beyond co-management. Adaptive co-management: Collaboration, learning, and multi-level governance. D. Armitage, F. Berkes and N. Doubleday. Vancouver, BC, University of British Columbia Press: 1-15.
- ASA (2008). Today's angler: A statistical profile of anglers, their targeted species and expenditures. American Sportfishing Association. Alexandria, VA.
- Awange, J., J. and O. Ong'ong'a (2006). Lake victoria: Ecology, resources, environment. New York, Springer-Verlag Berlin Heidelberg.
- Baland, J. M. and J. P. Platteau (2000). Halting degradation of natural resources: Is there a role for rural communities, Oxford University Press.
- Banana, A. and W. Gombya-Ssembajjwe (2000). Successful forest management: The importance of security of tenure and rule enforcement in ugandan forests. People and forests: Communities, institutions, and governance. C. Gibson, M. McKean and E. Ostrom. Cambridge, MA, MIT Press.
- Banana, A. Y., N. D. Vogt, J. Bahati and W. Gombya-Ssembajjwe (2007). Decentralized governance and ecological health: Why local institutions fail to moderate deforestation in mpigi district of uganda. Sci Res Essays **2**(10): 434-445.
- Bauer, P. T. (1972). Dissent on development, Harvard University Press.
- Bavington, D. L. Y. (2010). Managed annihilation: An unnatural history of the newfoundland cod collapse, University of British Columbia.
- Ben-Yami, M. (2007). Hijacked by neoliberal economics. Sizing up: Property rights and fisheries management: A collection of articles from samudra report. K. G. Kumar. Chennai, India, International Collective in Support of Fishworkers (ICSF). **SUMUDRA Report**: 34-40.
- Bence, J. R. and K. D. Smith (1999). An overview of recreational fisheries of the great lakes. Great lakes fisheries policy and management: A binational perspective. W. W. Taylor and C. P. Ferreri. East Lansing, Michigan, USA, Michigan State University Press.
- Béné, C. (2003). When fishery rhymes with poverty: A first step beyond the old paradigm on poverty in small-scale fisheries. World Development **31**(6): 949-975.
- Berkes, F. (2007). Adaptive co-management and complexity: Exploring the many faces of co-management. Adaptive co-management: Collaboration, learning, and multi-level governance D. Armitage, F. Berkes and N. Doubleday. Vancouver, BC, University of British Columbia Press: 19-37.

- Berkes, F. and C. Folke (1998). Linking social and ecological systems for resilience and sustainability. Linking social and ecological systems: Management practices and social mechanisms for building resilience. F. Berkes, C. Folke and J. Colding. Cambridge, U.K.; New York, NY, USA, Cambridge University Press: 1-25.
- Bogue, M. B. (2000). Fishing the great lakes: An environmental history, 1833-1933. Madison, WI, University of Wisconsin.
- Brooks, J. S., M. A. Franzen, C. M. Holmes, M. N. Grote and M. B. Mulder (2006). Testing hypotheses for the success of different conservation strategies. Conservation Biology **20**(5): 1528-1538.
- Brown, R. W., M. Ebener and T. Gorenflo (1999). Great lakes commercial fisheries: Historical overview and prognosis for the future. Great lakes fisheries policy and management. W. W. Taylor and C. P. Ferreri. East Lansing, USA, Michigan State University Press.
- Bryan, T. A. (2004). Tragedy averted: The promise of collaboration. Society & Natural Resources **17**: 881-896.
- Busiahn, T. R. (1985). An introduction to native peoples' fisheries issues in north america. Renewable Resources Journal **3**(2): 23-26.
- Busiahn, T. R. (1989). The development of state/tribal co-management of wisconsin fisheries. Co-operative management of local fisheries: New directions for improved management and community development. E. Pinkerton. Vancouver, Canada, University of British Columbia Press: 170-185.
- Bwathondi, P. O. J., R. Ogutu-Ohwayo and J. Ogari (2001). Lake victoria fisheries management plan (lvfmp). I. G. Cowx and K. Crean. Lake Victoria Fisheries Research Project (LVFRP) - Phase II, *LVFRP Technical Document* No. 16. LVFRP/TECH/01/16: Socio-economic Data Working Group of the Lake Victoria Fisheries Research Project, Jinja.
- Cargill, T. (2004). Still the donors' darling. World Today **60**(12): 26-27.
- Carlsson, L. and F. Berkes (2005). Co-management: Concepts and methodological implications. J Environ Manage **75**(1): 65-76.
- Castro, A. P. and E. Nielsen (2001). Indigenous people and co-management: Implications for conflict management. Environmental Science and Policy **4**(4-5): 229-239.
- Chiarappa, M. J. and K. M. Szylvian (2003). Fish for all: An oral history of multiple claims and divided sentiment on lake michigan. East Lansing, MI, USA.
- Coffey, C. (2005). What role for public participation in fisheries governance? Participation in fisheries governance (reviews: Methods and technologies in fish biology and fisheries). T. S. Gray. Dordrecht, The Netherlands, Springer. **4**: 27-44.
- Coggins, G. C. (2001). Of californicators, quislings, and crazies: Some perils of devolved collaborations. Across the great divide: Exploration in collaborative conservation and the american west. P. Brick, D. Snow and S. V. d. Wetering. Washington, DC. USA, Island Press: 163-171.
- Cohen, F. S. (1988). Cohen's handbook of federal indian law. Washington, DC, USA.
- Commonwealth Local Government Forum (2012a). "The local government system in tanzania." Retrieved February 1, 2012, from <http://www.clgf.org.uk/userfiles/1/files/Tanzania%20local%20government%20profile%202011-12.pdf>.
