

**ASSESSMENT OF THE INFLUENCE OF BEACH MANAGEMENT UNITS ON  
FISHERIES GOVERNANCE IN MIGINGO ISLAND, KENYA**

**LUCKY CINNY TUBMAN**

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award of Master of Science Degree in Environmental Governance, Wangari  
Maathai Institute for Peace and Environmental Studies, University of Nairobi.**

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**DECLARATION**

I declare that, this thesis is my original work and has not been submitted for examination to any university or institution of higher learning.

Signature..... Date.....

**Lucky Cinny Tubman**

**A60/89296/2016**

**SUPERVISOR:**

This thesis has been submitted with my approval as the university project supervisor.

Signature..... Date.....

**Dr. Kariuki Muigua**

**Kariuki Muigua & Company Advocates**

**SUPERVISOR:**

This thesis has been submitted with my approval as the second university research project supervisor.

Signature..... Date.....

**Prof. Nzioka John Muthama**

**Wangari Maathai Institute for Peace and Environmental Studies**

## **DEDICATION**

This work is dedicated to my family, my father Mr. Tubmun Otieno, my mother Mrs. Dolly Otieno, my siblings: Daemien, Suzzon, Vincenza and my nieces and nephews.

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## **LIST OF ABBREVIATION AND ACRONYMS**

<b>BMU</b>	Beach Management Unit
<b>CPR</b>	Common pool resources
<b>EAC</b>	East African Community
<b>FAO</b>	Food and Agricultural Organization
<b>GDP</b>	Gross Domestic Product
<b>LVBC</b>	Lake Victoria Basin Commission
<b>LVFO</b>	Lake Victoria Fisheries Organization
<b>SSI</b>	Semi Structured Interviews
<b>UN</b>	United Nations
<b>UNCED</b>	United Nation Conference on Environment and Development

## ABSTRACT

Beach Management Units in Kenya were established to ensure that fisheries resource are better and sustainably managed and utilized. This was to be achieved by seeking the community's participation to aid in the implementation of fisheries regulations and rules. Sustainable fisheries management by the BMUs has however not been realized, years after the institution's inception. The study set out to assess the operations of BMUs, as a co management institution, in the governance of fisheries resource in Kenya. Specifically it aimed at; analyzing the community's participation in the management of BMUs; establishing how management of BMUs affects the implementation of the regulations and assessing the implementation of regulations with regards to fish stocks. The study was done in Migingo Island located in Lake Victoria, at the border of Kenya and Uganda. Data was collected from BMU committee members and stakeholders at the fish landing site along the island's shores. Data was collected from BMU committee members and major stakeholders through the use of questionnaires and semi structured interviews. Data analysis involving both inferential and descriptive analyses such as cross tabulations, chi square goodness of fit and percentage distribution techniques was performed. Results point out that the three out of seven functions were performed satisfactorily by the Migingo BMU. These were; collection of revenues, confiscation of illegal gears and arrest of offenders. The performance of conducting meetings, patrol of the lake, formulation of bylaws and keeping of inventories were unsatisfactory. It was reported that Migingo's BMU structure comprised of a committee and lacked an assembly. The representation of BMU committee was dominated by the boat owners while fishermen and women were low in numbers. Implementation of regulations by the BMU faced various challenges such as lack of support from the government, inadequate capacity and inadequate knowledge to operate its functions. These challenges, along with inadequate funds and equipment, hindered the effective implementation of regulations. It was noted that community's participation aids in the management of BMUs however their opinion during decision making are rarely sought after and they could hardly access information concerning the BMU, mostly through word of mouth. It was also reported that fish catches from the lake had decreased and the number of fishermen was on the rise. This study shows that the BMUs are viable institutions but operations are unsustainable due to their weak structure, limited support from government and inadequate resources. Capacity building is needed on the BMUs operations, provision of relevant skills, equipment and funds and improved support from the government for the BMU to be sustainable.

