

**ASSESSING THE ROLE OF BEACH MANAGEMENT UNITS IN CO-  
MANAGEMENT OF FISHERIES RESOURCES IN KISUMU COUNTY,  
KENYA**

**BY**

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**DECLARATION**

**DECLARATION BY THE CANDIDATE**

This research project report is my original work and has not been presented for any award in any other university.

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Glory to God!

## **DEDICATION**

Dedicated to God Almighty and my late parents Lawrence and Electine!

## ABSTRACT

Fisheries Management approaches continued being by centralized government intervention for some time after independence in countries in Africa. Later the approach proved inadequate to deal with the emerging issues in the management of fisheries resources. Partnerships known as co-management, now practiced in East Africa including Kenya, involve Beach Management Units (BMUs) in fisheries management. In Kenya co-management of fisheries with BMUs began in 2007 with hope that they will help Fisheries department better manage Lake Victoria Fisheries resources. However, fisheries management still remains a challenge to the central government. Minimal research has been done to assess the role of the BMUs in co-management. The overall objective of the study is to assess the role of BMUs as partners in co-management of Lake Victoria fisheries resources in Kisumu County. The specific objectives are to evaluate management functions of BMUs as co-management partners in sustainable utilization of Lake Victoria fisheries resources, establish factors that influence BMUs performance of their roles in sustainable utilization of fisheries resources and examine strategies BMUs employ to play their co-management roles in sustainable utilization of Lake Victoria fisheries resources. The study adopted a cross-sectional study design with target population consisting of BMU Assembly members from thirty one (31) gazetted BMUs, totaling to 6499 and 18 key Informants drawn from Fisheries Departments, Chiefs and Sub-chiefs at Lake riparian location and sub-location levels, Sub-County Police Departments and National BMUs network representative, all from Kisumu County. Focus Group Discussions (FGDs) were undertaken within each of the five riparian Sub-Counties five (5) with each FGD composed of 8 -10 participants. Three hundred and seventy-six (376) respondents who were BMU officials and ordinary members were sampled through simple random sampling from the 6499 BMU Assembly members for questionnaire administration. Data was collected by use of questionnaires which were pre-tested to ascertain their validity and consistency before they were used. The study found that all the BMUs exist as legal entities, having been registered by Fisheries Department with majority having democratically elected officials with Executive Committee composed of required stakeholders' representation. Lack of commitment among the BMU assembly in playing their stipulated roles as well as lack of co-operation among the executive committee members was reported to be major reasons for dismal performance of BMUs in co-management. Majority of BMUs source funds from international and local donors as a strategy to enable them play their co-management roles probably due to such as organizing lake patrols. The study concludes that although majority of BMUs in Kisumu County are compliant with BMU regulations with regard to management functions and playing their intended roles effectively though this is not reflected in the recovery of fish stocks as intended and recommends a rethink about of roles BMUs are supposed to play to sustainably utilize Lake Victoria fisheries resources.

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## **LIST OF ABBREVIATIONS AND ACRONYMS**

<b>BMUs:</b>	Beach Management Units
<b>CAS:</b>	Catch Assessment Surveys
<b>CDF:</b>	Constituency Development Fund
<b>CSO:</b>	Commercial Stakeholder Organization
<b>FS:</b>	Frame survey
<b>IFMP:</b>	Implementation of Fisheries Management Plan for Lake Victoria
<b>LADF:</b>	Local Authority Development Fund
<b>LVEMP:</b>	Lake Victoria Environment Management Program
<b>LVFO:</b>	Lake Victoria Fisheries Organization
<b>MCS:</b>	Monitoring, Control and Surveillance
<b>OCS:</b>	Officer Commanding Station



## DEFINITION OF TERMS

**“Assembly”**: means a meeting of registered members of a beach management unit convened pursuant to the provisions of the beach management regulations, 2007

**“Beach management units”**: means, an organization of fishers, fish traders, boat owners, fish processors and other beach stakeholders, at a fish landing site that traditionally depend on fisheries activities for their livelihoods

**“Beach Management Unit network”**: means, an association of BMUs within a County, with elected officials

**“Co-management”**: means terms refers to management, in which government and potential users of fisheries resources such as Beach Management Units (BMUs) share responsibilities and rights to manage fisheries activities, environmental protection and resources in an identified area, based on the cooperation between two sides and relevant stakeholders

**“Riparian sub-counties”**: means, sub-counties bordering the shores of Lake Victoria

**“Fishing gears”**: means, nets and other tools that are used on boats to get fish out of the water in the lake

**“Fisheries resources”**: means various types of fishes that are obtainable from the Lake Victoria waters

**“Frame survey”**: means: an exercise that is carried out in the Lake Victoria waters to determine number of the entire fisheries facilities and infrastructure

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# CHAPTER ONE

## 1.0 INTRODUCTION

### 1.1 Background

Since 1990s global capture fisheries has been on decline, warranting a sustainable approach to its exploitation (Dey and Kanagaratnam, 2007) in Busiega, 2011. World over, there has been a shift in governance of fisheries to a broader approach that recognizes fishers' participation, local stewardship, and shared decision making in the management of fisheries (Raakjaer et al., 1999). Through this process, fishers are empowered to become active members of the fisheries management team balancing rights and responsibilities and working in partnership, rather than antagonistically, with the government. This approach is called co-management, and is one of a number of promising new and alternative management approaches that have emerged in recent years for fisheries management (Jansen et al., 1999).

Co-management concept in fisheries resources conservation in simple terms refers to management, in which government and potential users of fisheries resources such as Beach Management Units (BMUs) share responsibilities and rights to manage fisheries activities, environmental protection and resources in an identified area, based on the cooperation between two sides and relevant stakeholders (Musiega, 2011).

The concept of co-management has gained acceptance among government agencies and development practitioners as an alternative fisheries management strategy to the top-down, centralized government management approach which has not been able to bare much fruit in restoration of the dwindling stocks (Raakjaer et al., 2005).

In the Brazilian Amazon, the use of community initiatives, the equivalents of BMUs in Lake Victoria, to regulate the exploitation of flood plain lake fisheries have proliferated, and are now legalized as co-management agreements whereby the government endorses and enforces community rules. Most agreements aim to raise stock abundance and thereby the productivity of lake fisheries by limiting exploitation by larger and often external commercial boats as well as local fishers (De Castro 1999, Almeida *et al.* 2001,

Pereira 2000). The Lower Amazon is one of the regions where community management has expanded rapidly, with 137 community management units in place by 1999 (De Castro 1999).

In New Zealand, the government amended the Fisheries Act in 1999 to allow delegation of certain management responsibilities to approved service delivery organizations more commonly referred to as Commercial Stakeholder Organizations (CSOs) or stakeholder groups, who are the equivalents of the Beach Management Units (BMUs) in East Africa. Essentially, CSOs are authorized to carry out routine management activities, including research, while the Ministry maintains the role of setting management standards, enforcement, and auditing CSO activities (De Castro, 1999).

In 1994 the three partner states sharing Lake Victoria (Kenya, Uganda and Tanzania) formed a regional organization known as the Lake Victoria Fisheries Organization (LVFO) with the objectives to develop and adopt conservation and management measures to assure the lake's ecosystem health and sustainability of living resources. The LVFO spearheads co-management partnership which harnesses the knowledge and capacities of those who have shared interest in the sustainability of Lake Victoria fishery.

Initiatives to promote management through the formation of resource user groups, known as Beach Management units (BMUs), started in Tanzania in 1998, and then spread to the three riparian states (Lake Victoria Fisheries Organization, 2007). The co-management regime in Tanzania was implemented through the establishment of Beach Management Units (BMUs), which are community-based organizations that are legally accepted as a representative of a fishing community regarding fisheries resource utilization and management. Later on BMUs were formed all around Lake Victoria to work in collaboration with the relevant government authorities concerned with fisheries management (Musiega, 2011). There are 1069 BMUs Lake wide, 433 in Tanzania 355 in Uganda and 281 in Kenya with approximately 250,000 people registered with the BMUs (Frame Survey, 2012).

The primary goal of this partnership is the management of the fisheries resources where Governments entered into an agreement with the BMUs on the protection and sustainable utilization of the fish resources (Musiega, 2011).

The idea of co-management approach as a strategy for conservation of fisheries resources in Kenya was initiated after the three East African Countries agreed to form Beach Management Units (BMUs) under LVFO secretariat as the local entities at the Beach level that enables the fishing communities to participate in co-managing the fisheries resources of Lake Victoria. Involving BMUs in fisheries management is seen by economists as a possible approach to increasing the cost effectiveness of fisheries management through lowering the ex-post transaction costs, for example, the costs involved in carrying out Monitoring Control and Surveillance to root out the illegal fishing methods in Lake Victoria (Ogwang *et al*, 2009).

Legislation in each riparian country gives legal status to the BMUs, and ensures their formation includes everyone involved in fisheries at Beach level i.e. Boat owners, Crew members, Managers/Supervisors, Artisanal fish processors and Traders, fishing gears and equipment dealers/repairers, boat maker's agents of industrial fish processors and other fisheries related institutions operating at the beach (Lake Victoria Fisheries Organization, 2007).

The above studies express the fact that BMUs are expected to take up a major fisheries management role in the Lake Victoria fishery and are supposed to carry out their functions through the existing BMUs structure, memberships, electoral processes, and administration structures. There is limited information on evaluation of BMUs level of compliance to their management functions. This study therefore will evaluate the management functions of BMUs to determine the level of compliance by BMUs to the various functions as stipulated in the BMUs regulations.

The BMUs are supposed to independently operate as co-management partners in sustainable utilization of fisheries resources by playing roles in routine management of fisheries and among the roles envisioned for them to play include prohibition of illegal fishing practices, control of fishers migration from one BMU to another, statistical data collection and recording, beach cleanliness and good environmental keeping, banditry

and theft reporting and control, which if implemented will ensure sustainable utilization of fisheries resources (Heck et al.,2004). There has been continued decline of fisheries resources probably occasioned by some BMUs performing their roles at different levels of effectiveness (Musiega, 2011). It is not clear what influences performance of their roles, thus the need for this study to establish factors that influence BMUs performance of roles in sustainable utilization of fisheries resources.

The introduction of BMUs is one of ways of strengthening the central government efforts to curb the increased non-compliance to the fisheries management regulations in Lake Victoria (Government of Kenya, 2007). BMUs are expected to collaborate with other stakeholders to develop and apply relevant strategies that can enable them effectively play their roles and ensure sustainable utilization of fisheries resources.

However, in Kisumu County for instance, despite the shared mandate given to the BMUs to assist the Central and County Government to sustainably exploit the fishery through responsible fishing practices, there has been continued use of illegal fishing methods that has probably contributed to decline in catches (Government of Kenya, 2008; , 2010; , 2012; ,2014), throwing into doubt whether BMUs have strategies that enable them play their roles effectively. This necessitated this study to examine the strategies BMUs employ in order to play their co-management roles in sustainable utilization of fisheries resources.

## **1.2 Statement of the problem**

Between 2003- 2008, the Implementation of a Fisheries Management Plan (IFMP) for Lake Victoria project facilitated and implemented the reformation of the Beach Management Units (BMUs) around Lake Victoria in order to ensure they fully participate in the management and sustainable utilization of the Lake Victoria fisheries resources. One of the major steps in the process was legalizing BMUs to participate in fisheries management.

However, despite the efforts of empowering of BMUs in 2007 to deliver on their mandates in fisheries management in general, biennial Frame Survey (FS) reports of 2008, 2010, 2012 and 2014 of Kisumu County still indicate existence of fisheries

related illegalities namely, trade in illegal undersize fishes, use and possession undersize nets (gill nets < 5'' and mosquito nets < 8-10 mm) , use of monofilament nets, fishing in the breeding areas ,beach seining and fishing during the closed seasons. It was hoped that with the operationalization of the BMUs, such illegalities would be eradicated leading to sustainable utilization of the fisheries resources. The situation called for a study to address the BMUs' role in the co-management of Lake Victoria fisheries resources in Kisumu County by specifically examining management functions of BMUs as co-management partners in fisheries management, establishing factors that influence BMUs performance of their roles as well as examine strategies they employ to play their co-management roles. This will help to document information on BMU strengths and weaknesses thereby enable the government of Kenya and other stakeholders to know the extent to which they should entrust the BMUs in the management of fisheries resources.

### **1.3 Objectives of the study**

#### **Overall objective**

The overall objective of this study is to assess the role of BMUs as partners in co-management of Lake Victoria fisheries resources.

#### **Specific objectives**

1. To evaluate management functions of BMUs as co-management partners in sustainable utilization of the Lake Victoria fisheries resources
2. To establish factors that influence BMUs performance of their roles in sustainable utilization of fisheries resources
3. To examine strategies BMUs employ to play their co-management roles in sustainable utilization of fisheries resources.

### **1.4 Research questions**

1. What are the levels of compliance of BMUs to management functions that enable them participate as co-management partners in sustainable utilization of the Lake Victoria Fisheries resources



2. What factors influence BMUs' performance of roles in sustainable utilization of fisheries resources?
3. What strategies do BMUs employ to play their co-management roles in sustainable utilization of fisheries resources?

### **1.5 Significance of study**

Despite the establishment of BMUs several years ago, in order for them among other things to be co-management partners to aid the government to reduce illegal fishing practices that led to decline in fish landings, cases of illegal fishing practices are still being reported among the BMUs.