- Commonwealth Local Government Forum (2012b). "The local government system in uganda." Retrieved February 1, 2012, from

- <http://www.clgf.org.uk/userfiles/1/files/Uganda%20local%20government%20profile%202011-12.pdf>.
- Commonwealth Local Government Forum (2012c). "The local government system in Kenya." Retrieved February 1, 2012, from <http://www.clgf.org.uk/userfiles/1/files/Kenya%20local%20government%20profile%202011-12.pdf>.
- Datta, S. and V. Varalakshmi (1999). Decentralization: An effective method of financial management at the grassroots (evidence from India). *Sustainable Development* **7**: 113-120.
- Dempsey, D. (2001). Ruin and recovery: Michigan's rise as a conservation leader. *University of Michigan Press*. Ann Arbor, MI, USA.
- Dietz, T., N. Dolsak, E. Ostrom and P. C. Stern (2002). The drama of the commons. *The drama of the commons*. E. Ostrom, T. Dietz, N. Dolsak, P. C. Stern, S. Stonich and E. U. Weber. Washington D.C., National Academy Press: 3-40.
- Doubleday, N. (1989). Co-management provisions of the Inuvialuit Final Agreement. *Co-operative management of local fisheries: New directions for improved management and community development*. E. Pinkerton. Vancouver, Canada, University of British Columbia Press: 209-230.
- Ebong, I., M. Lwanga and J. Scullion (2004). *Beach management units and integrated lake management*. International Workshop on Community Participation in Fisheries Management on Lake Victoria, Kisumu, Kenya.
- Eggertson, T. (1996). A note on the economics of institutions. *Empirical studies in institutional change*. L. J. Akstan and T. Eggertson. Cambridge, UK, Cambridge University Press: 6-24.
- FAO (2010a). Miscellaneous freshwater fisheries, capture production by species, fishing areas and countries or areas. *Fisheries and Aquaculture Statistics: Capture production*. Fisheries and Aquaculture Department, Food and Agriculture Organization of the United Nations. **B-13**.
- FAO (2010b). Fish, crustaceans, molluscs, etc; capture production by species items; Africa-inland waters. *Fisheries and Aquaculture Statistics: Capture production*. Fisheries and Aquaculture Department, Food and Agriculture Organization of the United Nations. **C-01 (a)**.
- FAO (2010c). Tilapias and other cichlids; capture production by species, fishing areas and countries or areas. *Fisheries and Aquaculture Statistics: Capture production*. Fisheries and Aquaculture Department, Food and Agriculture Organization of the United Nations. **B-12**.
- FAO (2010d). Carps, barbels and other cyprinids; capture production by species, fishing areas and countries or areas. *Fisheries and Aquaculture Statistics: Capture production*. Fisheries and Aquaculture Department, Food and Agriculture Organization of the United Nations. **B-11: 57**.
- FAO (2010e). Imports and exports by country and by seven fishery commodity groups. *Fisheries and Aquaculture Statistics: Capture production*. Fisheries and Aquaculture Department, Food and Agriculture Organization of the United Nations. **A-8: 87, 115, 118**.
- FAO (2012). "Fishery and aquaculture country profiles: Malawi." *Food and Agriculture Organization*. Retrieved December 8, 2012, from http://www.fao.org/fishery/countrysector/FI-CP_MW/3/en.

- Ferreri, C. P., W. Taylor and J. M. Robertson (1999). Great lakes fisheries futures: Balancing the demands of a multijurisdictional resource. Great lakes fisheries policy and management: A binational perspective. W. W. Taylor and C. P. Ferreri. East Lansing, USA, Michigan State University Press.
- Flanagan, T. (2000). First nations? Second thoughts. Montreal and Kingston, ON, Canada, McGill-Queen's University Press.
- Fleischman, F. D., K. Boenning, G. A. Garcia-Lopez, S. Mincey, M. Schmitt-Harsh, K. Daedlow, M. C. Lopez, X. Basurto, B. Fischer and E. Ostrom (2010). Disturbance, response, and persistence in self-organized forested communities: Analysis of robustness and resilience in five communities in southern indiana. Ecology and Society **15**(4): 9.
- Folke, C. and F. Berkes (1995). Mechanisms that link property rights to ecological systems. Property rights and the environment: Social and ecological issues. S. Hanna and M. Munasinghe. Washington, DC, USA, Beijer International Institute of Ecological Economics and the World Bank: 121-138.
- Forest policy (1948). Forest policy in uganda. Nature **162**(4126): 864-864.
- Francis, G. and H. A. Regier (1995). Barriers and bridges to the restoration of the great lakes basin ecosystem. Barriers and bridges to the renewal of ecosystems and institutions. L. H. Gunderson, C. S. Holling and S. S. Light. New York, NY, USA, Columbia University Press: 239-291.
- Francis, P. and R. James (2003). Balancing rural poverty reduction and citizen participation: The contradictions of uganda's decentralization program. World Dev. **31**(2): 325-337.
- Gaden, M. (2007). Bridging jurisdictional divides: Collective action through a joint strategic plan for management of great lakes fisheries. School of Natural Resources and Environment. Ann Arbor, MI, University of Michigan. **Ph.D.**: 296.
- Gaden, M., C. Goddard and J. Read (2011). A history of multi-jurisdictional management of the shared great lakes fishery: Transcending conflict and diffuse political authority. Great lakes fishery management and policy. W. Taylor, A. J. Lynch and N. Leonard. East Lansing, USA, Michigan State University.