## CHAPTER ONE: BACKGROUND OF THE STUDY

### 1.1 Introduction

Fisheries play an important role in the socio economic development of Kenya as it generated 5% of the gross domestic product (GDP) in 2004 (Muigua *et al.*, 2015). This is evident as it supports various livelihoods, offers employment avenues and generates income. It also ensures that the nation is food secure. The resource is also important in the pharmaceutical and animal feed industry as it provides raw materials used in the manufacture of products. Furthermore it supports other industries that are dependent on it such as the packaging industries, boat building and repair, net making, transport and recreation. Muigua *et al.* (2015) states that over 50,000 people are working in the sector (directly) - fishers, processors, traders and employees. Fisheries resource refers to components of a natural aquatic resource for example species, populations, stocks and assemblages which can be legally caught by fishing (FAO, 2017). Notably in Kenya, the fresh water sector has overshadowed the marine sector (Japp, 2012) since 96% of the total fish production of the nation is from the fresh water, with Lake Victoria being the principal fish producer.

The production of fish has however, been on a downward spiral over the past few years. This condition is particularly evident in L. Victoria's fishery. This has led to the importation of fish from China as well as trading in fish from neighboring countries in order to meet the demand. The dwindling fish stocks can be attributed but not limited to increased pressure due to rapid growth of the human population, the deteriorating environmental conditions of the lake eco-system and poor resource governance and management.

Before the late 1990s the fisheries management in Lake Victoria was done through a state-controlled fisheries authorities with minimum or no room for the stakeholders' involvement in the decision-making process. Lawrence and Watkins (2011) state that this system of management could not sustain the fisheries that people depended on for their livelihoods. This necessitated a change in the management system due to the declining fish catches and the deteriorating state of the lake ecosystem.

It led to a shift, a collaborative management approach which at all levels involved the stakeholders from that of a centralized one (Njiru *et al.*, 2008). Co management is a system where there is a shared responsibility and authority over the management of a common resource between; resource users, the government and other stakeholders to administer the resource jointly (Abila *et al.*, 2000). The opinions of the fisher folk are incorporated during the decision making process and the execution of management measures. This enhances the legitimacy of the decided regulations resulting to more inclination of the fishers to follow them (Ogwang, 2005).

The ineffectiveness of government to prevent fish stock devastation led to the widespread adoption of the fisheries co-management approach (Nunan, 2010). Co management of the resource is done by the fishing community around L. Victoria through Beach Management Units. According to Abila (2014) Beach Management Units (BMUs) is an organization within the fishing community at the beach of fisher folk. This includes the fishermen, vessel owners, managers, fish processors, fish mongers, gear makers or repairers and fishing equipment dealers. This institution as recognized in the Fisheries Management and Development Act 2016, allows for co-management of the local fisheries by the community and the government.

BMUs make room for stakeholder participation in the management activities and consequently increases the community's sense of entitlement to the resource. This therefore would strengthen the engagement of the local community to managing the fisheries due to their changing perception of ownership- from belonging to the government to the resource, a common property being held in trust for the community. Ngige and Jaekal (2012) state that the local communities' participation is vital in attaining the sustainable management and use of aquatic resources. This is because it considers the opinions and information of all stakeholders in making decisions and their varied capacities are harnessed in enactment of rules (Ogwang, 2005). As a result BMUs, in a participatory approach employs elements from all management levels hence forms a link and a partnership between the government level and the fisher folk.

Ngige and Jaekal (2012) notes that the empowerment of local communities, which is legal in this case has been proposed as a solution to overexploitation of the fisheries resource. It also intends to emulate the ecosystem approach to fisheries management. Essentially BMUs as co management bodies are mandated to ensure that the fisheries are sustainably utilized and there is integration of traditional knowledge with scientific findings in management of fisheries. They are also to sensitize, build capacity and engage their members on matters of poverty reduction, sustainable development, gender, well-being and equity.

BMUs are key institutions in ensuring sustainable use and conservation of aquatic resources as their regulations deters use of illegal gears, observance of closed seasons and areas, and limitation of fishing vessels in terms of numbers on the lake. These measures supports the replenishment of fish stocks hence avoiding its devastation, deters overexploitation and ensures the resource reaches maturity for reproduction purposes. Data collection and records keeping, as a major function of the BMU also contributes to the resource's sustainability as it keeps account of the quantity, quality and fish species. Detection of change in the fish stock abundance is therefore easily noticed hence measures can be taken to control the situation.