This study may assist the State Department of Fisheries and other key stakeholders in Lake Victoria fisheries, to identify points of strengths and weaknesses in the co-management role of BMUs in fisheries management. It may also be useful to Lake Victoria Fisheries Organization (LVFO), being a regional body responsible for managing the lake and finally to the BMUs to understand the gap between the roles they play and what is expected of them in the sustainability of the fisheries resources. The findings of this study are likely to contribute towards ensuring that BMUs as partners of co-management effectively contribute to ensuring sustainable utilization of Lake Victoria Fisheries Resources.

### **1.6 Scope and limitation of study**

The study focused on the role of BMUs as co-management partners of Lake Victoria fisheries resources and was conducted among the Beach Management Units (BMUs) in Kisumu County, Kenya. The BMUs were namely; Dunga, Kijinjio, Usoma, Ngege, Usare, Paga, Rare, Mawembe, Ogal, Nyamware, Oseth Obange, Nduru, Kaloleni, Ugwe, Ogenya, Kaloka, Nanga, Bao, Assat, Kihanja, Kobudho, Arongo, Nyamaruaka, Kagwel, Othany , Kusa, Kombewa, Bala, Sango Rota, Ochok and Koguta. The Fisheries Department officials, Internal Security staff (Chiefs and Sub-chiefs in the Riparian Lake Victoria Locations and Sub-locations), BMU network officials and the Police Department Officials in-charge of lake patrols were key informants in this case study since they all closely interact with the BMUs. The study was limited by lack of

willingness by respondents to provide information voluntarily unless given handouts, thus respondents were sensitized on the usefulness of the study findings to the fishery before providing them with questionnaires. In addition, information that the researcher could not get from BMUs was obtained from the Key informants (KI) and Focus Group Discussions (FGDs).

## CHAPTER TWO

### 2.0 LITERATURE REVIEW

#### **2.1 BMUs Management functions for co-management of Lake Victoria fisheries resources.**

The form of organizational representation of the participants in any specific fishery system depends on the particular context of that fishery, and the level of activity of its various groups. There are two principle views of the fisheries co-management organization that have been described namely social inclusion and industrial organization.

The social inclusion view of the co-management organization emphasizes the role of local stakeholders, including native peoples, local communities, and environmental lobbies (NGOs) in the development and critic of fisheries management policy. This social contribution is generally seen as having been excluded from participating in management because of the dominant influences of large corporate interests and government regulatory institutions as fishers' knowledge can provide a valuable set of information about the characteristics of practices, tools and techniques that led a more sustainable pattern of resource use in the past. Such knowledge can contribute to the formulation of present management plans to better adapt rules to local social and environmental conditions. The industrial organization view of the co-management organization seeks to balance management responsibilities for the fishery between government agencies and the commercial fishing industry by working together to meet mutual goals for resource sustainability and for economic viability. This view requires that resource management decision making should be shared with the exploiters of the resource in order for them to become responsible participants in a sustainable fishery (Jentoft, 1989).

International research shows that although women are active participants in natural resource management groups they are not well represented in positions of decision-making within those groups (Curtis *et al.*, 1994; Claridge and Chamala, 1995).

In a UN report by the Secretary General on women and the environment it was noted that in most natural resource management groups in developed countries, the usual inequality of power existed i.e., the pyramidal structure, with women underrepresented in the top managerial positions, despite the constant rhetoric praising women as natural conservationists, more connected than men to an ethic of caring for the earth and more affected by unfriendly environmental actions (UN, 1995: 285). This imbalance is illustrated by Land care groups in Victoria, Australia in which women comprise only 33 percent of leadership positions and, within these positions, are disproportionately represented in secretarial and administrative positions. A hierarchical decision-making structure can discourage women from participating in decision-making as they may feel uncomfortable in such a competitive and exclusive environment (Curtis *et al.*, 1994: 3).

The above studies refer to levels of involvement of stakeholders in decision making in so far as natural resource management groups are concerned in other parts of the world, especially percentage of women in leadership positions in such groups. According to BMUs guidelines, Committees at beaches are supposed to have at least 3 women. This study will determine level of involvement of other stakeholders in decision making particularly whether the law is followed to ensure gender equity and other stakeholder involvement.

### **2.2.1 Structure of BMUs and their functions**

To qualify for registration as a BMU, however, a landing site needs to have a minimum of 30 boats among other requirements (Ogwang *et al.* 2006). The spatial jurisdiction of a BMU constitutes a defined geographical area that has been surveyed, its boundaries clearly delineated, and marked as a fish landing station by the Director of Fisheries. The BMU functions within their area of jurisdiction include recording fish landings and enforcing fisheries regulations (Etiegni *et al.* 2016). BMUs are required to make their own rules, in the form of by-laws to govern their internal operations, examples being restricting certain gears or establishing a fisheries closure, although final approval rests with the Director of Fisheries.

An essential first step in the formation of BMUs around the lake was the development of regionally agreed harmonized BMU Guidelines, which were approved by the LVFO

Fisheries Management Committee in May 2005 and used to guide the development of national guidelines which carry the management functions of BMUs Legislation to provide legal status for BMUs was passed in Uganda in 2003, in Tanzania in 2005 and in Kenya in 2008 (Ogwang et al., 2009).

A BMU is made up of the assembly and committee (Figure 1). The assembly includes all persons engaged in fishing activities at Beach level. The members include boat owners, crew members, managers/supervisors, artisanal fish processors and traders, fishing gear and equipment dealers/repairers and boat makers. The committee has (a chairperson, deputy chairman, secretary, treasurer and other defined posts) elected by the members (Government of Kenya, 2007; Etiegni, et al., 2016)

BMU regulations are clear about the total number and gender composition of executives (9 to 15 and 1/3 women) and not the total number of members.

Executive Committee should be as close as possible to; 30 % boat owners; 30 % crew (fishing laborers who do not own boats); 30% other stakeholder groups (including fish processors, boat makers, local gear makers or repairers, fishing equipment dealers, managers, and chatterers); 10% fish mongers/traders.

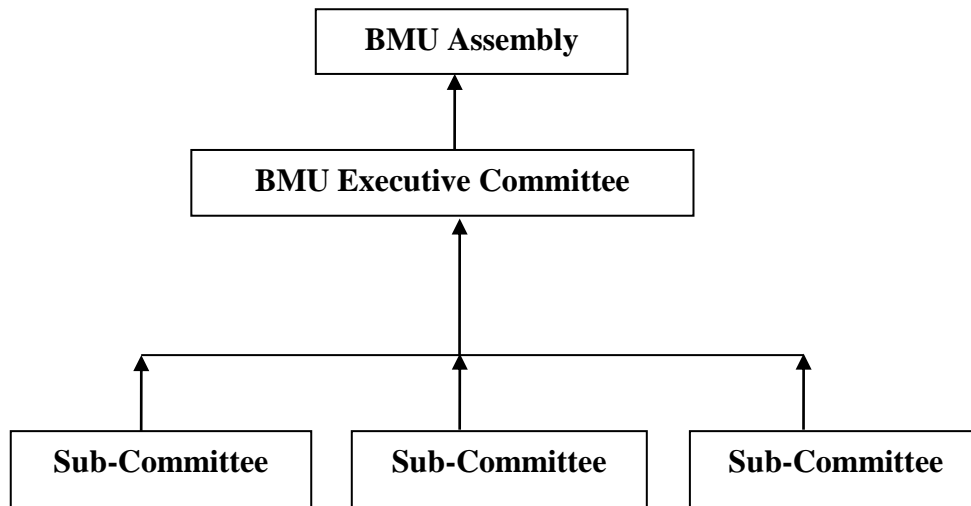
Within each BMU committee there have to be at least three sub-committees responsible for fisheries management, financial management and environmental protection. However more sub-committees can be formed depending on the need of respective BMUs (Government of Kenya, 2007).

Where membership was too large, it was generally observed that members lack commitment and are not fully aware and involved in the BMUs current affairs. Large membership has also been reported to restrict effective communication and decision making. Therefore, BMU assembly membership should be limited in order to enhance effective communication and decision making (Pomeroy et al. 2001).

Subcommittees are formed as necessary by BMU members and are headed by executive members. However, in some cases, despite the clear provisions on the Guidelines on how to constitute such committees, different BMUs have formed the committees in different way, including cases where BMU chairmen are elected and then they just

picked their committee members without involvement of ordinary fishers (Odongkara, 2009; Government of Kenya, 2006)

LVFO supported establishment of BMU networks, through which BMUs are able to collaborate with each other, with Government and other stakeholder groups. These networks are essential for harmonizing plans and management measures, to prevent and address conflict, and to promote equity and justice between BMUs for all members. BMU Networks have been formed up to the district/county level, with elected committees with stakeholder composition comparable to that of BMUs at community level (Nunan et al.2012; Nunan,2010).



**Figure 1: BMU Organ gram**

For BMUs to be effective in fisheries co management, they must collaborate with other BMUs, as well as with government agencies and other stakeholder groups. This can be achieved through the formation of BMU Networks and Fisheries Co-Management Committees at local, national and regional levels. The co management guidelines that have been drawn up (Lake Victoria Fisheries Organization, 2007) give the procedures for the formation of BMU Networks and Fisheries Co-Management Committees at each level as well as a clear outline of the functions of these structures and of each stakeholder group (Government of Kenya, 2007).

The guidelines also explain what co-management means for Lake Victoria fisheries and how the meetings and activities of the BMU Networks and Fisheries Co-Management Committees will be funded. They will therefore strengthen the understanding and implementation of co-management, including the further development of institutions, and contribute significantly to sustainable fisheries management.

The new regionally agreed paradigm (Government of Kenya, 2006) envisioned co-management as a partnership between the fishing community and the government. It was intended to end in sustainable management of fisheries. The BMUs were mandated to enforce government fisheries regulations, control access to the lake, set local by-laws, collect fisheries data, and resolve conflicts among BMU members, such as disputes over gears, and among traders and boat owners (Government of Kenya, 2007; Obiero et al.2015). The central government set guidelines for functions and responsibilities of BMUs (Government of Kenya, 2006). The State Department of Fisheries (SDF) has overall responsibility for the BMUs (Government of Kenya, 2006). However, both SDF and BMUs mandates are guided by the National Oceans and Fisheries Policy, Fisheries Act and BMU regulations (Government of Kenya, 2007; 2008; 2012).

The studies above have elaborated the contents of the Fisheries BMU regulations, 2007, focusing on the BMU structure, membership and elections, administration, responsibilities of BMUs organs and officials in terms of what there are supposed to be. However, the information on compliance by BMUs is limited. This study will fill this gap by evaluating the various management functions with a view of determining compliance levels to the regulations.

## **2.2 BMUs performance and factors influencing their roles in sustainable utilization of fisheries resources**

According to (Raakjaer and Vedmand, 1999), among issues which influence co-management institutional arrangements are firstly, existing property rights regime in place: state, private, communal or open access. It matters who has access to the resource, who defines rights for exploitation of the fish resources. Secondly the Scale and level of user-group involvement i.e. which level, central, regional or local, are user

groups participating in the decision-making process and what is the scale of involvement in terms of tasks that are delegated or co-managed? Thirdly, representation of user groups in the decision-making process, referring to who should participate in co-management arrangements - which user-groups are legitimate participants in the decision-making process and who claim rights to participate (e.g. fishermen, fish processors, consumers, local/regional interest groups or environmentalists)?

Pomeroy et al (1997), in their report on the findings of research into fisheries co-management in Asia identified conditions affecting success of co-management which include enabling policies and legislation, to spell out jurisdiction and control; provision of legitimacy to property right and decision making arrangements, as well as definition of rights, responsibilities and authority at the different levels of management of both the government and local fisher groups and organizations.

At the community level, key conditions that influence success of co-management include participation, empowerment and clearly defined property rights ( Hara and Nielsen, 2003). Empowerment is described as covering a range of actions including “enhancing community access to information and services, ensuring community participation, consciousness raising of people, business and enterprise management skills and gaining control over the utilization of management of natural resources (Pomeroy et al., 1997).Pomeroy et al., (1997) emphasizes the need to empower women and enable them to actively participate in the co-management process. Empowerment is a key theme within the fisheries co-management issues (Jentoft, 2005).

Jentoft, 2005, suggests that “empowerment is what co-management is all about, as it involves bringing previously excluded disenfranchised and sometimes alienated user groups and stakeholders into the management decision making process”. He further defines empowerment as involving “an enabling process, in which individuals and communities can take responsibility and act effectively to safeguard or change their environment” .

Several co-management challenges experienced in African countries are outlined in the literature (Hara 1996; Njaya et al., 1999; Mohammed, 2002). In broader terms, the



challenges described in the literature relate to transparency and accountability, initiation processes, membership, scale, and power struggle issues.

Wilson (2003) argues that community motivations for participation in co-management usually stem from either a desire for the resources that co-management programs, particularly those involving donors and NGOs often provide; and the conflicts that the community needs help resolving because of declining resources, new fishers coming into new areas, the introduction of more intensive techniques, or conflicts over space for gears. In these common cases, conflict provides the motivation for community participation and can mean more active and authentic interest in the programs. Only limited empowerment of the local fishing population can be observed in existing co-management efforts (Hara and Nielsen, 2003).

These studies have exhaustively looked into factors that influence co-management in cases where there are property rights regimes, where partners in co-management may possess quarters in fishery as opposed to open access fishery where the fishery is free for all, as is the case with Lake Victoria. This study addresses this gap by researching factors influencing the BMUs performance in co-management in Lake Victoria which is an open access fishery case.