- Gaden, M., O. C. Mkumbo, T. Lawrence and C. Goddard (2012). Top-down and bottom-up approaches in the management of the laurentian great lakes and lake victoria fisheries: A comparison of two shared water bodies. Great lakes great responsibilities: Lessons in participatory governance. V. I. Grover and G. Krantzberg. Enfield, New Hampshire, Science Publishers: 364-390.
- Gallagher, H. R., A. G. Huntsman, D. J. Taylor and J. V. Oosten (1942). Report and supplement. U. S. G. P. Office. Washington, DC, USA.
- Geheb, K., K. Cream, M. Medard, M. Kyangwa, C. Lwenya and P. Onyango (2002). On pitfalls and building blocks: Towards the management of lake victoria's fisheries. Africa's inland fisheries: The management challenge. K. Geheb and M.-T. Sarch. Kampala, Uganda, Fountain Publishers: 142-173.
- Geheb, K., M. Medard, M. Kyangwa and C. Lwenya (2007). The future of change: Roles, dynamics and functions for fishing communities in the management of lake victoria's fisheries. Aquatic Ecosystem Health & Management **10**(4): 447-480.
- Geheb, K. and M. T. Sarch (2002). A challenge met? Some final thoughts. Africa's inland fisheries: The management challenge. K. Geheb and M. T. Sarch. Kampala, Uganda, Fountain Publishers: 240-249.

- Gibson, C. M., M. McKean and E. Ostrom (2000). People and forests: Communities, institutions and the governance of forests. Cambridge, MA, MIT Press.
- GLFC (1997). A joint strategic plan for the management of great lakes fisheries (supercedes 1994 version). Ann Arbor, Michigan, Great Lakes Fishery Commission.
- GLIFWC (2006). A guide to understanding ojibwe treaty rights. Odanah, WI, Great Lakes Indian Fish and Wildlife Commission.
- Goldschmidt, T. (1998). Darwin's dreampond: Drama in lake victoria, MIT Press.
- Gough, J. (2006). Managing canada's fisheries: From early days to the year 2000. Georgetown, ON, Canada, McGill-Queens University Press.
- Graham, M. (1929). The victoria nyanza and its fisheries. A report on the fishing survey of lake victoria, 1927-1928, and appendices., London, Crown agents for the colonies, 1929.
- Haas, P. M. and J. Sundgren (1990). Evolving international environmental law: Changing practices of national sovereignty. Integrated pollution control in europe and north america. N. Haigh and F. Irwin. Washington, DC., USA, The Conservation Foundation: 401-430.
- Haley, M. and A. Clayton (2003). The role of ngos in environmental policy failures in a developing country: The mismanagement of jamaica's coral reefs. Environmental Values **12**: 29-54.
- Hamilton, A. (1984). Deforestation in uganda. Nairobi, Kenya, Oxford University Press.
- Hanna, S. (1995). User participation and fishery management performance within the pacific fishery management council. Ocean & Council Management **28**(1-3): 23-44.
- Hara, M., S. Donda and F. J. Njaya (2002). Lessons from malawi's experience with fisheries co-management initiatives. Africa's inland fisheries: The management challenge. K. Geheb and M.-T. Sarch. Kampala, Uganda, Fountain Publishers: 31-48.
- Hardin, G. (1968). The tragedy of the commons. Science **162**: 1243-1248.
- Harris, M. (1999). Lament for an ocean: The collapse of the atlantic cod fishery. Toronto, Ontario, McClelland & Stewart Inc.
- Hartter, J. and S. J. Ryan (2010). Top-down or bottom-up? Decentralization, natural resource management, and usufruct rights in the forests and wetlands of western uganda. Land Use Policy **27**: 815-826.
- Hauser, E. (1999). Ugandan relations with western donors in the 1990s: What impact on democratisation? Journal of Modern African Studies **37**(4): 621-641.
- Hayes, T. and L. Persha (2010). Nesting local forestry initiatives: Revisiting community forest management in a redd+ world. For Policy Econ **12**(8): 545-553.
- Head, B. W. (2007). Community engagement: Participation on whose terms? Australian Journal of Political Science **42**(3): 441-454.
- Hecky, R. (2003). What does the future hold for the great lakes of africa? African Journal of Aquatic Science **28**(1): iii-vi.
- Holloway, W. V. (1972). Intergovernmental relations in the united states. MSS Information Corps. New York, US.
- Howard, P., T. Davenport, F. Kigenyi, P. Viskanic, M. Baltzer, C. Kickinson, J. Lwanga and R. Matthews (2000). Protected area planning in the tropics: Uganda's national system of forest nature reserves. Conservation Biology **14**(3): 858-875.
- I LEG (2005). Regional workshop on legal and operational framework for beach management units in east africa. Regional workshop on legal and operational framework for beach

- management units in East Africa, Imperial Hotel, Kisumu, Kenya, Institute for Law and Environmental Governance and the Environmental Law Institute.
- Janssen, M., J. M. Anderies and E. Ostrom (2007). Robustness of social-ecological systems to spatial and temporal variability. Society & Natural Resources **20**(4): 307-322.
- Jentoft, S. (1989). Fisheries co-management: Delegating government responsibility to fishermen's organizations. Marine Policy **13**(2): 137-154.
- Jentoft, S. (2004). The community in fisheries management: Experience, opportunities and risks. Fisheries development: The institutional challenge. B. Hersoug, S. Jentoft and P. Degnbol. Delft, The Netherlands, Eburon.
- Jentoft, S., B. J. McCay and D. C. Wilson (1998). Social theory and fisheries co-management. Marine Policy **22**(4-5): 423-436.
- Jul-Larsen, E., J. Kolding, R. Overa, J. Raakjaer Nielsen and A.M. van Zwieten (2003). Management, co-management or no management? Major dilemmas in southern african freshwater fisheries. F. F. T. Paper. Rome, FAO.