### **Kenyan perspective**

In Kenya, BMU structures were formed in 2004 and majority of them were later established by 2006 (Obiero *et al.*, 2015). BMUs built on the arrangements of beach committees that existed since the 1960s (Abila *et al.*, 2009). According to Cinner *et al.* (2009) BMUs mandates include taking inventory of the fish landings, implementing the fisheries regulations and create their individual regulations in the form of bylaws to manage their own operations. However the final approval of the rules lies with the Director of Fisheries. Various successes has been achieved in the country since the formation of BMUs. These include increased vertical and horizontal linkages of the relevant institutions, reduction in the use of illegal fishing gears, levels of compliance have increased and there is significant community participation. Ngige and Jaekal (2012) state that the introduction of the BMU institution has resulted to a 40% decrease in the harvesting of immature fish as well as a stronger sense by the community on the

ownership of the resource. As a result, some BMUs have formed compliance committees that independently carry out patrols on fishing grounds without government support.

BMUs have also been successful in implementing the provisions of the Constitution of Kenya by encouraging public participation and forging cooperation among the stakeholders in the fisheries industry and enhancing the communication between the government and the local communities. This is supported in the article 174 of the constitution which makes room for devolution of state powers in order to give the citizens powers of self-governance and enhance participation in the implementation of powers and decision making in matters that have an effect on them and to acknowledge the communities rights to control their own activities and further their development.

Despite of the success of BMU institutions in the country, it faces numerous challenges that hinder its operation and ultimate aim of ensuring sustainable utilization of the fisheries resource.

The existing communication and infrastructure system poses a challenge in the operations of the BMUs. Due to the poor logistical networks, BMUs are unable to fully tap into the wider market for their produce hence their income is limited. Poor infrastructure also translates to huge postharvest losses and the breakdown of communication between the institution and the fisheries department hence poor service delivery. The situation is further worsened by inadequate funding from the fisheries department. As a result the fisheries department is unable to efficiently supervise, regulate, and administer the Beach Management Units.

Enforcement of regulations by the BMUs is a huge challenge. This difficulty arises due to inadequate skills, training and capacities by members of the BMUs to effectively perform their duties. Ngige and Jackal (2012) state that capacity building is needed for the co-management institution to be successful. Lack of these essential qualities hinders various activities such as stock abundance which is important in informing decision making, regulation and enforcement of the resource.



Achieving greater participation of women is also a major challenge in the functioning of BMUs. The BMU institution in the country, is still grappling with gender equity despite the provisions in the Fisheries (Beach Management Units) regulations 2007 which state that women in the executive committee should not be less than three. The roles played by women are mostly confined to processing, transporting and marketing the fish resource. On the other hand, Management positions are primarily held by men who collect revenue, make decisions and given first priority in attending seminars to sensitize them on sustainable resource use. This phenomena can be attributed to the patriarchy nature of the community, where male are the dominant figures while women tend to look after household activities and whose opinions are rarely sort after.

Obtaining adequate funding for the Beach Management Units is another hindering factor. Obiero *et al.*, 2015 states that the financial mechanism of BMUs is weak hence limiting their administrative operations. The financial domain in the nation has been reluctant in offering loans to members of BMUs as they are uncertain of the repayment. In addition to that, BMUs lack the legal standing needed for group loans. As a result, it inhibits their capacity to purchase modern gears therefore unable to fully utilize the fisheries resource for the betterment of their livelihoods.

The BMUs success rate is minimal due to social and health problems in the fisheries communities. This is manifested in the high prevalence of HIV/AIDS and waterborne diseases such as typhoid and cholera. The situation is worsened by inadequate health facilities for the fisher folks.

The fact that members of the BMUs are not technically qualified in fisheries rules, development and management poses a legal challenge as the structures provided for in the fisheries regulations 2007 appear relatively complex to them. Therefore understanding and enforcing the regulations can be a daunting task hence resulting to a weak operating system. Furthermore the fisher folk have little knowledge of international, regional and national fisheries agreements and their impact on their livelihoods. Ngige and Jackal (2012) state that it would be beneficial for members of the BMUs and the fisheries community at large to have regular awareness sessions in order to sensitize them on the relevant rules, laws and regulations that have an impact on them.

## 1.2 Statement of Research Problem

Sustainable utilization of the fisheries resource can be achieved by co management through the BMUs. According to Abila *et al.* (2000) co management has in the recent years been viewed as a strategy for effectively managing fisheries. The shared responsibility over the management of the resource ensures legitimacy in the managerial process therefore resulting to a higher rate of compliance with the regulations by the community members. It also compensates for the shortcomings of the government's system of management, command and control, which often is distant, understaffed, underfunded and too bureaucratic (Abila *et al.*, 2000) therefore having a limited capacity to monitor and regulate what goes on the fishing grounds.