It is too simple to argue that the top-down implementation of co-management in Africa is attributed to a lack of political will, as the situation is more complex than that. In fact, local co-management groups themselves often place great emphasis on their role as enforcers of government rules. Debates between local committees and government officers about the level of appropriate policing authority are common. Community-based organizations doing enforcement work related to issues including and beyond resource management is hardly an alien model in Africa. On Lake Victoria, for example, beach leaders, political parties and local voluntary crime fighters, all of whom make some rules but who are mainly enforcement groups for wider institutions, are a much more common model of local organization than autonomous resource management groups (Wilson, 2002).

Within the fishing communities are the norms of kinship based on marriage, family (blood) relations and other close relationships. This may affect actions taken to an

individual in case found in fault. Such makes it difficult to report a relative a relative breaking the law or for a BMU executive to sanction an offender who is a relative, as this may be against norms based on kinship on where one is supposed to be the 'brother's protector' (Etiegni, et al.,2016).

Owing to historical background around the lake, most BMUs are composed of members with close family ties, meaning, in many cases families elect their own to office, thus any action against them is viewed as going against them, raising fear that it may reduce their chances of re-election, since they depend on clan members to vote them to office (Opondo, 2011; Etiegni et al., 2016).

The BMUs have specific roles and responsibilities including prohibition of illegal fishing practices, control of fishers migration from one BMU to another, statistical data collection and recording, beach cleanliness and good environmental keeping, banditry and theft reporting and control, which if implemented will ensure sustainable utilization of fisheries resources (Heck et al.,2004). Some BMU institutions have not performed to expectations (Nunan, 2010) assertion that BMUs have failed to control migration of fishers. They have played their roles dismally in various roles including statistical data collection and recording which is a key role in sustainable utilization of fisheries resources as stipulated in the BMU guidelines, 2007. The dismal performance in this particular role has rendered it difficult for the State Department of fisheries to obtain catch data to gain insight on how the fishery is performing. Similarly, dismal performance in prohibition of illegal fishing is of great concern as fishing illegalities have since increased ever since the BMUs were established (Government of Kenya, 2014)

These studies have given background information on the salient links that may affect BMUs performance of their roles mainly kinship and other relationships. The studies also indicate that some BMU institutions are performing well while others are not thus important to determine factors that influence their performance through this study.

### **2.3 Strategies for BMUs performance of co-management roles in sustainable utilization of fisheries resources**

A wide variety of stakeholder groups are involved in fisheries co-management on Lake Victoria (Ogwang et al., 2009). The BMUs, represented by their BMU Committee and Assembly, seem to be superior stakeholders as they include all members of fishing communities at the beaches. The BMU Network committees are established at the respective administrative levels of governance as a strategy to enhance BMU performance as they are able to link with the Fisheries Departmental staff at different levels as well as other players in fisheries sector such as police and judiciary who also play a crucial role in effective fisheries management. They should be trained in fisheries laws and regulations and be made fully aware of the meaning and importance of co-management (Ogwang et al., 2009). The new dimension has been taken in to ensure that fishers and other fish users are involved in fisheries management and the process of decision making in fisheries (Kariuki, 2005). Therefore, the concept of co-management in fisheries resources was adopted as the way forward for sustainable fisheries. In order to affect this, Beach Management Units have been established at all local landing stations to bring on board all stakeholders with interest in fisheries resource management (Ogwang *et al* 2009).

Beach management leadership act as spokes people elected by fishermen and represent them in negotiations and problem solving with other organizations, particularly the Fisheries Department, co-operatives and agents from fish processing factories as a strategy to enable them perform their roles effectively (Pomeroy et. al. 1997).

Active participation of partners is directly related to their sense of ownership and commitment to the co-management arrangements. Partners involved in co-management need to feel that the process not only benefits them, but that they have a strong sense of participation in, commitment to and ownership of the process. External agents working to plan and implement the co-management arrangements must allow the partners to recognize themselves as the owners and directors of the process. Early and continuous participation of partners such as Beach Management Units in planning and

implementation of co-management is related to success and allows them to demonstrate their commitment to the process (Pomeroy et. al. 1997).

The joint undertaking of co-management by a combination of organizations and groups has obvious advantages in increasing the financial, administrative and technical resources necessary for effective implementation. In addition, inter-agency linkages can promote co-management and leads to a stronger foundation for the co-management initiative which can be sustained beyond the implementation period (Segura-Ybanez, 1996).

In fishery resource management, effectiveness and efficiency are enhanced when BMUs link up with each other thereby creating a BMU networking forum for recognizing the user rights of the same fishing ground with the neighboring villages of the same or different ward, Sub-County, County or Region to work together in a manner that will minimize resource use conflict. In Lake Victoria such networks are formed and their functions are to coordinate BMU activities on sustainable management, conservation and protection of fisheries resources in their locality in collaboration with Government for the benefit of present and future generations (Sobo., 2012).

BMU institutions are mandated by regulations to develop their individual co-management plans as well as strategies to fund them. Their management guidelines allow them to develop strategies that deal with poverty reduction within their units to ensure BMU members are empowered to contribute financially to implementation of co-management plans. However they lack skills and expertise to come up with any poverty reduction strategy. Some poverty initiative plans such as revolving funds where fishers lend money to one another have been advanced by fishers themselves and is common among the female than male fishers see also (Onyango, 2004).

The formal savings and credit schemes operated in some landings are extension of Micro Finance Institution and NGOs with no BMUs initiative. The BMUs too have failed in encouraging their members to join this schemes that may benefit most members of the units. The members to these schemes are mainly boat owners, middle class women dealing in dagaa trading and processing and some other business found around the fishing communities (Mlingwa and Luomba, 2011).

Each BMU is required to make its own rules in form of by-laws, which are in line with the Fisheries Act and its Subsidiary Legislations, to govern its internal operations. Such by-laws must be forwarded to the Director of Fisheries for approval before they are put into force. The director of fisheries in collaboration with other arms of the government identifies and establishes BMU area of jurisdiction over a beach. The Authorized officer in collaboration with other stakeholders, designate in respect to each BMU a co-management area which shall be an area in which the BMU shall undertake fisheries management jointly with the Director (Government of Kenya ,2014)

Under the BMU Regulations, BMUs are authorized to levy fees and charges against its members and other users of the beach in respect of services that it provides in connection with the operation and management of the beach and its participation in co-management activities pursuant to regulation 7. Such levies include fees membership payable by all members, annual registration fee for fishing vessels, landing fees for catch, charges for use of BMU facilities and services provided by the BMU, rental fees for buildings , marketing fee payable by persons involved in the trading of fish or grants and donations from donors and the government.

According to BMU regulations,2007, Executive committees of BMUs oversees day to day operation of the BMU and are also responsible for ensuring that the roles and objectives of the BMU are met. The specific roles that the BMU executive committees are supposed to undertake to regulate fisheries and address the poverty include the following; Identify wider development interventions at Village level from the BMU plan and make financial proposals for their support by the BMU, propose by-laws for endorsement by the County Authorities and enforce them, assist in the collection of fisheries data on catch, effort and socio-economic information using agreed formats.

Further the regulations empowers BMUs executive committees to undertake Monitoring, Control and Surveillance in collaboration with the relevant authorities to reduce, and, ensure that harmful and illegal fish trading practices are eliminated from within the jurisdictional area of the BMU, collaborate with the Department of Fisheries, to identify fish breeding areas on the basis of indigenous knowledge and identify and clearly demarcate them as breeding and nursery areas.

The literature above centers on BMUs partnering with other all stakeholders as a strategy employed to ensure sustainable utilization of fisheries resources and mandates of BMU executive committees. However there seems to be limited results of a studies indicating how BMUs are performing in this area. This study will therefore give an idea regarding strategies BMUs employ to ensure sustainable utilization of fisheries resources.

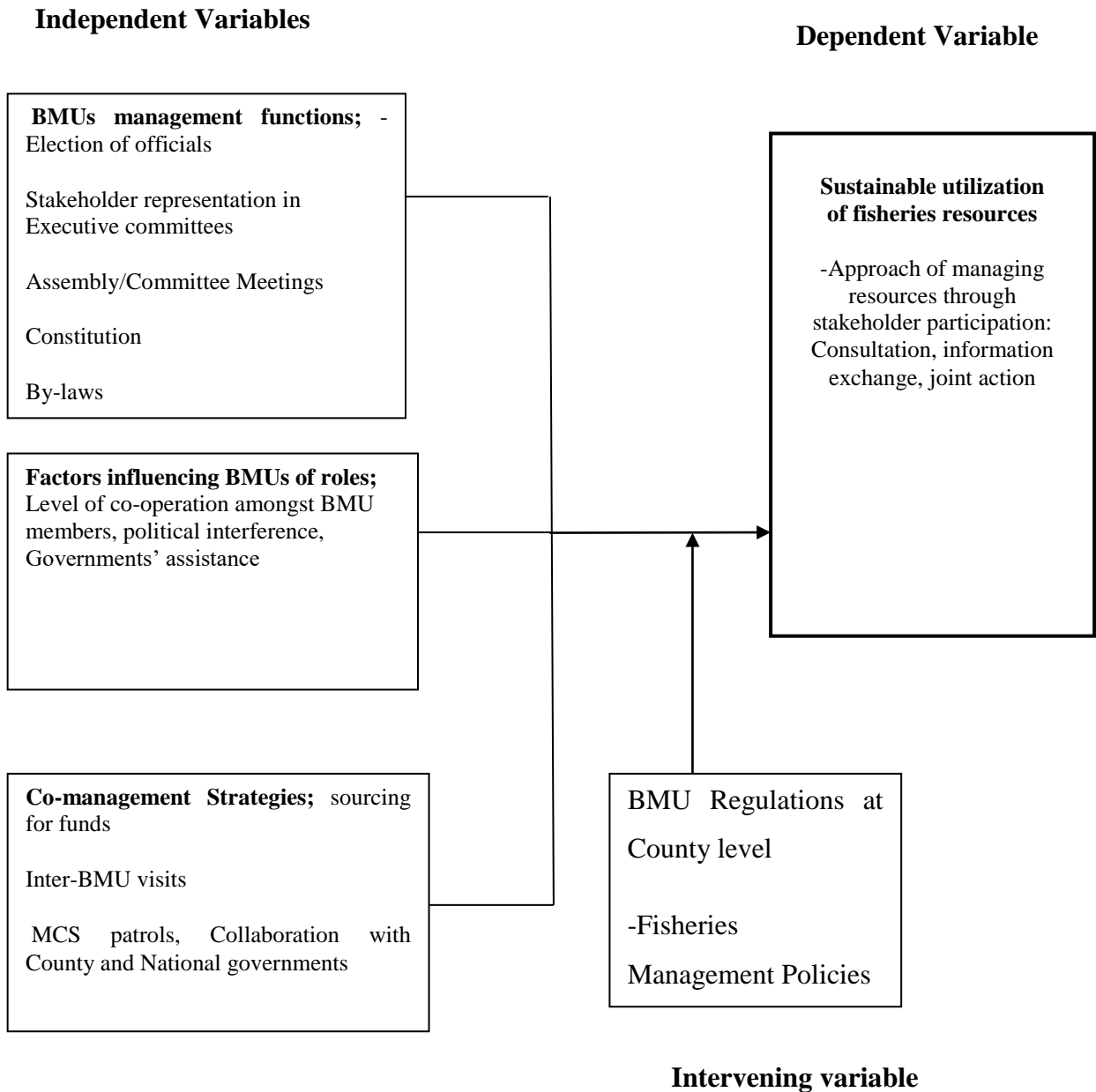
## **2.4 Conceptual framework**

Sustainable utilization of fisheries resources can be achieved through co-management which is a way of managing resources through stakeholder participation. This is enhanced by persistent consultations, information exchange among key stakeholders and joint action. The BMUs are believed to be immediate beneficiaries of the resource as they rely on the resource for their livelihoods. It is therefore important that they participate in prominent roles in fisheries co-management. The BMUs are expected to take lead in developing co-management strategies e.g. sourcing for funds to implement their fisheries management plans, organizing inter-BMU visits to learn from each other, plan for monitoring control and surveillance to control illegal fishing activities, collaborating with County and National Governments in matters of fisheries management.

According to BMU regulations, 2007, the BMUs are supposed to be playing roles such as working with the government for sustainable management of fisheries resources, collection of fisheries information such as daily catches and use the information for planning, formulation of BMU by-laws, rising of funds to help look after the beach and the Lake and apprehending of illegal fishers. However, the BMUs have been found wanting in areas such as sustainable management of the fisheries resources thereby helping reduce illegal fishing in the lake.