- Kaimowitz, D. and J. C. Ribot (2002). Services and infrastructure versus natural resource management: Building a base for democratic decentralization. Conference on Decentralization and the Environment, Bellagio, Italy, Washington, DC: World Resources Institute.
- Kajembe, G., E. Luoga, M. Kijazi and C. Mwaipopo (2003). The role of traditional institutions in the conservation of forest resources in east usambara, tanzania. International Journal of Sustainable Development & World Ecology **10**(2): 101-107.
- Kappler, C. ([2004] 2006). Treaty with the chippewa, 1942. Indian affairs: Laws and treaties, vol. ii. Oklahoma State University (online at digital.library.okstate.edu/kappler/). Washington, DC, USA, Treaties U.S. Government Printing Office.
- Karani, P. (1972). Eucalyptus is here to stay. Uganda Journal **36**: 73-77.
- Kawachi, I. and L. F. Berkman (2014). Social cohesion, social capital, and health. Social epidemiology. L. F. Berkman, I. Kawachi and M. M. Glymour. New York, NY, Oxford University Press: 290.
- Kayanja, F. I. B. and D. Byarugaba (2001). Disapperating forests of uganda: The way forward. Curr Sci **81**(8): 936-947.
- Kearney, J. F. (1989). Co-management or co-optation? The ambiguities of lobster fishery management in southwest nova scotia. Co-operative management of local fisheries: New directions for improved management and community development. E. Pinkerton. Vancouver, Canada, University of British Columbia: 209-230.
- Keizire, B. B. (2002). Opportunities and options for financing fisheries management in uganda: . Marine Research Institute: Fisheries Training Program. Reykjavik, Iceland, United Nations University. **Diploma, Fisheries Policy, Planning and Management**: 54.
- Kenyan Department of Fisheries (2006). Implementation of a fisheries management plan for lake victoria. D. o. F. Kenya, Republic of Kenya. **EDF Project NO. 8 ACP ROR 029**.
- Kohn, A. (1992). Cooperation: What it means and doesn't mean. Cooperation: Beyond the age of competition. A. Combs. Philadelphia, USA, Gordon and Breach. **4**: 3-11.
- Kooiman, J., M. Bavinck, S. Jentoft and R. Pullin, Eds. (2005). Fish for rife: Interactive governance for fisheries. Mare publication, Amsterdam University Press.
- Kooiman, J. and R. Chuenpagdee (2005). Governance and governability. Fish for life: Interactive governance for fisheries. J. Kooiman, M. Bavinck, S. Jentoft and R. Pullin. Amsterdam, The Netherlands, Amsterdam University Press: 325-349.

- Krantzberg, G. (2012). The remedial action plan program, historical and contemporary overview. Great lakes great responsibilities: Lessons in participatory governance. V. I. Grover and G. Krantzberg. Enfield, New Hampshire, Science Publishers: 245-256.
- Krueger, C. C. and D. J. Decker (1999). The process of fisheries management. Inland fisheries management in north america. C. C. Kohler and W. A. Hubert. Bethesda, USA, American Fisheries Society: 31-59.
- Lange, J. I. (2001). Exploring paradox in environmental collaborations. Across the great divide: Exploration in collaborative conservation and the american west. P. Brick, D. Snow and S. V. d. Wetering. Washington, DC., USA, Island Press: 200-209.
- Larson, A. M. and F. Soto (2008). Decentralization of natural resource governance regimes. Annual Review of Environment and Resources **33**: 213-239.
- Lawrence, T. (2013). Taking the co out of co-management: The deligitimization of fishing communities on lake victoria, e. Africa. Water co-management. G. Krantzberg and V. I. Grover. Boca Raton, FL, CRC Press: 168-196.
- Lawrence, T. and C. Watkins (2012). It takes more than a village: The challenges of co-management in uganda's fishery and forestry sectors. International Journal of Sustainable Development & World Ecology **19**(2): 144-154.
- Lawyers' Environmental Action Team (2012). "District local government authorities." Retrieved February 1, 2012.
- Leech, N. L., A. J. Onwuegbuzi and J. C. Combs (2011). Writing publishable mixed research articles: Guidelines for emerging scholars in the health sciences and beyond. International Journal of Multiple Research Approaches **5**: 7-24.
- Lemos, M. C. and A. Agrawal (2006). Environmental governance. Annu. Rev. Environ. Resour. **31**: 297-325.
- LTA (2012). "Investment opportunities in lake tanganyika and victoria are still limited by security and environmental threats." Lake Tanganyika Authority. Retrieved December 8, 2012, from <http://lta.iwlearn.org/investment-opportunities-in-lake-tanganyika-and-victoria-are-still-limited-by-security-and-environmental-threats>.
- LVBC (2007). Regional transboundary diagnostic analysis of the lake victoria basin. Kisumu, Kenya, Lake Victoria Basin Commission.
- LVFO (2001). The convention for the establishment of the lake victoria fisheries organization, Lake Victoria Fisheries Organization in conjunction with the International Union for Conservation of Nature.
- LVFO (2005a). Guidelines for beach management units (bmus) on lake victoria. V. Ogwang', M. Medard, E. Kilosa, J. I. Nyeko and A. Bakunda. Jinja, Uganda, Lake Victoria Fisheries Organization, East African Community.
- LVFO (2005b). Proceedings of the regional stakeholders' conference. The State of the Fisheries Resources of Lake Victoria and Their Management, Entebbe, Uganda, Lake Victoria Fisheries Organization.