Although co management in Lake Victoria's fisheries has been adopted, there is continuous pressure in terms of catch and effort on the resource (Van der Knaap *et al.*, 2002). This has resulted to a decrease of fish stock in the lake. Decline of fish stocks has led to reduced earnings from export especially the Nile perch species hence affecting the country's GDP. The dwindling fish stocks has also led to conflicts over rich fishing grounds as was the case with Kenya and Uganda's row over Migingo Island a few years ago. Concerns have therefore been raised about the co management's ability to sustainably manage the resource. It is evident that there is a mismatch between the set regulations of the BMUs (co management) and its implementation. Hence the objective of this study is to assess co management, BMUs, on the governance of the fisheries resource.

A review of current studies indicates that minimal research has been carried out on Beach Management Units that are trans-boundary in nature and on the governance of the fisheries resource. Most of the studies that have been undertaken mainly concentrated on the management of the BMUs in terms of performing its functions but did not dwell on the governance of the resource as a result of co management (Luomba 2013, Kasililika 2013 and Obiero *et al.*, 2015). A few studies have been done in terms of how the Beach Management Units are being managed in Uganda, Tanzania and Kenya that share the Lake Victoria. This was the case as cross border analysis on the BMUs in the three countries (Abila *et al* 2005). The study seeks to fill this gap.

### **1.3 Research Questions**

1. How does community participation influence the management of BMUs?
2. How does the management of BMUs affect implementation of the regulations?
3. What is the effect of BMUs implementing regulations on fish stocks?

### **1.4 Research objectives**

#### **1.4.1 General objective**

To assess the influence of Beach Management Units on fisheries governance in Migingo Island.

#### **1.4.2 Specific objectives include;**

- To analyze community's participation in the management of BMUs
- To establish how management of BMUs affects the implementation of the regulations
- To assess implementation of regulations by the BMUs with regards to fish stocks

### **1.5 Hypotheses**

1. H0; Community participation does not influence the efficient management of BMUs.

H1; Community participation influences the efficient management of BMUs.

2. H0; Efficient management of BMUs does not lead to the implementation of regulations.

H1; Efficient management of BMUs leads to the implementation of regulations.

3. H0; Implementation of regulations by the BMUs has no effect on the fish stocks.

H1; Implementation of regulations by the BMUs has an effect on the fish stocks.

### **1.6 Justification**

The research occurs at a time when the fisheries stock in the lake is dwindling at alarming rates and is on the verge of extinction. This is evident through indicators such as:

reduction of fish catch, changes in total population of the resource, continued scarcity of mature fish in catches among others. This phenomenon can be attributed to poor governance and management of the fishery resource among other factors. The study is therefore relevant as it aims to assess the functioning of the BMUs in the governance of the fisheries resource. The expected results will provide a basis to better the current operations of the BMUs in order to augment the effectiveness and efficiency of co management. As a result this will empower the fisher communities by ensuring that their fishing activities are sustainable thus increased catches; increasing the fishers' livelihoods and security by minimizing inter-group conflicts and thefts; improved value addition with enhanced handling facilities and prices. This will be achieved by bargaining collectively of fish traders (Ogwang, 2005). The research is expected to add onto the scientific knowledge and provide viable mechanisms for surviving with sustainable management and governance of the resource and contribute more knowledge to research. The targeted recipients are fishermen, policy makers, fisheries resource managers and researchers. The study will also contribute to the sustainable development goals (SDGs) number two and fourteen that state zero hunger and life below water respectively.

### **1.7 Scope and Limitation**

Co-management of fisheries in Lake Victoria is done through Beach Management Units. Co-management involves the distribution of roles and responsibilities amongst the resource users, other stakeholders and the government over the management of a common resource. Elements of Fisheries governance are highlighted in the co management system. These include participation, rule of law, equity and inclusion, efficiency and effectiveness among others. Strengthening these element on the management of BMUs will ensure the organizations efficacy. The study targeted the Migingo Island with the aim of assessing the influence of BMUs in Fisheries governance.