Various factors may influence performance of their roles among them being level of co-operation amongst the BMUs assembly, political interference and support from the Central Government. There are however various management functions provided in BMU guidelines which if followed are supposed to enable them play their co-management roles in order to ensure sustainable utilization of fisheries recourses. Such

management functions include having all stakeholders at the BMUs level represented in the Executive Committees of BMUs, election of officials, BMUs Assembly and committee meetings, Possession of BMU constitution among others. All factors regulating the sustainable management of fisheries are regulated by fisheries management policies at the counties, national and regional levels (Figure 2)



**Figure 2: The conceptual framework showing co-management approaches**

**Source; Author, 2015**

## **CHAPTER THREE**

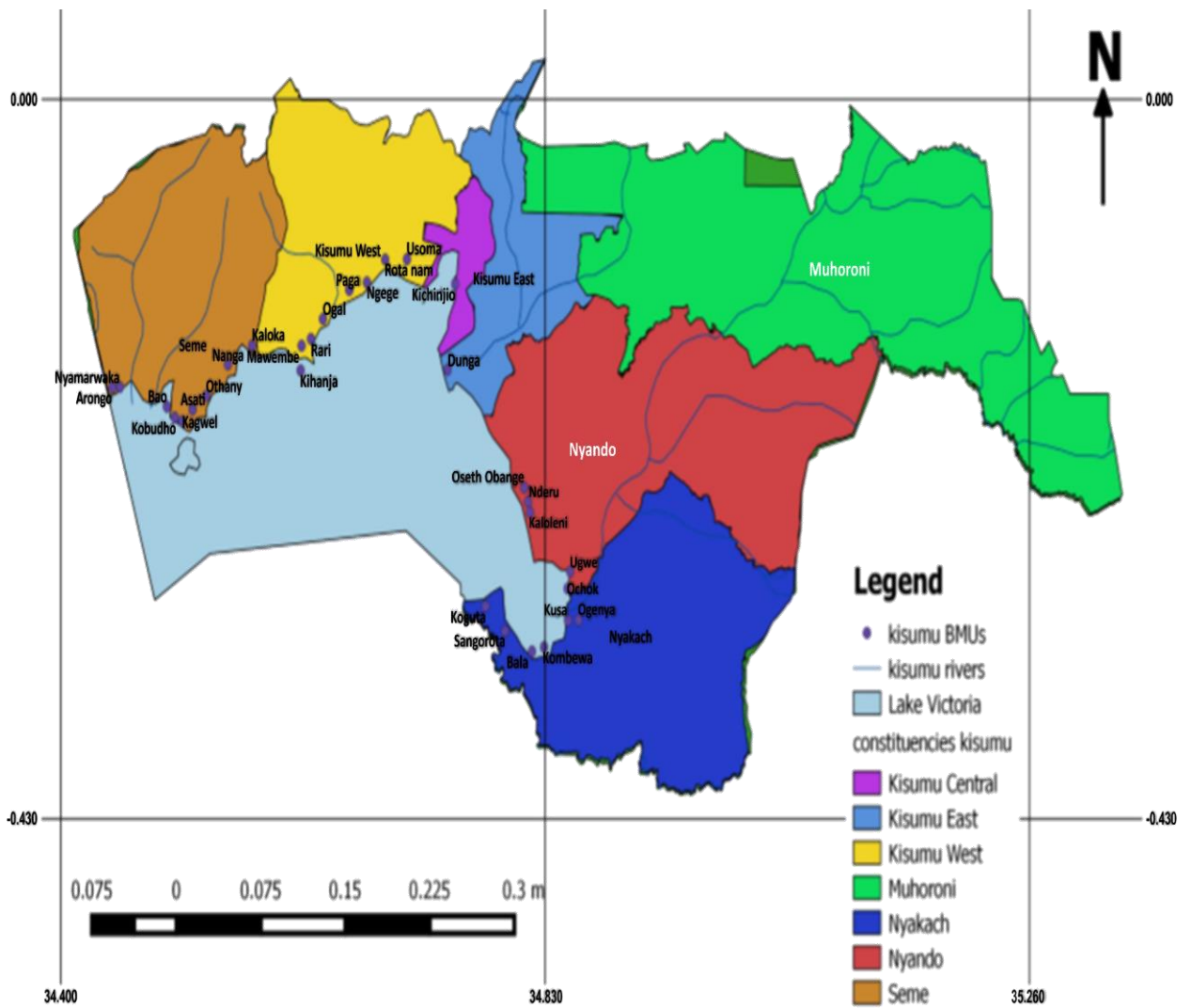
### **3.0 RESEARCH METHODOLOGY**

This section covers the area of study, research design, population and sampling procedures, data collection procedures and the statistical techniques employed to analyze the data.

#### **3.1 Study area description**

Kisumu County is composed of seven sub-counties namely Seme, Kisumu West, Kisumu Central, Kisumu East, Nyando, Muhoroni and Nyakach. Only Kisumu West, Central, East, Nyando and Seme Sub-counties are riparian to Lake Victoria. The County is bordered by Siaya, Nandi, Bomet and Vihiga Counties. The County lies in a down warped part of large lowland surrounding Nyanza Gulf, at the tip of which is Kisumu City. Kisumu County can be divided into three topographical zones namely the Kano plains, the upland area of Nyabondo plateau and the midland areas of Maseno. There are three major rivers flowing into the gulf namely the Nyando, Kibos and Sondu (Figure 3).





Source; State Department of Fisheries, Nairobi, Kenya

Figure 3: Map showing the sub-counties forming Kisumu County and with the BMU study sites

### 3.2 Research design

This study employed a cross-sectional study design to establish how the Beach Management Units playing their roles in co-management of fisheries resources in Kisumu County.

### 3.3 Study population

The study population was the fisher community, comprising of the BMUs assemblies at fish landing sites, fisheries officers, police and Internal Security Administration staff (Chiefs and Sub-chiefs manning the locations and sub-locations) where the BMUs are located. Kisumu County has 31 BMUs with population of BMU assemblies estimated at 6499 individuals engaged in fishing activities i.e. fish traders, fish crews, boat owners, boat repairers and fish processors according to the Kisumu County Lake Victoria BMU vetting reports, conducted in 2014 (Table 1). Each beach was treated as a cluster out of which simple random sampling was used to administer questionnaires

### 3.4 Sampling procedures

According to Yamane (1967), the sample size can be determined by the formula;

$$n = \frac{N}{1 + N(e)^2}$$

Where  $n$  = Sample size

$N$  = Study population

$e$  = Tolerance at desired level of confidence, take 0.05 at 95% confidence level

Thus the sample of the BMU Assemblies (fisher community) shall be;

$$\begin{aligned} n &= 6499 / 1 + (6499) 0.0025 \\ &= 6499 / 17.2475 \\ &= 376 \end{aligned}$$

Also included in the target population were the key informants namely; 8 fisheries officers; 4 police officers and 5 chiefs, all in Kisumu Sub-counties. This will target the Assistant director of fisheries- National Fisheries office; Kisumu, County Director of Fisheries-Kisumu County, the fisheries officers of the riparian Sub-Counties, Chiefs of the riparian locations, OCS of four riparian police divisions and the National BMU Network chairperson. This translated into a sample of 394 individuals to be interviewed. The individuals interviewed at the beaches were identified through cluster random sampling since BMUs are clusters.

The 31 gazetted beaches in Kisumu County were the sampling units for this study while the BMU Assembly individuals, officials and key informants formed the units of analysis. BMUs have varying population; therefore, sample size at each Beach was arrived at using the formula;

$$\frac{\text{Population at the individual Beach} \times 376 \text{ (Sample size)}}{\text{Total BMUs Assembly Population (6499)}}$$

The sample sizes were calculated as in Table (1) below. Purposive sampling was used to obtain a sample of key informants who were mainly drawn from Fisheries department, Internal Security administration staff (Chiefs and Sub-chiefs) and police department (Marine police officers).

*Table 1: Sampling table of distribution of beaches in the Kisumu County*

<b>SUB-COUNTY</b>	<b>NAME OF BMU</b>	<b>POPULATION</b>	<b>SAMPLE SIZE</b>
<b>Kisumu East</b>	Dunga	397	23
	Kichinjio	132	8
	<b>Totals</b>	<b>529</b>	<b>31</b>
<b>Kisumu West</b>	Ogal	206	12
	Mawembe	213	12
	Rari	181	10
	Paga	217	13

	Usari	174	10
	Ngege	203	12
	Usoma	220	13
	Rota	163	9
	<b>Totals</b>	<b>1577</b>	<b>91</b>
<b>Seme</b>	Kaloka	158	9
	Nanga	167	10
	Othany	102	6
	Bao	208	12
	Asat	356	21
	Kiyanja	89	5
	Kagwel	253	15
	Kobudho	217	13
	Arongo	148	9
	Nyamaruaka	288	17
	<b>Total</b>	<b>1986</b>	<b>115</b>
<b>Nyakach</b>	Kusa	117	7
	Kombewa	230	13
	Bala	159	9
	Sango Rota	432	25
	Koguta	397	23
	<b>Total</b>	<b>1335</b>	<b>77</b>
<b>Nyando</b>	Oseth Obange	320	19
	Nduru	270	16
	Kaloleni	72	4
	Ogenya	180	10
	Ugwe	140	8
	Ochok	90	5
	<b>Total</b>	<b>1072</b>	<b>62</b>
<b>Kisumu County</b>	<b>Totals</b>	<b>6499</b>	<b>376</b>

Source: Fisheries Department, Kisumu County

### **3.5 Data Collection**

Both primary and secondary data were collected. Questionnaires, checklists and interview schedules were developed and administered to the targeted population, which included the officials of the BMU Executive committee members, Assembly members, Fisheries department officials, Internal Security Administration staff (Chiefs and Sub-Chiefs) and police department. Interviews were carried out at the beaches and the government offices during the month of May 2014. The study employed separate questionnaires for the BMUs officials, non BMU-officials, Key informants and Focus Group Discussions. The key informants were officials from Fisheries department, Internal Security Administration staff (Chiefs and Sub-Chiefs) and police department staff, which were interviewed by use of pre-determined questions on the different aspects of the roles of BMUs in co-management in order to gather their views about the BMUs performance in their roles as co-managers of fisheries.

#### **3.5.1 Secondary data**

The study relied on secondary data collected from monthly and annual reports by Fisheries Departments in Kisumu County and National fisheries offices as well as annual statistical bulletins prepared by State department of fisheries headquarters. Additional data in this category was gathered from LVFO reports and scientific journals.

#### **3.5.2 Primary data collection instruments**

Data was collected using questionnaires A; For BMU officials only, B; For non- BMU officials and checklist C the Key Informants and guidelines D for Focus Group Discussions respectively(Appendix A,B,C,D). The questionnaires were meant to elicit both qualitative and quantitative data. Where interviewees proved illiterate or semi-illiterate the interviewer read for them the questions and recorded responses. The instruments had both open-ended and closed ended questions, which would yield qualitative and quantitative data respectively.

#### **3.5.3 Pre-testing of the instruments**

This was done to check for proper wording of questions, ambiguity and inappropriate sequencing of questions. The interview checklist was pre-tested on two key informants, while the questionnaire and interview guidelines were pre-tested at 3 of the 31 beaches in Kisumu County namely; Dunga, Kichinjio and Paga BMUs). Those who participated were individual BMU members, fisheries officials and other stakeholders who qualify to participate in the study and were later not included in the actual study.

### **3.5.4 Primary data collection methods**

#### **3.5.4.1 Interview with BMU Assembly**

Data was collected from a sample 376 individuals out of which 93 were BMU officials who responded to questionnaire A while 283 non-BMU officials that responded to questionnaire B. BMU officials (chairpersons and secretaries or treasurer and a member of Executive Committee i.e. three officials per beach for 31 beaches (bringing the total number of officials interviewed to 93), responded to questionnaire A alone because they were expected to have in-depth information on BMUs and co-management.

Data collection exercise was done at the Beach Management Unit (BMU) offices, to enable the interviewers to observe and record information about co-management at the beaches and in the house holds near the sample beaches because not all the interviewees may be at the BMUs offices but their houses nearby. For interviews for ordinary BMU members, BMU registers were used to randomly select the respondents from the general BMU assembly to answer their questionnaire. Names from the BMU register lists for those present were separated between males and females to ensure gender balance, written on small papers, rolled into small 'balls', mixed and put in two bowls, one for males and the other for females to ensure gender balance. Four to twenty-five (4-25) respondents were picked depending on the sample size at the BMU to respond to the questionnaire (Table 1). The researcher read the questions in the questionnaire to the interviewee where necessary, and then recorded the responses and observations.

#### **3.5.4.2 Interviews with key informants**

Interview schedules (Appendix B) were used to collect data from 18 Key Informants who were Police officers involved in lake patrols, Assistant Director of Fisheries in-

charge of Lake Victoria Fisheries activities based at Kisumu Fisheries National office, Riparian Sub-County Fisheries Officers, Lake Riparian Chiefs in Kisumu County and National BMU Network chairperson (Table 2). These individuals were targeted because of their experience in fisheries management in the area. They were believed to have vital information on fisheries management and were helpful in providing a detailed perspective on co-management of fisheries resources in Kisumu County. Moreover, the nature of their roles in the area of study enabled them to have access to information in official domain and which may have escaped scrutiny during household study. The task was achieved by use of interview guides to the 18 key informants.

**Table 2: Key Informants**

Category of target population	Sample population
National BMU Network chairperson	1
Fisheries department Officers (National and County)	8
Police department	4
Internal Security	5
<b>Totals</b>	<b>18</b>

### 3.5.4.3 Focus Group Discussions

For opinions about the objectives of this study, Focus Group Discussions (FGDs) were undertaken within each of the five riparian Sub-Counties namely Nyando, Nyakach, Seme, Kisumu West and Kisumu East bringing about five FGDs. The FGDs were composed of members of sub-county BMU network executive officials and their committee members. The five (5) FGDs was composed of 8 -10 participants each. A set of pre-determined questions on the different aspects of the study objectives were designed and administered to the groups during the interviews.