- LVFO (2005c). Book of abstracts: The state of the fisheries resources of lake victoria and their management: Concerns, challenges and opportunities. Regional Stakeholders' Conference, Imperial Resort Beach Hotel, Entebbe, Uganda, Lake Victoria Fisheries Organization.
- LVFO (2005d). Guidelines for beach management units (bmus) on lake victoria. V. Ogwang', M. Medard, E. Kilosa, J. I. Nyeko and A. Bakunda. Jinja, Uganda, Lake Victoria Fisheries Organization, East African Community.

- LVFO (2005e). Entebbe declaration. February 24-25, Imperial Resort Beach Hotel, Entebbe, Uganda, The regional stakeholders' conference on the state of the fisheries resources of lake victoria and their management.
- LVFO (2010a). Regional status report on lake victoria bi-ennial frame surveys between 2000 and 2010: Kenya, tanzania and uganda. Jinja, Uganda, Lake Victoria Fisheries Organization and East African Community.
- LVFO (2010b). Table: Comparison of lake victoria fisheries frame survey 2000, 2002, 2004, 2006, 2008, and 2010 results for the three partner states, kenya, tanzania, and uganda. Jinja, Uganda, Lake Victoria Fisheries Organization.
- LVFO (2011a). "Welcome to lake victoria fisheries organization." Retrieved Cited 2011 July 31, 2011, from <http://www.lvfo.org>.
- LVFO (2011b). "About the lake victoria fisheries organization." Retrieved December 4, 2011, from http://www.lvfo.org/index.php?option=com_content&view=article&id=50&Itemid=56.
- LVFO (2011c). "Organs and institutions of the lvfo." Retrieved December 4, 2011, from http://www.lvfo.org/index.php?option=com_content&view=article&id=52&Itemid=58.
- LVFO (2011d). "Beach management units: Building co-management in east africa." Retrieved December 7, 2011, from http://www.lvfo.org/index.php?option=com_content&view=article&id=53&Itemid=59.
- LVFO (2012). "Lake victoria fisheries organization home page." Retrieved August 30, 2012.
- Manring, N. J. (2005). The politics of accountability in national forest planning. Administration & Society **37**(1): 57-88.
- Manthesian, C. (1998). Grassroots charade. Governing: 38-42.
- Matovu, M. (2007). Uganda: Meeting the demand for scarce fish. The Monitor. Kampala, Uganda.
- Mattes, W., J. S. Arnold, C. O. Rasmussen, N. Kmiecik and S. Erickson (2005). Mazina'igan. Lake Superior fishery management supplement. Mazina'igan Fall.
- McCloskey, M. (2000). Problems with using collaboration to shape environmental public policy. Valparaiso University Law Review **34**(2): 423-434.
- Ministry of Local Government (2003). Harmonised participatory planning guide for parishes/wards. Ministry of Local Government. Entebbe, Uganda, Republic of Uganda.
- Mkumbo, O. C. (2006). The fisheries of lake victoria: Status and management initiatives for sustainable exploitation. Great Lakes of the World IV. Bagamoyo, Tanzania.
- Mkumbo, O. C., B. Marshall, L. Muhoozi, T. Munyaho, P. Nzungi and B. Msuku (2009). Presentation: The commercial fisheries of lake victoria: How do we manage the Nile perch stocks? 139th Meeting of the American Fisheries Society, Nashville, Tennessee, American Fisheries Society.
- Mkumbo, O. C. and E. Mlaponi (2007). Impact of the baited hook fishery on the recovering endemic fish species in lake victoria. Aquatic Ecosystem Health & Management **10**(4): 458-466.
- Mkumbo, O. C., P. Nsinda, C. E. Ezekiel, I. G. Cowx and M. Aeron (2007). Towards sustainable exploitation of Nile perch consequential to regulated fisheries in lake victoria. Aquatic Ecosystem Health & Management **10**(4): 449-457.
- Moore, M., Ed. (1997). Death without taxes: Democracy, state capacity, and aid dependence in the fourth world. Draft. (later published in g. White and m. Robinson (eds.). 1998. Towards a democratic development state. Oxford university press, oxford.).

- Mugabi, E. (2004). Uganda's decentralization policy, legal framework, local government structure and service delivery. The First Conference of Regional Assemblies of Africa and Europe. 2004 Sep 17-18; Florence, Italy. Cited 2011 Jul 31. Available from: <http://unpan1.un.org/intradoc/groups/public/documents/UN/UNPAN031014.pdf>.
- Mwenda, A. and R. Tangri (2005). Patronage, politics, donor reforms, and regime consolidation in Uganda. African Affairs **104**(416): 449-467.
- MWLE (2001). The Uganda forest policy. Ministry of Water, Lands and Environment (MWLE). Republic of Uganda. Kampala, Uganda.
- MWLE (2002). National biomass study. Technical report of 1996-2002. Ministry of Water, Lands and Environment (MWLE). Republic of Uganda. Kampala, Uganda.
- MWLE (2009). Water and environment sector performance report 2009. Ministry of Water, Lands and Environment (MWLE). Republic of Uganda. Kampala, Uganda.
- Naluwairo, R. (2005). A review of the national fisheries policy and the proposed fisheries legislation. Promoting common property rights in fisheries management in Uganda, Advocates Coalition for Development and Environment (ACODE): ACODE Policy Briefing Paper No. 8.
- Ndegwa, S. N. (2002). Decentralization in Africa: A stocktaking survey. Africa Region Working Paper Series number 40, The World Bank.
- Nelson, F. and A. Agrawal (2008). Patronage or participation? Community-based natural resource management reform in sub-Saharan Africa. Development and Change **39**(4): 557-585.