The allocated time for data collection in this study was short hence it limited the scale of data collection and analysis. Moreover, it is difficult to separate the effect of management methods from other sources of change. As such, the study mainly focused on the perception of the interviewees.

## CHAPTER TWO: LITERATURE REVIEW

### 2.1 Introduction

This literature reviews international, regional and national legal and Institutional frameworks put in place to attain sustainable management, governance and development of the fisheries resource. It also touches on the co-management structures put in place to achieve the above mentioned objective by involving the community in the implementation of rules and regulations.

### 2.2 Decentralization of Fisheries Management

According to Lundstorm and Nordlund (2016) co management empowers people at the local level and is a decentralized method that ensures collaboration between the local community and the government. Pomeroy and Rivera-Guieb (2005) also state that co management is a process that involves collaboration and power sharing among government officials and the resource users using decentralization and democratization mechanisms. Béné (2006) states that decentralization can be defined as a mechanism for empowerment and inclusion. This is so as it in both institutional and spatial senses brings closer the government to the locals- the governed. In this case the decentralized government will be more knowledgeable hence responsive to the needs of the marginalized people.

Decentralization as a method of management has been widely adopted to sustainably utilize natural resources, and in this case fisheries resource. Visawanathan *et al.* 2003 states that decentralization has become the new model after years of strong centralized management in small scale fisheries. This shift from the centralized way of management was brought about by the rapid decline of fish stocks in water bodies. As a result, decentralization through co management was opted for the participation and inclusiveness of the local community. Béné (2006) states that policy discourse in governance has been in favor of decentralized fisheries management in the form of Community based fisheries management (CBFM) or co-management. Therefore, majority of the developing countries have adopted co management or some form of CBFM in their national fisheries policies. Hara *et al.*, (2002) states that decentralization

through representation of the locals in decision making and proximity often leads to equity gains and efficiency.

Decentralization is founded on democratic processes and proximity therefore reducing transactional costs of management. It also ensures improved accountability to local communities from the decision makers thus enabling them to match and integrate the target group aspiration and needs to resources and decisions (Ribot 2004). He further states decentralization can be successful if a public space is provided for where people can engage in collective action and decision making. Béné (2006) argues that decentralized management usually leads to improved environmental sustainability, public accountability and empowerment of vulnerable and poor groups. The rationale of decentralization under the community paradigm approach is logical. Local people have a better understanding of the environment particularly the indigenous ecosystem and the natural resources which they depend on. They are also more familiar with a given area than outsiders. Béné (2006) states that management efforts and investments are likely to succeed as local participation ensures self-interest.

## **2.3 International Frameworks on Fisheries**

### **2.3.1 Convention of Biological Diversity**

This convention was opened for signature at the United Nations Conference on Environment and Development (UNCED). Its main goals are the protection of the biological diversity, sustainable use of its components and the equitable use of the benefits arising out of the utilization of genetic resources. This convention requires cooperation between contracting parties in regards to regions beyond a nation's jurisdiction and on issues of common interest for sustainable utilization and conservation of biodiversity. This is due to the fact that a state's activities may affect the biological diversity of the other as some organisms are highly mobile or that some ecosystem are trans boundary in nature. It further states that signatory parties should develop strategies plans and programs for their nations so as to protect and sustainably use the biodiversity. These should be assimilated into relevant sectorial strategies programs and guidelines. The contracting parties should also ensure that the public are aware of the conservation

initiatives and their importance. Article 7 of the convention mandates countries to adopt precautionary approach in conservation.

### **2.3.2 FAO Code of Conduct for Responsible Fisheries**

This instrument was initiated by the FAO Committee on Fisheries in 1991 and is voluntary in nature. It recognizes that participation and transparency are important for responsible and sustainable fisheries. Principles that are applicable to the management, development and conservation of all fisheries are provided for in the Code. The objectives are to: establish regulations for responsible fishing and fisheries activities; serve as an instrument hence aiding states to establish or implement legal and institutional frameworks; establish an avenue for elaboration and implementation of national policies for conservation and management of fisheries; promote and facilitate technical, financial and other cooperation for the fisheries resource's development, management and conservation; enhance research; increase the contribution of fisheries to food quality and security; and provide standards of conduct for persons involved in the fisheries sector.