### 3.6 Data analysis

Data analysis describes related operations which are performed to summarize collected data and organize them in a manner that they answer research questions (Kothari,

2009). Data was edited for completeness and consistency. The qualitative data was coded and classified according to themes for easy analysis then sought to make general statements on how categories or themes of data are related (Gall, Borg, & Gall; 1996). Qualitative data was analyzed using descriptive statistics, including frequencies and percentages. Frequency distribution and percentages were also used to organize and present quantitative data then results presented as narratives.

The analysis involved proper selection of variables based on research questions. The variables were the respondents' knowledge on management structures of BMUs, factors that determine BMUs performance of their roles and strategies employed by BMUs for co-management of fisheries resources. The runs were then set up to produce bar charts and frequency tables. The results were then interpreted based on the objectives of the research. Qualitative data from Focus Group Discussions and Key Informants was analyzed through transcription and content analysis. This was used for in depth understanding of various issues under study.



## **CHAPTER FOUR**

### **4.0 RESULTS AND DISCUSSION**

#### **4.1 Overview**

This chapter focuses on the research data, analyzed according to the objectives of the study and results presented in form of figures and tables.

#### **4.2 Questionnaire response rate**

A total of 376 questionnaires were administered at all the 31 BMUs. 354 questionnaires were returned for analysis yielding a response rate of 94% (261 questionnaires out of target 283 for questionnaire A from non- BMU officials and the 93 for Questionnaire B for BMU officials. This response rate was achieved as a result of proper co-ordination with the field assistants and Beach Management Unit officials and also adequate sensitization of the Beach Management Unit members and the community on the importance and purpose of the study.

#### **4.3 Characteristics of the Respondents**

##### **4.3.1 Gender of the Respondents**

Gender defines the socio-cultural roles, functions and characteristics of men and women as they relate to each other within a specific social and cultural context and shapes people's access to, use of and control over natural resources (Lwenya, et al 2009). The researcher found it necessary to take a look at the issue of gender and its link to co-management. A total of 354 interviewees responded to the question. Of these 283 were male constituting 80 % while the remaining 71 respondents representing 20% were female (Table 3).

**Table 3: Gender proportions of respondents**

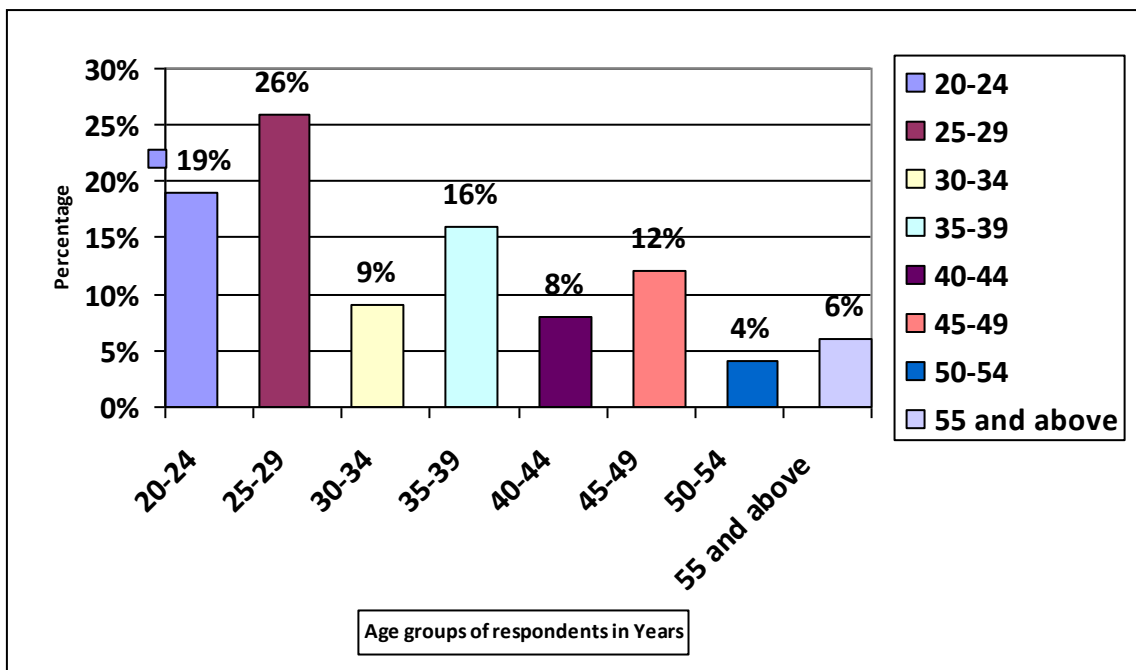
<b>Gender</b>	<b>Frequency</b>	<b>Percentages</b>
Male	283	80
Female	71	20
<b>Totals</b>	<b>354</b>	<b>100</b>

The data shows that most of the BMUs members are males. This is probably so since most fisheries activities are strenuous and done at odd hours thus are undertaken mostly by males, leaving women with light duties such as fish processing and marketing of products. The findings can be compared with those of (Lwenya, *et al*, 2009) who established that in Kenya on average more men than women are involved in fisheries activities along the beaches of Lake Victoria. The fisheries of Lake Victoria are highly characterized by gender with men catching the fish while women dominate post-harvest activities such as fish processing as well as trade. Males are also dominantly employed as boat crew and fish factory agents and transporters of fish (Lwenya et al, 2009). Therefore, the findings are indicative of different roles played by either gender in beaches of Kisumu County.

#### **4.3.2 BMU members by age**

The researcher found it necessary to understand the age distribution of the BMU members in Kisumu County. This is important as it gives age schemes for data analysis in the different categories of BMU members. The BMU members were asked to state their ages which were then categorized as presented in Figure 4 below. Results showed that 19 % of the respondents fell in age group 20- 24 years, 26 % in age group 25-29, 9% in age group 30-34, 16 % fell in age group 35-39, 8 % were in age bracket 40-44, 45-49 were 12 % of the total respondents, while age group 50-54 were 4% and 55 and above were 6 % of all the respondents (Figure 4). These results indicate that the age of the respondents is skewed towards youthful age bracket of 26-35 years, indicating that most youth in the County have nowadays accepted fishing as a source of employment compared to the past data when only old people were engaged in the fishery. The results also show that the mean age of the respondents lies in the age group 35-39 years which

nearly agrees with the research done by Ofula et al., (2007) which showed that the average age of fishers was 36.0 years for men and 35.6 years for female while crew members are relatively young (about 80%) being less than 35 years old and most were school dropouts. This points to the fact that fisheries activities involve intense manual labor demanding engagement of strong youth. Additionally, most BMU assembly members of age group 35-39 are married people with family responsibilities thus are obligated to source for livelihood of their families hence their majority involvement in fishing as source of income.

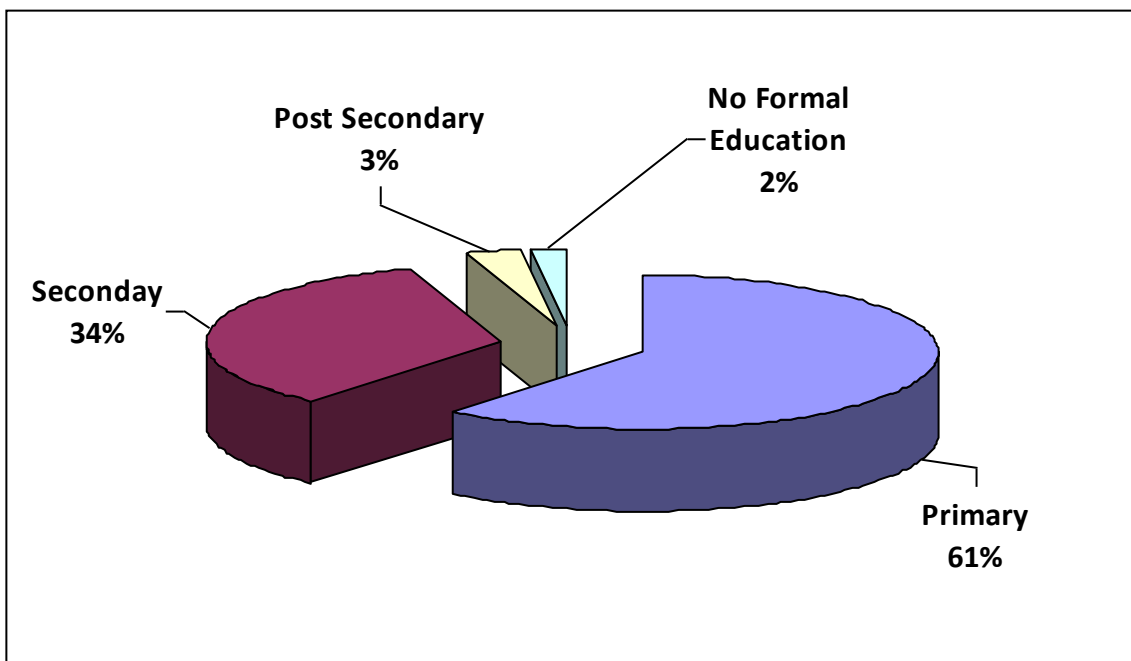


**Figure 4: Age groups of respondents in years**

#### 4.3.3 Education Level of the BMU Members

Since level of education of respondents is important in understanding the uptake of co-management initiatives in conservation of fisheries resources (Ofulla, et. al 2007), the researcher found it necessary to understand the level of education of the BMU members in beaches of Kisumu County so that its influence to co-management can be deduced. The respondents were asked to state their level of education from the choices in the questionnaire and the results were presented below(Figure 5).The results showed that

61% of the respondents had primary education (with more males falling in this category), 34% had secondary education, 3% had post secondary education qualifications and 2 % had no formal education. The results indicate most of BMU members in beaches of Kisumu County have some basic education. This implies that majority of the fishers have some education and are at least able to read and write agreeing with Lwenya *et al*, (2009) whose study findings indicated that most fisher folk, both men and women in the entire lake tended to be poorly-educated, with a high proportion being primary school drop outs, especially amongst women. Their low level of education limits their chances of finding alternative jobs outside the fishing industry. The low level of education reported amongst majority of fishermen may negatively influence BMUs performance of their roles especially uptake of new fisheries management approaches, leading to continued use of illegal fishing methods and eventual depletion of fish stocks (Ogwang et al. (2009)



**Figure 5: Proportions of respondents levels of education**

The respondents who had no formal education were predominantly males. Results further showed that 60% of males had primary level of education while for female it was 69%. For secondary education level the males were, 35% while females in this category were 26%. Most of the respondents with post-secondary education were males. Both men and women tended to be poorly-educated, with a high proportion

being primary school drop outs, especially amongst women (Table 4). The lack of proper education will limit their chances of finding alternative employment outside the fishery. Males with low education are more likely to be employed as a crew member and be absorbed into the fishery while the women would do engage in light fisheries related income earning activities at the fish landing sites. The findings are supported by those of Lwenya et al.,(2009), who noted that most fishermen have low education and take fishing as their main source of income as cannot easily get other jobs that require a higher level of education.

**Table 4: Cross-tabulation between education level and gender of the respondents**

Level of Education	Male		Female		Totals	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
No formal education	8	3	0	0	8	2
Primary education	166	60	51	69	217	61
Secondary education	100	35	19	26	119	34
Post secondary education	6	2	4	5	10	3
<b>Totals</b>	<b>280</b>	<b>100</b>	<b>74</b>	<b>100</b>	<b>354</b>	<b>100</b>

#### 4.3.4 Occupation of the BMU Members

The researcher found it necessary to study the sources of income for the BMU members as provided for in co-management approach in conservation of fisheries resources of Lake Victoria. The respondents were asked to select their occupation from a list of options and the results found were as below (Table 5). Concerning the full occupation of the respondents at the BMUs, 34% indicated that they were fish traders of which majority (90%) were women, fishermen 29%, boat owners 24%, fish processors 8%, boat and net repairers 3% and 2% respectively. Of the boat owners, 75% of them were in the BMUs executive committees. This conforms to the results of the study in Uganda fisheries sector by Odongkara, (2009) which revealed that most members of BMU

Executive committees in Lake Victoria are boat owners, and are held in high respect and authority among fishing communities thus elected as leaders and thus key stakeholders in co-management. Results also indicate that fish traders, an occupation mainly of women are the majority at beaches and are involved mainly in the light duties in fishing industry followed by fishermen, who are engaged in the heavy duty of fishing (Table 5). This disagrees with the findings of the study of Odongkara, (2009) which showed that fishermen are majority at most BMUs along Lake Victoria, implying the cases where fishermen are the minority at BMUs may not necessarily be consistent at BMUs in all counties.

**Table 5: Occupation of respondents**

<b>Occupation</b>	<b>Frequency</b>	<b>Percentages</b>
Fish trader	121	34
Fishermen	101	29
Boat owner	86	24
Fish processor	28	8
Boat builders and repair	10	3
Net repair	8	2
<b>Totals</b>	<b>354</b>	<b>100</b>

Most of the BMU members (82%) engaged in fish processing have secondary level of education, probably due to the fact that it requires some innovativeness which requires a higher level of education above primary. Most fish crews (73%) have primary level of education, and are those who drop out of primary probably due to lack of fees to proceed for secondary of education and find fishing as a source of livelihood and 66% of fish traders have primary school level of education and is an occupation dominated

with females (Table 6). Most of the BMU members with post-secondary level of education were boat owners probably due to the fact that this is a sector that even those employed gainfully elsewhere can invest in.