- NFA, N. F. A. (2008). Partnerships. Kampala, Uganda, Cited 2011, Jul 31. Available from: http://www.nfa.org.ug/content.php?submenu_id=3.
- Nielsen, J. R. (2003). An analytical framework for studying: Compliance and legitimacy in fisheries management. Marine Policy **27**: 425-432.
- Njiru, M., J. Kazungu, C. C. Ngugi, J. Gichuki and L. Muhoozi (2008). An overview of the current status of Lake Victoria fishery: Opportunities, challenges and management strategies. Lakes & Reservoirs: Research and Management **13**(1): 1-12.
- Njiru, M., P. Ngungi, A. Getabu, E. Wakwabi, A. Othina, T. Jembe and S. Wekesa (2006). Are fisheries management measures in Lake Victoria successful? The case of Nile perch and Nile tilapia fishery. African Journal of Ecology **45**(3): 315-323(319).
- Njiru, M., J. B. Okeyo-Oworu, M. Muchiri, I. G. Cowx and M. v. d. Knaap (2007). Changes in population characteristics and diet of Nile tilapia *Oreochromis niloticus* (L.) from Nyanza Gulf of Lake Victoria, Kenya: What are the management options. Aquatic Ecosystem Health & Management **10**(4): 434-442.
- Njiru, M., E. Waithaka, M. Muchiri, M. v. d. Knaap and I. G. Cowx (2005). Exotic introductions to the fishery of Lake Victoria: What are the management options? Lakes & Reservoirs: Research and Management **10**(3): 147-155.
- North, D. C. (1990). Institutions, institutional change and economic performance. New York, NY, Cambridge University Press.
- Nunan, F. (2006). Empowerment and institutions: Managing fisheries in Uganda. World Development **34**(7): 1316-1332.
- Nunan, F. and J. Scullion (2004). Lakes and livelihoods: Integrated co-management in Uganda, Department for International Development - Integrated Lake Management Project: 55.

- Odongkara, K. O., R. O. Abila and J. Luomba (2009). The contribution of lake victoria fisheries to national economies. African Journal of Tropical Hydrobiology and Fisheries **12**: 47-51.
- Ogutu-Ohwayo, R. (2001). Efforts to incorporate biodiversity concerns in management of the fisheries of lake victoria, east africa. Blue Millennium: Managing Global Fisheries for Biodiversity, Victoria, British Columbia, Global Environment Facility and United Nations Environment Programme.
- Ogwang', V. and F. Nunan (2008). Presentation: Result 2: Abilities of communities to co-manage the fishery strengthened. Great Lakes of the World (GLOW) V Conference, April 26-28, Addis Ababa, Ethiopia, Aquatic Ecosystem Health & Management Society.
- Ogwang', V. O., J. I. Nyeko and R. Mbilinyi (2009). Implementing co-management of lake victoria's fisheries: Achievements and challenges. African Journal of Tropical Hydrobiology and Fisheries **12**: 52-58.
- Ojuok, J. E., M. Njiru, M. Ntiba and K. M. Mavuti (2007). The effects of overfishing on the life-history strategies of Nile tilapia, *oreochromis niloticus* (L.) in the nyanza gulf of lake victoria, kenya. Aquatic Ecosystem Health & Management **10**(4): 443-448.
- Ostrom, E. (1990). Governing the commons: The evolution of institutions for collective action, Cambridge University Press.
- Ostrom, E. (1999). Self-governance and forest resources. **Occasional Paper No. 20**: Jakarta, Indonesia.
- Ostrom, E. (2005). Understanding institutional diversity, Princeton University Press.
- Ostrom, E. (2007). A diagnostic approach for going beyond panaceas. Proceedings of the National Academy of Sciences **104**(39): 15181-15187.
- Ostrom, E. (2009). A general framework for analyzing sustainability of social-ecological systems. Science **325**(5939): 419-422.
- Ostrom, E., T. Dietz, N. Dolsak, P. C. Stern, S. Stonich and E. U. Weber, Eds. (2002). The drama of the commons. Washington, DC, National Academy Press.
- Ostrom, E., J. Walker and R. Gardner (1992). Covenants with and without a sword: Self-governance is possible. The American Political Science Review **86**(2): 404-417.
- Owusu, J. (1998). Current convenience, desperate deforestation: Ghana's adjustment program and the forestry sector. The Professional Geographer **50**(4): 418-436.
- Pinkerton, E. (1989). Introduction: Attaining better fisheries management through co-management--prospects, problems, and propositions. Co-operative management of local fisheries: New directions for improved management & community development. E. Pinkerton. Vancouver, BC, University of British Columbia Press: 3-34.
- Pinkerton, E., Ed. (1989a). Co-operative management of local fisheries: New directions for improved management and community development. Vancouver, BC, University of British Columbia Press.
- Pinkerton, E. (2009). The skeen watershed partnership: Learning from success and failure in salmon management. Pacific salmon: Ecology and management of western alaska's populations: American fisheries society symposium 70. C. C. Krueger and C. E. Zimmerman. Bethesda, MD, USA, American Fisheries Society: 903-919.
- Pinkerton, E. and L. John (2008). Creating local management legitimacy. Marine Policy **32**(4): 680-691.
- Piper, D. (1967). The international law of the great lakes. Durham, NC, USA., Duke University Press.

- Place, F. (1995). The role of land tenure in the adoption of agro-forestry in burundi, uganda, zambia, and malawi: A summary and synthesis. Land Tenure Center. Land Tenure Center Report. Madison, WI.
- Place, F. and K. Otsuka (2002). Land tenure systems and their impacts on agricultural investments and productivity in uganda. J Dev Stud **38**(6): 105-128.