## **2.4 Continental Frameworks**

Policy framework and reform strategy for fisheries and aquaculture in Africa

The main purpose for this framework is to improve the fisheries sector in Africa for food secure nations, better livelihoods and financial empowerment of fishing communities. Accordingly, the policy framework aims to: a) facilitate coordination and collaboration within the region in shared fisheries resources management; b) aid in the development of fisheries policies for African Union member states by proposing best practices to the sector in terms of income, employment and food security; c) guide countries on how to best implement reforms for the development of aquaculture and fisheries d) aid in advocacy for better investment in the fisheries domain; e) facilitate adoption or ratification of international agreements for fisheries management; and f) expound and make it known to countries the principles of good governance for increased coherence in Africa's fisheries

This policy framework covers all member states and emphasizes on the importance of fish as a vital resource which if sustainably utilized has the potential to benefit present and future generations. The framework is centered on aquaculture, inland and marine fisheries as well as the post-harvest sector. It also recognizes the diverse use of the fisheries resource hence it promotes an inclusive and broad approach to its management and development. Furthermore, the policy takes a holistic view, it is evidence based and is precautionary in its approach.

The main objective of the framework is to make provisions through a prioritized prospectus of opportunities to Africa's fisheries technical institutions, development assistance donor agencies, management organizations, fish produces and traders to facilitate reforms towards coherent policies that realize the full potential for Africa's fisheries so as to enable sustainable environmental, social and profitable outcomes for Africans.

## **2.5 Regional frameworks**

### **2.5.1 Protocol for Sustainable Development of Lake Victoria Basin**

This protocol aims to oversee the cooperation of partner nations to sustainably develop the Lake Victoria. It was entered into by Uganda, Kenya and Tanzania. The protocol states that all partner countries should take appropriate measures, jointly, individually or with the input of every stakeholders to protect and restore the basin's ecosystem. The management of the basin as stated in the protocol should get guidelines from: the principle of prevention; principle of earlier notification concerning planned measures; principle of sustainable development, precautionary principle; prevention principle; polluter pays principle; principle of gender equality in decision making and development; principle of Environmental Impact Assessment and Audit; and principle of preservation and protection of the ecosystem international watercourses. Notably, the protocol requires that partner states should through institutional frameworks harmonize their policies and laws. Partner states under this protocol, are to develop, manage and conserve the fishery of the lake according to the Convention establishing the Lake Victoria Fisheries Organization.



### **2.5.2 Lake Victoria Fisheries Organization Strategic plan 2016- 2020**

This organization was established in 1994 by the convention signed by the three countries: Tanzania, Uganda and Kenya. It was later registered under the United Nations charter of the Food and Agriculture Organization CAP 102 as a regional fisheries management organization. It is an institution with the mandate of managing the fisheries and aquaculture in the East African Community. It comprises of Beach Management Units, fisheries management and research institutions, fish processors and exporters associations in the EAC. Its main aims are to create harmony in the processes for sustainable utilization of fisheries resource nationally, improve cooperation between the signatory states and development and adoption of measures both conservation and management ones. Collaboration between the institution and member states exist to: build capacity of institutions; encourage the enhanced management, development and use of the fisheries resources; provision of a platform for house clearing and databank for information and knowledge on fisheries and aquaculture products; give advice on the effect of the introduction of an aquatic plant or animal; and provision of the conduct of research concerning the fisheries and aquaculture resources and related activities.

The Strategic Plan for the period 2016-2020 is expected to: increase the visibility of the organization; strengthen the operations of the organization; mainstreaming the organization into EAC structures; Build its capacity to mobilize resources; as well as enhance its coordination role for sustainably developing and managing the fisheries resource to contribute to economic growth and food security in the region. The Strategic plan also intends to amend the LVFO Convention of 1994 to make room for all the five EAC Partner States, inclusion of Rwanda and Burundi. This amendment of the Convention will lead to other changes including a new institutional arrangement and the expansion of the organizations mandate- all East African water bodies.

### **2.5.3 Fisheries Management Plan (III) for Lake Victoria Fisheries 2016-2020.**

From the Lake Victoria Environmental Management Project (I) (1997-2005) and Lake Victoria Fisheries Research Project (1999- 2002), scientific information was gathered and generated upon which LVFO based the fisheries management decisions on. It is also on

the basis that the first Lake Victoria's Fisheries Management Plan was developed in 2001, and implemented from 2005 to 2008 with financial support from EU to improve the management of the fishery. FMP II was implemented from 2009 to 2014. The FMP (III) is informed by the two management plans.