**Table 6: Cross-tabulation between occupation and education level of respondents**

Occupation	Level of education				Totals
	No formal education	Primary	Secondary	Post Secondary	
<b>Fisherman/crew</b>	3(3%)	74(73%)	24(24%)	0	<b>101(100%)</b>
<b>Fish trader</b>	1(1%)	81(66%)	37(31%)	2(2%)	<b>121(100%)</b>
<b>Boat owner</b>	1(1%)	52(61%)	25(29%)	8(9%)	<b>86(100%)</b>
<b>Fish processor</b>	0(0%)	5(18%)	23(82%)	0(0%)	<b>28(100%)</b>
<b>Boat repairer</b>	1(10%)	2(20%)	7(70%)	0(0%)	<b>10(100%)</b>
<b>Net repairer</b>	2(25%)	3(37.5%)	3(37.5)	0(0)	<b>8(100%)</b>
<b>Total count</b>	<b>8(2.3%)</b>	<b>217(61.3%)</b>	<b>119(33.6%)</b>	<b>10(2.8%)</b>	<b>354(100%)</b>

#### **4.4 Evaluation of management functions of BMUs as co-management partners of the Lake Victoria fisheries resources**

BMUs Executive Committees are expected to have 9-15 members democratically elected by a BMU Assembly and should consist of a Chairperson, Vice Chairperson, Secretary, deputy secretary and Treasurer, plus any other post defined by the BMU by-laws. Sub-committees are to be headed by members of the BMU Executive Committee and may be formed as need arises and depending on the by-laws of a BMU. The representation to the Executive Committee should be as close as possible to the following distribution: 30% boat owners;30% crew (fishing laborers who do not own boats);30% other stakeholder groups (including fish processors, boat makers, local gear makers or repairers, fishing equipment dealers, managers, and chatterers); 10% fish mongers/traders (Government of Kenya,2007).

The second objective sought to evaluate the status of BMUs management functions as spelt out in BMU guidelines, 2007, to determine their level of compliance to the guidelines and by-laws. The State Department of Fisheries for instance only recognizes BMUs registered by either Social services or Fisheries Department. With respect to this, the respondents were asked if their BMU is registered with State Department of Fisheries or Social services and results were summarized as in the table 7 below. All the BMUs (31) where interviews were carried out were registered with Ministry of Fisheries Development between 1997 and 2011, i.e. none with social services, with most registered in the years 2007 and 2008 (Table 7). This implies that all BMUs in Kisumu County are complaint with the law concerning registration of BMUs with the Government before operation and can therefore effectively partner with State Department of Fisheries as are able to communicate from time to time to ensure sustainable utilization of fisheries resources.

**Table 7: Table showing year BMUs were registered**

<b>Year BMU Registered</b>	<b>Frequency</b>	<b>Percent</b>
1997	1	3
2000	1	3
2005	1	3
2006	3	10
2007	14	45
2008	8	26
2011	3	10
<b>Total</b>	<b>31</b>	<b>100</b>



These results mirror observations by Ogwang et al., (2009) that all the BMUs in Kenya are in legal existence and compliant with the BMU regulations, thus recognized co-management partners and if properly natured can work together with the government in ensuring the runaway sustainable utilization of fisheries resources in Lake Victoria.

The respondents were also asked whether their BMUs have elected officials, have a constitution in place and whether they have regular meetings as a BMU Assembly as stipulated in the BMU guidelines with proof of kept minutes as stipulated in the BMUs regulations, 2007. The results indicated majority (87%) are compliant with this regulation, thus had elected officials in place, implying that officials in most of the BMUs are legally in their offices as per Beach Management Unit Regulations, (2007) and have the mandate of the members who are ready to be led, implying they are likely to co-operate and work together with their elected leaders to willingly deliver in the various co-management activities.

The results tally with observations by Ogwang et al, (2009) and Lake Victoria Fisheries Organization, (2007) that electing officials democratically is embraced by most BMUs in Lake Victoria and are recommended because it promotes a sense of ownership and a greater willingness to comply with BMU regulations, a tenet that ensures sustainable use of fisheries resources. This further confirms that majority of BMUs have complied with the BMU regulation.

The regulations spell out that a BMU set up should have 9 - 15 elected officials forming the Executive Committee depending on the size of the BMU (Lake Victoria Fisheries Organization, 2007). According to the results 13% of BMUs have committee members of 9 officials, 22% 10 officials, 39% 11 officials, 9% 12 officials and 17% of the were composed of 13 officials. However, there were no BMUs with 14 and 15 officials in their Executive Committees (Table 8). Most of the BMUs in the area of study are relatively small in membership probably due to their minimal landings at the beaches in Kisumu County (Table 1), thus with no committees' membership of 14 and 15 members. The results show that the BMUs have complied with this section of the regulations by having the membership of executive committees' commensurate with the population of the BMUs.

The findings are in compliance with BMU guidelines which spell out that the size of the Executive Committee should depend on the population at the landing site which in turn depends on tonnage of fish harvest or landings at that particular beach (Lake Victoria Fisheries Organization, 2007).

**Table 8: Number of Executive Committee members forming the BMUs**

<b>Number of Executive Committee members at BMU</b>	<b>Frequency</b>	<b>%</b>
9	3	10
10	7	23
11	9	29
12	4	13
13	8	26
14	0	0
15	0	0
<b>Totals</b>	<b>31</b>	<b>100</b>

The respondents were also asked if their Executive Committees consist of all positions; Chairperson, Vice Chairperson, Secretary, deputy secretary and Treasurer, plus any other post defined by the BMU by-laws. The results indicated that all BMUs have officials to carry out their mandate. This is an ingredient that ensures proper management of fisheries resources as also noted by Ogwang et al, (2009) and Lake Victoria Fisheries Organization, (2007).

Concerning whether BMUs have a constitution in place or not, all the 93 BMU officials (100%) interviewed confirmed having and being governed by a constitution. Similarly, all the BMUs interviewed (100%) had by-laws guiding their day to day operations at

the BMUs. This result confirms that the management of the beaches is being guided by rules and regulations developed by the BMU assemblies as required of them by the Fisheries (BMU) regulations, 2007.

The regulations also require that the BMU Assembly be held at least once every three months or more frequently as may be specified in the by-laws. Additional meetings of the beach management unit members may be called by Executive Committee when necessary. In this regard, all BMUs reported to be having regular meetings with BMU Assembly. Concerning how regular meetings are held, 2 out of 31 (7%), indicated have weekly meetings, 12 (38%) monthly, 13 (42%) held quarterly meetings and only 4 (13%) held no meetings (Table 9). Results show that most BMUs committees hold their meetings quarterly. The outcome is a show of 87% compliance to the BMUs regulations, with 13% not compliant implying most BMUs commonly use meetings as one of their basic comanagement approach.

This result closely agrees with Odongkara et al.,(2009), research results on BMU s in Uganda which indicated that majority of BMUs are compliant to BMUs regulations, holding Committee meetings regularly, with a frequency ranging from 2 weeks to 2 months meaning most BMUs in Lake Victoria use meetings as one of their management tools.

**Table 9: Frequency of holding BMU meetings**

<b>Duration</b>	<b>Frequency</b>	<b>Percentages</b>
Weekly	2	7
Monthly	12	38
Quarterly	13	42
None above	4	13
<b>Total</b>	<b>31</b>	<b>100.0</b>

The BMU regulations also require that minutes for every meeting are recorded and kept. Results concerning keeping minutes as a proof of meetings held indicated that (95.7%) write and keep minutes for every meeting held. This implies that to a large extent comply with BMU guidelines because majority of the BMUs meet, deliberate make decisions concerning fisheries management as well as other BMU issues and keep minutes of deliberations for future follow up and action, thus compliant with regulations.

This finding is corroborated by views resulting from studies by Ogwang et al., (2009) and Odongkara et al., (2009) that most BMUs use meetings as important tools for collective decision making in participatory management and agrees with co-management principles of democracy, transparency and accountability that is instrumental in proper fisheries management and which was the basis for BMUs regulations.

In cases where the BMUs responded as having elected officials, they were asked if they followed the laid down procedures in the BMU guidelines, especially in the representation of the Executive Committee members, which is 30% boat owners, 30% crew (fishing laborers who don't own boats), 30% other stakeholders groups (including fish processors, local gear makers, fishing equipment dealers, managers and charters), 10% fish mongers/traders and not less than three members of Executive Committee should be women. The results as indicated below shows that majority of the BMUs are in conformity with this regulation.

As to whether BMU Executive Committee has 30% boat owners' representation, results showed that (87%) have the 30% representation in their Executive Committees. This implies that majority of the BMUs in Kisumu County comply with the BMU regulations, (2007) stated in the Kenya Legal Notice 402 (2007).

The finding agrees with those of Ogwang et al, (2009), majority of BMUs leadership are in compliance with BMU regulations with a wide variety of stakeholder groups including boat owners who are involved in fisheries co-management on Lake Victoria and represented by their BMU Committee and Assemblies of fishing communities at the fish landing sites.

Regarding BMU Executive Committees having 30% boat crews' representation, results showed that majority (91.7%) BMUs have the 30% representation in their Executive Committees. The finding implies that majority of the BMUs comply with BMUs regulations and concurs with the views of Pinkerton and Weinstein, (1995) and Pinkerton, (1992,1993) that because fishers' knowledge can provide a valuable set of information about the characteristics of tools and techniques that can lead to a more sustainable pattern of resource use, most co-management arrangements don't ignore their participation in decision making.

Concerning whether BMU Executive Committee has 30% other stakeholders' representation, results showed that (96%) have the 30% representation in their Executive Committees. This results indicate that majority of the BMUs involve other stakeholders in the fishing industry in the fisheries management process. These finding shows that there is compliance of this regulation and supported by views of Mikalsen et al., (2001) that most natural resources co-management arrangements are and should be managed through institutional arrangements that take all stakeholders interest into account.

As for BMU Executive Committee having not less than three women representation, results showed that majority of interviewed BMUs (96%) have at least 3 women representation in their Executive Committees. This depicts that most of the BMUs have their management in line with the BMU regulations and have recognized the role of women in fisheries management. These results are supported by the findings of Brown and Switzer, (1992) and Merchant, (1995) that because women play an important role in fisheries resource management in view of their different skills, knowledge and experience compared with men and being more concerned with environmental issues and are more likely to join environmental groups compared with men, most co-management arrangements ensure they are involved in fisheries management process.

As for BMU Executive Committee having 10% fish mongers' representation, results indicated that (91%) have the 10% representation in their Executive Committees. This implies that the section of the regulation is complied with by majority of BMUs and findings are corroborated by those of Medard, (2000) from a study in Tanzania that

revealed that partners in co-management process mostly include fish traders among other interested parties that exploit the Lake Victoria fishery to ensure sustainable utilization of fisheries resources.

Responses from non-BMUs officials concerning whether BMU Executive Committee members is composed of 30% Boat Owners, 30% other stakeholders, 10% Fish Mongers /Traders and not less than 3 members of BMU assembly being women reveals that 67% agree to a large extent they BMUs are complying, 16 % to a small extent, 17% indicated there is no compliance to the regulation at all. This implies that the BMUs non-officials concur with the results above that majority of the BMUs have complied with the BMU regulation that ensures representation of all stakeholders in the BMUs executive committees to ensure management of the fishery is based on contribution by all stakeholders.

Key informant's interviews, particularly chiefs and fisheries officers, concurred with the results that majority of BMUs have management structures in place to help them play their roles effectively. Such structures include having all the stakeholders represented in the BMU Committees, holding meetings regularly and taking minutes whenever such meetings are held and ensuring that at least three women are represented in the Executive Committees.

Results from the FGDs agree with those of Key Informants. A Sub-County BMU Network chairman justified the existence of various management functions as useful in ensuring BMUs manage fisheries resources, stating;

*“Most BMUs have working management structures in place that enables them participate in co-management of fisheries resources; they have elected officials whose terms lasts for five years and may be re-elected by their respective assemblies; they all have constitutions and by-laws that guide their day to day activities; most of the BMUs Executive committees meet regularly especially whenever issues arise that require urgent decision making; However in most meetings minutes are not recorded”.*

#### **4.5 Factors influencing BMUs performance of roles in sustainable utilization of fisheries resources**

Among the roles and responsibilities expected of the BMUs which if implemented will ensure sustainable utilization of fisheries resources are prohibition of illegal fishing practices, control of fishers migration from one BMU to another, statistical data collection and recording, beach cleanliness and good environmental keeping, banditry and theft reporting and control, (Heck et al.,2004; Government of Kenya,2007).

When BMU officials were asked whether they know their roles as stipulated in the BMU guidelines, 2007 and whether they have accessed the guidelines, 81% indicated positively while 19% responded they don't know their roles and have not read the BMU Guidelines. This confirms that the finding of (Lwenya,2009), that since the establishment of BMUs in 2006, there has been continued sensitization by State Department of Fisheries concerning BMUs rules and regulations among the fisher community. This is probably the reason why majority of BMUs officials know their roles as leaders of BMUs.

Some BMUs continue playing their roles stipulated in the BMU guidelines, dismally notably statistical data collection and prohibition of illegal fishing (Government of Kenya, 2014) .When the BMUs officials were asked to give reasons were asked to give reasons for their dismal performance, responses were as follows.