- Platteau, J. P. (2000). Institutions, social norms and economic development, Routledge.
- Pomeroy, R. (2001). Fisheries co-management: A fact sheet for connecticut fishermen. Groton, CT, Connecticut Sea Grant College Program, The University of Connecticut. **Fisheries Fact Sheet: 2**.
- Pomeroy, R. (2007). Conditions for successful fisheries and coastal resources co-management: Lessons learned in asia, africa, and the wider caribbean. Adaptive co-management: Collaboration, learning, and multi-level governance D. Armitage, F. Berkes and N. Doubleday. Vancouver, BC, University of British Columbia Press: 172-190.
- Pomeroy, R. S. and F. Berkes (1997). Two to tango: The role of government in fisheries co-management. Marine Policy **21**(5): 465-480.
- Pomeroy, R. S., B. M. Katon and I. Harkes (2001). Conditions affecting the success of fisheries co-management: Lessons from asia. Marine Policy **25**: 197-208.
- Rachlinski, J. J. (2006). Bottom-up versus top-down lawmaking. The University of Chicago Law Review **73**(3): 933-964.
- Republic of Kenya (2008). National oceans and fisheries policy 2008, Ministry of Fisheries Development.
- Rettig, R. B., F. Berkes and E. Pinkerton (1989). The future of fisheries co-management: A multi-disciplinary assessment. Co-operative management of local fisheries: New directions for improved management and community development. E. Pinkerton. Vancouver, Canada, University of British Columbia: 273-289.
- Ribot, J. C. (2002a). African decentralization: Local actors, powers and accountability. Democracy, Governance and Human Rights. Geneva, UNRSD and IDRC. **Paper No. 8**.
- Ribot, J. C. (2002b). Democratic decentralization of natural resources: Institutionalizing popular participation. Wahington, DC, World Resources Institute.
- Ribot, J. C., A. Agrawal and A. M. Larson (2006). Recentralizing while decentralizing: How national governments reappropriate forest resources. World Development **34**(11): 1864-1886.
- Schlender, J. H. (undated). The impact of the voigt case: On-going and upcoming issues. Great Lakes Indian Fish and Wildlife Commission, Odanah, WI
- Schneider, A. (2003). Decentralization: Conceptualization and measurement. Studies in Comparative International Development **38**(3): 32-56.
- Sen, S. and J. R. Nielsen (1996). Fisheries co-management: A comparative analysis. Marine Policy **20**(5): 405-418.
- Seymour, F. and N. Dubash (2000). Right conditions: The world bank, structural adjustment, and forest policy reform. Washington, D.C. World Resources Institute.
- Stein (2007). Personal communications at center for afroamerican and african studies, university of michigan. Ann Arbor, MI.
- Stein, H., Ed. (1995). Asian industrialization and africa: Studies in policy alternatives to structural adjustment. International political economy series. Basingstoke, Hampshire, Macmillan Press Ltd.

- Stein, H. (2005a). Lecture title: Development crisis. Seminar. Ann Arbor, MI, Course 408: Center for Afroamerican and African Studies. University of Michigan. September 13, 2005.
- Stein, H. (2005b). Lecture title: Structural adjustment programs, country specific overview. Seminar. Ann Arbor, MI, Course 408: Center for Afroamerican and African Studies. University of Michigan. November 29, 2005.
- Stein, H. (2008). Beyond the world bank agenda: An institutional approach to development. Chicago, The University of Chicago Press.
- Struhsaker, T. (1987). Forestry issues and conservation in uganda. Biol Conserv **39**: 209-234.
- Tabuti, J. R. S., S. S. Dhillion and K. A. Lye (2003). Firewood use in bulamogi county, uganda: Species selection, harvesting and consumption patterns. Biomass Bioenergy **25**(6): 581-596.
- The World Bank (1996). Proposal for review: Lake victoria environmental management. T. W. Bank, The World Bank.
- The World Bank (2006). Implementation completion report, no: 36559. T. W. Bank, The World Bank: 53.
- Therkildsen, O. (1993). Legitimacy, local governments and natural resource management in sub-saharan africa. Institutional Issues in Natural Resources Management: With Special Reference to Arid and Semi-Arid Areas in Africa. In Henrik Secher Marcussen (ed.). Denmark, International Development Studies, Roskilde University. **Occasional Paper No. 9**.
- Townsend, R. and R. Shotton (2008). Fisheries self-governance: New directions in fisheries management. Case studies in fisheries self-governance. R. Townsend, R. Shotton and H. Uchida. Rome, FAO Fisheries Technical Paper 504: 1-19.
- Townsend, R. E. and S. G. Pooley (1995). Distributed governance in fisheries. Property rights and the environment: Social and ecological issues. S. Hanna and M. Munasinghe. Washington, DC., USA, Betjer International Institute of Ecological Economics and The World Bank: 47-58.
- Turyahabwe, N. and A. Banana (2008). An overview of history and development of forest policy and legislation in uganda. International Forest Review **10**(4): 641-656.
- Turyahabwe, N., C. J. Geldenhuys, S. Watts and A. Banana (2006). Technical and institutional capacity in local organisations to manage decentralised forest resources in uganda. South Afr For J. **208**: 63-78.
- Turyahabwe, N., C. J. Geldenhuys, S. Watts and J. Obua (2007). Local organisations and decentralised forest management in uganda: Roles, challenges and policy implications. Int For Rev **9**(2): 581-596.
- Twyman, C. (1998). Rethinking community resource management: Managing resources or managing people in western botswana? Third World Quarterly **19**(4): 745-770.