Sixteen (16) out of 93 respondents (17%) indicated their reason for dismal performance being lack of government support in terms of extension service and other requisite trainings. This implies that majority of the respondents didn't identify this reason as a salient issue making BMUs to perform dismally in their roles but rather other issues. It also implies that the State Department for fisheries could be providing extension services and relevant trainings.

Only 36 out of 93 (39%) of the BMU officials interviewed gave reason for their dismal performance as lack of sufficient funds for implementation of co-management plans while the remaining 57 (61%) responded that this is not the reason. The result indicates

that lack of funds for implementation of planned comanagement actions is not the reason for dismal performance as evidenced by majority not siting with the reason.

Lack of commitment on the side of BMUs members was cited by majority 81 (91%) of the BMUs as being the reason for dismal participation in co-management. Similarly a majority, 72 out 93 (70%)) indicated that lack of co-operation amongst BMU officials contributes to dismal participation in co-management. The finding implies that BMUs are not performing as expected firstly as a result of lack of commitment among the BMU assembly to play their stipulated roles and secondly lack of co-operation among the executive committee members.

Inadequate capacity building was cited by only 21 out of 93 (23%) BMU has reason for dismal performance in co-management (Table 10) .This implies most units feel they have been adequately capacity built by the various stakeholders in the sector.

**Table 10: Suggested reasons for BMUs dismal participation in co-management**

<b>Reasons for dismal performance in co-management</b>	<b>Frequency (out of 93)</b>	<b>Percentages (%)</b>
Lack of government support (extension services)	16	17
Lack of funds to implement co-management plans	36	39
Lack of commitment by BMU members to implement plans	85	91
Political interference	28	30
Lack of co-operation amongst BMU officials	65	70
Lack of appropriate trainings/ capacity building	21	23

Political interference was cited by 28 out of 93 (30%) of the respondents implying that though an enabling political environment should be created to allow partners in co-



management exercise their powers and authorities over the management of fisheries resources through decentralized systems such as BMUs, it is not responsible for poor performance of BMUs. This is a departure from reports that political interference especially has a strong influence on BMUs performance of their roles (Government of Kenya, 2014).

This finding is corroborated by those of Njaya,(2002), indicating that political interference and lack of capacity building are not the main reasons for dismal performance of BMUs in their roles as but other factors such as lack of co-operation and goodwill from BMU members themselves specifically regarding performance of co-management roles at respective BMUs.

Similarly, when the BMUs assembly (non-officials) were asked to comment on whether the BMUs are performing their roles, overwhelming majority 183 out of 261 (70%) positively while (57) 22 % indicated No and 21 (8 %) were not sure. This response shows that most BMU assembly members believe their officials in the various BMUs are performing as expected. This however is not reflected in improved abundance in fisheries resources as depicted by production over years, as harvest has been declining over years. From (Table 11) below it can be deduced that total catches have gradually reduced from 11661 Metric tons in 2006 at the time around which the BMUs were established to 5556 Metric tons in 2014. Probably if the BMUs were playing their roles effectively, the situation could have been improving as is perceived that the reason why BMUs were introduced was to ensure sustainable utilization of fisheries resources in Lake Victoria.

**Table 11: Kisumu County Lake Victoria Fish catches data in (Metric tonnes) 2006-2014**

<b>Species/Year</b>	2006	2007	2008	2009	2010	2011	2012	2013	2014
L.niloticus	4964	1891	1797	1687	366	1081	963	992	786
R.argentea	4243	4022	3821	2398	984	1797	1360	1650	1786
O.niloticus	1397	2352	2232	1240	256	152	899	1058	1172

Clarias	300	263	250	436	211	927	862	851	875
Protopterus	315	781	552	257	113	418	291	384	326
Haplochromis	334	1071	1018	344		12	97	25	125
Bargus	3			70					
Others	105	211	316	106	137	411	420	59	487
<b>TOTAL</b>	<b>11661</b>	<b>12598</b>	<b>9986</b>	<b>6538</b>	<b>2067</b>	<b>5798</b>	<b>4892</b>	<b>5550</b>	<b>5556</b>

**Source; State Department of Fisheries Bulletins, 2006-2014**

The results closely agree with those of the key informants and Focus Group Discussions who reported that although most of the BMUs are playing their roles effectively especially in conflict resolution at their BMU level and also help the central government combat piracy in the lake by having security teams that organize patrols regularly within the BMUs areas of jurisdiction, daily landings of fish have continued dropping. They attributed their dismal performance to lack of financial support to implement their planned activities and low commitment amongst BMU officials and general assembly to ensuring fisheries resources is properly managed.

Respondents were also asked if State Department of Fisheries provides technical support for co-management to thrive or not. In response to this 73 (78%) of the BMU officials responded positively while the remaining 20 (22%) disagreed. This implies that among most BMUs, the government offers support required to accomplish their co-management roles. The findings agree with those of Musiega, (2011) on co-management in Mbita Sub-county which state that the government works together with BMUs to ensure co-management is strengthened.

For those who responded that Fisheries Department/Government give technical support, they were asked to state the specified areas they were being supported. Fifty-seven (77) out of 93 (83%) indicated that they receive support in form of extension service while the remaining 17% indicated they do not. Majority of BMUs receive technical support (extension services) provided by Government officers in the various offices in the area of their jurisdiction. However the officers are few and therefore may not be adequately rendering their services to all BMUs (Government of Kenya, 2014)

Seventy percent (70 %) of the respondents agreed that the government involves them in decision making processes concerning fisheries management matters as 30% disagreed. The finding implies that often the County and National fisheries offices in the various counties work closely with BMUs in the spirit of co-management of fisheries resources (Government of Kenya, 2012).

For those who indicated lack of necessary support they were asked to specify what fisheries department should do to enable them be better co-managers and responses were summarized as need for provision of financial resources that would enable BMUs to carry out their fisheries conservation mandates (90%), involving them in decision making during the process of developing legislations that affect them (70%), BMU leaders to be paid salaries (85%), capacity building in areas of organizational development and Monitoring control and surveillance . This implies that a number of BMUs in Kisumu county still require nurturing by the government for them to discharge their duties effectively and are not ready to give voluntary support for the success of co-management. This agrees with the research findings of Imende *et al*, (2005) that most BMUs are still on the path to embrace the principle of co-management thus need for continuous mentoring and close collaboration with other stakeholders.

The findings concur with the comments of all the key informants and Focus Group Discussions who noted that BMUs still require support from the National and County governments particularly in capacity building of newly elected BMU officials in areas such as fisheries and financial management. This is so due to re-election of new BMU officials from time to time who require retraining and orientation.

A key informant stated;

*“BMUs are like young babies that still require ‘baby-sitting’ by both national and county governments; they need nurturing and mentoring programs especially for new officials that keep coming in.”*

This finding of the Key informants agree with those of Ogwang et al., (2009) who noted that because BMU Committees change offices every after five years or when

need arises, the new officials need to be oriented on matters of financial and fisheries management for their effective performance. Lack of continued support to BMUs may be the reason for their dismal performance as evidenced by continued use of illegal gears. The various types of gears namely Gill nets < 5", Mosquito nets < 8-10 mm, Beach seines, Monofilament nets are considered illegal and their use responsible for the decline of fisheries in lake Victoria. Since 2006, the use of Gill nets < 5", Beach seines and monofilaments have increased implying little is being done to eradicate them (Table 12).

**Table 12: Illegal fishing gears in Kisumu County**

Type of fishing gear	Frame Survey reports				
	2006	2008	2010	2012	2014
Gill nets < 5"	8610	20827	11787	13064	11813
Mosquito nets < 8-10 mm	139	100	147	15	16
Beach seines	27	17	43	111	172
Monofilament nets	-	9	7	103	16

**Source: LVFO, 2006-2014**

#### **4.6 Strategies employed by the BMUs to play their roles in the co-management of the fisheries resources**

BMU institutions are mandated by their regulations to develop their individual co-management plans as well as strategies to fund them. Each BMU is required to make its own rules in form of by-laws, which are in line with the Fisheries Act and its Subsidiary Legislations, to govern its internal operations.

When BMU officials were asked to comment on the strategies employed by BMUs to improve on their effectiveness in co-management of fisheries resources, over 57% in each case reported they have established effective patrol teams, source resources from donors to operate activities planned, organize for BMU inter-visits to learn from each

and collaborate with Fisheries department in providing intelligence that help reduce illegal fishing (Table 13).

Results indicate that establishing patrol teams and working closely with Fisheries Department to reduce the illegal fishing activities are most popular strategies practiced by most BMUs. This probably due to the fact the fisheries resources are on decline and the perceived main reason for this is rampant use of unregulated gears (Government of Kenya, 2014). If these results are anything to go by, it is expected that fisheries stocks can recover. Similarly organizing visits to best performing BMUs and sourcing for funds from donors to implement co-management plans goes on in majority of BMUs. Visits by BMUs leadership to best performing colleagues BMUs are useful as it enhances exchange of best practices information for sustainable fisheries management.

Generally, results show that most BMUs have developed various strategies in an effort to sustainably manage the fisheries resources they depend on. The findings are upheld by research findings of Medard, (2000) that indicated that most BMUs in Lake Victoria have developed strategies that help them perform their intended roles of co-management.

**Table 13: Responses on the strategies of BMUs to co-manage fisheries resources**

<b>BMUs strategies for co-management implementation</b>	<b>Frequency</b>			<b>%</b>
	<b>Yes</b>	<b>No</b>	<b>(Yes/No)</b>	
Establishing patrol teams to reduce the illegal fishing activities	Yes	69	74	
	No	24	16	
Sourcing funds from donors to operate activities planned	Yes	53	57	
	No	40	43	
Organizing inter-BMU-visits	Yes	53	57	
	No	40	43	

Working closely with Fisheries Dept to reduce illegal fishing	Yes	61	65
	No	32	35

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Under the BMU Regulations, BMUs are authorized to source for financial resources in respect of services that it provides in connection with the operation and management of the beach and its participation in co-management activities. In connection with this, respondents were also asked to state how they plan to mobilize resources to ensure their strategies are implemented.

In response to this (57%) of BMUs interviewed indicated they use revenues generated at Beaches to implement some of their strategies. Results showed that no BMU Committee requests for financial support from the government as a means of sourcing for finances to implement their strategies. Respondents writing proposals as a means of seeking for funds from Constituency Development Fund and Local Authority Transfer Fund is done by (87%), while (91%) source for funds from International and Local donors (Table 14). The fact that no BMU requests for financial support from the government but rather from international and local donors probably means that the latter presents more incentives to co-management than the government or the both the National and County governments have no provisions for funding fisheries activities, a fact that the BMUs are aware of thus don't bother to the requests. The results agree with research by Wilson (2003) that community motivations for participation in co-management may stem from a desire for the resources that co-management programs, particularly those involving donors and NGOS often provide.

Concerning whether the entire BMU Assembly is involved in making decisions as a strategy to co-manage fisheries resources, 152 of the non-BMU officials interviewed (56%) responded Yes while the remaining 119 (44%) responded with a No, implying more than half of the BMUs are allowed by stakeholders to play roles in fisheries management decisions, a spirit that enhances sustainable utilization of fisheries resources.

**Table 14: Methods of resource mobilization by BMUs**

<b>Methods of resource mobilization</b>	<b>Frequency</b>		<b>%</b>
	<b>(Yes/No)</b>		
BMU revenues	Yes	53	57
	No	47	43
Seeking financial support from State Department for Fisheries	Yes	0	0
	No	93	100
CDF/ County through proposal writing	Yes	81	87
	No	12	13
Seek for funding from foreign and local donors	Yes	85	91
	No	8	9

Thirty-nine (39) out of 93 (42%) respondents indicated would help reverse the trend of increasing number of illegal fishers if the government left BMUs as major co-managers of the fisheries resources, while the remaining (58%) declined. This implies that majority of the respondents probably believe that they don't have the capacity to counter increasing trend in illegal fishing activities in the lake.

Those who agreed gave some of the strategies they would employ as sensitization of fishers at the BMUs on the need to demarcate and protect breeding areas, stop fishing in breeding areas, controlling of illegalities each individual BMUs carrying out persistent patrols in the lake, networking with other stakeholders and ensuring all fishers abide by fisheries regulations as stipulated in the fisheries act and BMUs guidelines, 2007. The responses of the study are in line with Beach Management Units regulations, (2007) which encourages sharing the responsibility of managing Lake resources between BMUs and Fisheries Department as reported by Ogwang *et al.*, (2006).

Those who declined gave reasons as lack of sufficient financial resources to carry out BMU functions, lake of co-operation by BMUs to fight illegal fishing, BMU officials protecting some illegal fishers so that they may have longer terms in office or are relatives and inability to deal with trans-boundary issues e.g. conflicts among BMUs and fishers require only the Government to act. This result further confirms the need for

the government to continue mentoring and capacity building BMUs for them to effectively deliver on their co-management mandate. The finding is supported by the recommendations in Ogwang et al., (2009) that continuous capacity building and mentoring for BMUs is a vital for them to be useful entities in co-management.

Results of key informants' interviews concurred with findings of this study in so far as strategies employed by the BMUs to effectively play their roles are concerned. A Chief confirmed this stating:

*“I have been linking them to donors such as Plan international, who support them through proposals in putting up toilet facilities to ensure proper hygiene is observed at the landing sites, which is one of key roles of BMU Committees.”*

Fisheries officers and marine police staff also confirmed they organize and mount patrols with full participation of BMU Committees that in most cases provide intelligence information on where the illegal gears may be in operation in the lake and their owners.

Marine police staff commented:

*“Through BMUs we get to know who has the illegal fishing gears and where they keep them. This is important intelligence information we need during the planning stage of a lake patrol”*

FGDs findings affirmed that all Local NGOs in Lake Victoria region require well prepared proposals before they fund the BMUs activities and most BMUs rely on the NGOs, CBOs and Constituency Development Funds as a strategy to enable them participate in co-management of fisheries resources as the National and County Governments rarely support their development initiatives. Lake Victoria Environment Management Programme II (LVEMP II) was reported by all the FGDs as the most outstanding development partner of the BMUs; supporting putting up of infrastructure such are Fish Banda and rehabilitation of wetlands.



The national BMU chairman stated:

*'LVEMP II, Kenya, has done a lot for this lake; they have facilitated many BMUs to implement various micro-projects e.g. reclamation of wetlands'*

## CHAPTER FIVE

### 5.0 SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Overview

This section presents a consolidated summary of all findings, relevant conclusions, study recommendations and suggestions for further investigations.

#### 5.2 Summary of findings

The data in chapter four enabled the researcher to assess the role of BMUs as a partner in co-management of fisheries resources in Kisumu County. The study sought to evaluate the management functions of BMUs as co-management partners in sustainable utilization of Lake Victoria fisheries resources, establish factors that influence BMUs performance in their roles in sustainable utilization of Lake Victoria fisheries resources as well as examine strategies employed by the BMUs to play their co-management roles.

Regarding the evaluation of management functions of BMUs as co-management partners of Lake Victoria fisheries resources, the study found that all BMUs in Kisumu County have constitutions and are registered under Fisheries ACT Cap 378 of the laws of Kenya, have elected officials with BMUs executive committees constituted according to the sizes of the BMUs. All BMUs hold regular meetings with their BMU Assemblies, majority holding their quarterly meetings as per the BMU regulations, (2007) and keeping minutes. The study also found that majority of BMUs Executive committees are properly constituted with 30% boat owners, 30% boat crews' 30% other stakeholders in the fisheries sector and 10% fish mongers' representation requirement in Executive Committee and with at least 3 women representation in their Executive Committees.

As for objective on factors influencing BMUs performance in their roles in sustainable utilization of Lake Victoria fisheries resources, the study found that majority of BMUs know their roles as stipulated in the BMU guidelines, 2007 and are able to access them. More than half of the BMUs play their roles effectively and those not playing their roles effectively gave limitations for their dismal performance to be lack of government

support in terms of extension service and other training, insufficient funds for implementation of co-management plans, lack of commitment amongst and co-operation amongst BMU officials as well as members towards playing their co-management roles and political interference.

The study also found that State Department of fisheries gives technical support to BMUs for co-management to thrive through extension service rendering and response towards reports on illegal fishing in the lake though on a limited scale. Many BMUs indicated they are usually involved in decision making concerning fisheries management through invitations for crucial meetings and workshops.

Concerning strategies BMUs employ to play their co-management roles in sustainable utilization of fisheries resources, results indicate that establishing patrol teams and working closely with Fisheries Department to reduce the illegal fishing activities are most popular strategies practiced by most BMUs. Similarly organizing visits to best performing BMUs and sourcing for funds from donors to implement co-management plans goes on in majority of BMUs.

Regarding BMUs plans for mobilization of resources for implementation of their strategies, the study found that majority of the BMUs use the revenues they generate, write proposals seeking for funds from respective CDFs as well as international and local donors and grants from Government projects and programs notably LVEMP II.

### **5.3 Conclusions**

From the study, the conclusions based on findings were drawn. As proven by past studies and based on the findings of the study, it can be concluded that co-management as a strategy for fisheries resources' conservation has a high potential in strengthening fisheries resource management. Arising from the study objectives the following conclusions can be drawn.

1. Arising from evaluation of the management functions of the BMUs as stipulated in the BMUs regulations, majority of the BMUs in Kisumu County are compliant in terms of existence as per the BMU Fisheries regulations, 2007.

2. Majority of the BMUs in Kisumu County knows and plays their roles effectively as per the laid down regulations. However, lack of commitment among BMU members and co-operation amongst BMU officials are the major reasons for dismal performance of most BMUs in their co-management roles.

3. Establishment of effective lake patrol teams to curb illegal fishing, sourcing for resources to operate activities planned through writing proposals to Local and international donors as well as LATF and CDF offices, organizing BMU exchange visits as well as working closely with the Fisheries Department are popular strategies of the BMUs in the co-management of fisheries resources in Kisumu County.

#### **5.4 Recommendations**

The following recommendations regarding both policy making and for further research were put forward.

In line with the findings and conclusion of the study, the following policy recommendations were made for action in relation to strengthening the role of BMUs in co-management of fisheries resources; the State Department of Fisheries, being key stakeholders in fisheries matters should take the lead in ensuring the BMUs are facilitated adequately to perform their roles and review of their performance be done from time to time. There is also need for capacity building BMU officials in areas such as group dynamics, leadership and proposal writing to enable them face the challenges posed by BMUs routine management. Lake Victoria Fisheries Organization (LVFO) should also mobilize resources alongside the National and County governments that would ensure there are enough resources to support the activities that strengthen BMUs Structures Lake wide.

The following are suggestions for further research, arising from the findings and conclusions of the study;

- a) Having carried out this study at beaches in Kisumu County, the study could be replicated at all the beaches of Lake Victoria, Kenya., in order to deeply understand why majority of BMUs claim to be playing their roles and yet there

is still signs of poor fisheries resources management, contrary to expectations of formation of BMUs.

- b) Another study on co-management could be carried out on another type of natural resource where authority and responsibility have been delegated to the locals.

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**APPENDIX A:**

**QUESTIONNAIRE FOR BMU OFFICIALS ONLY**

This questionnaire is meant for research purposes only. The information you will provide herein will be treated confidentially

Date \_\_\_\_\_

Name of Beach \_\_\_\_\_

**SECTION 1: RESPONDENT'S PERSONAL DETAILS (tick as appropriate)**

1. Gender

Male [    ]

Female [    ]

Age of respondent \_\_\_\_\_

2. Level of Education

(a) No formal education [    ]

b) Primary [    ]

(c) Secondary [    ]

(d) Post- Secondary [    ]

3. Marital status

Married; Number of wives \_\_\_\_\_ [    ]

Single [    ]

Divorced/ separated [    ]

Widowed [ ]

4. Other than being a BMU official, what is your full time occupation?

Fish trader [ ]

Fish processor [ ]

Boat Owner [ ]

Fish processor and trader [ ]

Fisherman or fisher lady [ ]

Boat repair [ ]

Net repair [ ]

**SECTION 2: CO-MANAGEMENT INFORMATION**

**A: Management functions of BMUs as co-management partners in sustainable utilization of the Lake Victoria fisheries resources.**

Q1. (a) Is your BMU registered?

Yes ( ) No ( )

(b) If yes when was it registered and with who?

Year..... Organization – Fisheries ( ) A.G ( )

Please tick appropriately.

Q2. (a) (i) Does the BMU have elected officials ?

Yes ( ) No ( )

2a (ii) If Yes, were the laid down procedures followed i.e.

- How many members does the Executive Committee have?

- How is the representation of the Executive Committee members?

30% Boat owners    Yes ( )    No ( )

30% Crew (Fishing labourers who don't own boats)    Yes ( )    No ( )

30% other stakeholders groups (including fish processors, local gear makers, fishing equipment, dealers, Managers and charters)    Yes ( )    No ( )

10% Fish mongers/traders    Yes ( )    No ( )

Not less than 3 members of BMU Executive Committee should be women

Yes ( )    No ( )

(b) If the answer is NO, how were the officials picked?

\_\_\_\_\_

Q 3 Do you have a constitution in place for this BMU?

Yes ( )                      No ( )

Q 4 a) Do you hold meetings as a BMU Assembly?

Yes ( )                      No ( )

b) If yes, how often?

Weekly ( ) Monthly ( ) Quarterly ( ) Annually ( ) Other (specify).....

c) Do you take and keep minutes as proof of the above meetings?    Yes ( )    No ( )

**B) To establish factors that influence BMUs performance of their roles in sustainable utilization of fisheries resources**

Q3 a) Do you know your roles as BMU officials?

Yes ( )    No ( )

. b) Do you think you are playing your roles effectively?

Yes ( )                      No ( )

b) If no, what could be the reasons for you not playing your roles as you should?  
(Please tick where appropriate)

1	Lack of government support (extension services)	
2	Lack of funds	
3	Lack of commitment on the side of BMU members	
4	Political interference	
5	Lack of support from BMU officials	
6	Lack of knowledge/ Capacity building	

4 a) Is the government/ Fisheries department giving you the support you require to effectively act as a co-management of the lake?

Yes ( )                                              No ( )

(b) If yes, specify what specific help the government is offering to help you manage the fisheries resource. (Please tick as appropriate)

1	Provision of extension service		
2	Provision of resources for Monitoring, Control and Surveillance		
3	Involve you in decision making concerning Fisheries Management		
4	Swift response towards report on illegal practices		

5	Sharing information e.g. data		
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(c) If No, specify what you think should be/have been done by the government through the Fisheries department to enable you be better co-managers.

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C) Strategies BMUs employ in the co-management of the fisheries resources

Q1. (a) Which strategies do you have in place as BMUs to ensure effective management of Lake Victoria fisheries resources? (Please tick as appropriate)

1	Establishing effective patrols	
2	Sourcing of resources from donors to operationalize activities planned	
3	Organizing inter-BMU-visits	
4	Working closely with Fisheries department to reduce illegal fishing	

(b) Some of the mechanisms/strategies you have as BMUs, in the management of the Lake requires high financial demands. How do you plan to mobilize resources to ensure the tasks are accomplished, especially where you lack government/donor financial support? (Please tick as appropriate)

	BMU Revenue	
2	CDF/LATIF through proposals	



3	Members contributions and fines	
4	Requesting for Financial support from FD	
5	Proposals for funding from donors in the region	

Q2. (a) If the government left you as the main player/co-manager of the Lake Victoria fisheries resources, do you think you will reverse or help manage the downward trend in the fish catches?

Yes ( )                      No ( )

(b) If yes, how will you manage doing this?

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(a) If No, why do you think you will fail

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**APPENDIX B:**

**QUESTIONNAIRE 2 FOR NON- BMU OFFICIALS**

This questionnaire is meant for research purposes only. The information you will provide herein will be treated confidentially

Date \_\_\_\_\_

Name of Beach \_\_\_\_\_

**SECTION 1. RESPONDENT'S PERSONAL DETAILS (tick as appropriate)**

1. Gender

Male [  ]

Female [  ]

Age of respondent \_\_\_\_\_

2. Level of Education

(a) No formal education [  ]

b) Primary [  ]

(c) Secondary [  ]

(d) Post-Secondary [  ]

3. Marital status

Married; [  ]

Single [  ]

Divorced/ separated [  ]

Widowed [ ]

4. What is your full time occupation?

Fish trader [ ]

Boat Owner [ ]

Fish processor [ ]

Fish processor and trader [ ]

Fisherman or fisher lady [ ]

Boat repairer { }

Net repairer [ ]

**SECTION 2: CO-MANAGEMENT INFORMATION**

7. Are BMUs officials performing their roles as co-management partners of Lake Victoria Fisheries resources?

Yes ( ) No ( )

8. Do BMU officials regularly involve you in decision making processes for all matters of fisheries management?

Yes ( ) No ( )

9. The BMU Executive Committee members is composed of 30% Boat Owners, 30%/, 30% other stakeholders, 10% Fish Mongers /Traders and not less than 3 members of BMU assembly are women.

To a large extent ( ) To a small extent ( ) Not at all ( )

10. Do you believe the fisheries of Lake Victoria are on the decline due to illegal fishing?

Yes.....

No.....

11. Has illegal fishing reduced with existence of BMUs?

Yes.....No.....

## APPENDIX C

### CHECKLIST FOR KEY INFORMANTS

#### Instructions

This is checklist to be administered to Government departments directly involved in the management of Lake Victoria Fisheries resources.

#### GUIDELINES

- 1 (a) Do BMUs play their roles as co-managers of Lake Victoria fisheries resources?
  - (b) In your view do you think BMUs have effectively played their roles in co-management?
  - (c) What could be the factors that limit them from performing their roles effectively?
- Q2. What management structures that help BMUs to play their roles as co-management partners of Lake Victoria fisheries resources?
- Q3. What strategies are employed by BMUs in playing their roles as co-management partners of Lake Victoria fisheries resources?

## **APPENDIX D**

### **CHECKLIST FOCUS GROUP DISCUSSIONS**

#### **Instructions**

This is checklist to be administered to Government departments directly involved in the management of Lake Victoria Fisheries resources.

#### **GUIDELINES**

- 1a). Do BMUs play their roles as co-managers of Lake Victoria fisheries resources?
  - b) In your view do you think BMUs have effectively played their roles in co-management?
  - c) What could be the factors that limit them from performing their roles effectively?
- Q2. What management structures that help BMUs to play their roles as co-management partners of Lake Victoria fisheries resources?
- Q3. What strategies are employed by BMUs in playing their roles as co-management partners of Lake Victoria fisheries resources?