- Tyler, T. R. (1990). Why people obey the law. New Haven, Yale University Press.
- Uganda Export Promotion Board (2006). Uganda export performance analysis: 2005. Uganda Export Promotion Board, Kampala, Uganda.
- Ugandan Department of Fisheries Resources (2003). Guidelines for beach management units in uganda. Department of Fisheries Resources Uganda. Ministry of Agriculture Animal Industry and Fisheries, Kampala, Uganda.

- Ugandan Ministry of Agriculture Animal Industry and Fisheries (2004). The national fisheries policy. U. Ministry of Agriculture Animal Industry and Fisheries. Department of Fisheries Resources, Kampala, Uganda.
- United Republic of Tanzania (1977). The constitution of the united republic of tanzania. G. o. Tanzania. Duty to safeguard public property, Act No. 15 of 1984, Article 6, Dar es Salaam, Tanzania.
- United Republic of Tanzania (2011). The tanzania five year development plan 2011/12-2015/16: Unleashing tanzania's latent growth potentials. United Republic of Tanzania Presiden't Office, Planning Commission, Dar es Salaam, Tanzania.
- United States District Court (1979). United states vs. Michigan consent decree: United states district court, u.S. V. Michigan, 623 f2d 448: United states district court, western district, michigan.
- United States District Court (2000). United states vs. Michigan consent decree: United states district court, western district, michigan.
- Vaccaro, L. and J. Read (2011). Vital to our nation's economy: Great lakes jobs 2011 report. Ann Arbor, Michigan, Michigan Sea Grant.
- van den Brink, R., G. Thomas, H. Binswanger, J. Bruce and F. Byamugisha (2006). Consensus, confusion, and controversy: Selected land reform issues in sub-saharan africa. The World Bank. World Bank Working Paper No. 71. Washington, DC.
- van der Knaap, M. (2013). Comparative analysis of fisheries restoration and public participation in lake victoria and lake tanganyika. Aquatic Ecosystem Health & Management **16**(3): 279-287.
- van der Knaap, M. and W. Ligtvoet (2006). Is western consumption of nile perch from lake victoria sustainable? Great Lakes of the World IV. Bagamoyo, Tanzania.
- van Sittert, L. (2002). The tyranny of the past: Why local histories matter in south african fisheries. Ocean & Coastal Management **46**(1-2): 199-219.
- Vazquez, J. M. and F. Vaillancourt (2011). Obstacles to decentralisation: Lessons from the developing world. Development and Cooperation - EUROPEAID. European Commission. web-based, Capacity4dev.eu.
- Walker, B. and D. Salt (2006). Resilience thinking: Sustaining ecosystems and people in a changing world. Washington, DC, Island Press.
- Watkins, C. (2009a). Natural resource use strategies in a forest adjacent ugandan village. Hum Ecol **37**(6): 723-731.
- Watkins, C. (2009b). Natural resource use in uganda: Attitudes, behavior and the links in between. Doctoral dissertation. Ann Arbor, MI, University of Michigan.
- Weiss, E. B. (1999). The emerging structure of international environmental law. The global environment. N. J. Vig and R. S. Axelrod. Washington DC., USA, Congressional Quarterly Press: 98-115.
- Wiebe, P. D. and C. P. Dodge, Eds. (1987). Beyond crisis: Development issues in uganda. Kampala, Uganda, Makerere Institute of Social Research, African Studies Association.
- Wilson, D. C. (2002). Lake victoria fishers' attitudes towards management and co-management. Africa's inland fisheries: The management challenge. K. Geheb and M.-T. Sarch. Kampala, Fountain Publishers: 174-184.
- Wilson, D. C., M. Ahmed, A. Delaney, S. Donda, C. K. Kapasa, I. Malasha, K. Muyangali, F. Njaya, T. Olesen, E. Poiosse and J. R. Nielsen (2003). Power and politics in fisheries co-management programmes in southern africa. Department of Development and Planning

- Innovative Fisheries Management IFM. Aalborg, Denmark, Aalborg University.
Innovative Fisheries Management Publication: 224.
- Wilson, D. C., M. Medard, C. K. Harris and D. S. Wiley (1999). The implications for participatory fisheries management of intensified commercialization on lake victoria. Rural Sociology **64**(4): 554-572.
- Witte, F., T. Goldschmidt, J. Wanink, M. v. Oijen, K. Goudswaard, E. Witte-Maas and N. Bouton (1992). The destruction of an endemic species flock: Quantitative data on the decline of the haplochromine cichlids of lake victoria. Environmental Biology of Fishes **34**(1): 1-28.
- Witte, F., J. H. Wanink, M. Kische-Machumu, O. C. Mkumbo, P. C. Goudswaard and O. Seehausen (2007). Differential decline and recovery of haplochromine trophic groups in the mwanza gulf of lake victoria. Aquatic Ecosystem Health & Management **10**(4): 416-433.
- World Trade Organization (2006). Fish export from lake victoria - from import ban to cash earner. Committee on Sanitation and Phytosanitary Measures
- World Trade Organization. Geneva Switzerland, G/SPN/GEN/685.
- Wunsch, J. (2001). Decentralization, local governance and 'recentralization' in africa. Public Administration and Development **21**: 277-288.
- Young, O. R. (1994). International governance: Protecting the environment in a stateless society. Ithaca, NY, USA, Cornell University Press.
- Zorn, J. E. (1989). General principles of indian law. Odanah, WI, USA.
- Zorn, J. E. (2003). Testimony of james e. Zorn, policy analyst of the great lakes indian fish and wildlife commission. Senate Committee on Indian Affairs. June 3, 2003: 37-42