The vision of the FMP (III) is to ensure poverty reduction and sustainable economic growth within the East African Community with the objective of contributing to wealth creation through management and utilization of fisheries resources that is sustainable and provide equitable benefits and opportunities in the area. The objectives of the third FMP is to manage the Tilapia fishery for regional and national trade and increase the per capita consumption of fish, Nile perch fishery to augment export earnings and Dagaa to improve the community's livelihoods, well-being and food security in the region.

The third Fisheries and Management plan purposes to address the fisheries main challenges in Lake Victoria. These are: augmented illegalities due to poor enforcement, insufficient infrastructure for fish quality, inadequate funding to undertake research and agreed interventions, increased fishing pressure due to the high demand and rise of fish and fisheries products' prices, under developed aquaculture and other challenges that occur as a result of climate change.

Ecosystem Approach to Fisheries Management is embraced in the management plan in order to strengthen the collaborative management of Lake Victoria's fisheries resources for the shared benefits by the three countries. This approach emphasizes on the contribution of major stakeholders in the resource's management, harmonization of regulatory standards and policies, periodic evaluation of the fisheries' contribution to the regions GDP and use of cooperative management frameworks through regional institutions.

The fisheries management plan highlights the need of; conducting research that is demand driven for fisheries and aquaculture, development of new technologies for management, sharing market information, intelligence and teleconferencing, leveraging on Information, Communication and Technology for fishing activities, regular economic valuation of the fisheries sector; investment in infrastructure for fisheries and aquaculture

growth; and establishment of fisheries professional bodies and setting standards to fisheries research institutes and training centers.

The FMP (III) states that it requires good governance to ensure its mandates are achieved. Successful management as noted in the plan is achieved through a participatory decision making process. The governance structure of the LVFO presents the East African Community as the highest policy organ to the grass roots structures- the Beach Management Units.

#### **2.5.4 Regional Institutions**

These regional institutions are significant to the development, utilization and administration of fisheries in Lake Victoria. These include the East African Community, Lake Victoria Basin Commission and Lake Victoria Fisheries Organization.

#### **2.5.5 East African Community (EAC)**

The activities of EAC is informed by a treaty which was signed in 1999 and after ratification by Tanzania, Kenya and Uganda, it entered into force in 2000. Two states namely Burundi and Rwanda assented to the EAC in 2007 and became full member states in the same year. EAC is a regional intergovernmental organization, its headquarters in located in Arusha, Tanzania. The organization is one of the economic blocs in Africa and the world at large, that is growing rapidly hence widening cooperation among member states for mutual benefit in political, social and economic spheres.

EAC has eight institutions and seven main organs. Lake Victoria Basin Commission and Lake Victoria Fisheries Organization are among the institutions in the organization. Lake Victoria and its basin has since been designated as an economic growth zone in the region and a common area of economic importance by the EAC to be developed together by partner states. A joint programme was to be developed after the declaration of Heads of Government in the East African Community for the development and utilization of the lake's communal resources.

### **2.5.6 Lake Victoria Basin Commission (LVBC)**

Lake Victoria Basin Commission formerly known as the Lake Victoria Development Programme was established by EAC in 2001 as a strategy for organizing on the Lake the various interventions and serving as an avenue for the exchange of information and among the stakeholders' investments sharing. LVBC is responsible for making the Basin of Lake Victoria an economic growth sector.

This commission envisions collaboration and cooperation of the EAC and its member states, development partners and local communities around the Lake. The focus of the commissions activities are on: environmental management including the eradication of water hyacinth; synchronization of laws and policies on the development of the lake and its basin region; development of infrastructure particularly overhauling Lake Victoria's transport sector; management, conservation and development of aquatic resources; and economic aspects of the development of fishing, tourism, agriculture and industry.

LVBC emphasizes on the participation of local communities and eradication of poverty. As such it is envisioned to have a substantial impact to poverty minimization by improving the livelihoods of the communities. This is envisaged to be realized through investment and development practices that are sustainable as well as economic growth that are conscious of the environment.

### **2.5.7 Lake Victoria Fisheries Organization (LVFO)**

Graham 1929 states that efforts to manage the fishery of the Lake dates back to late 1920s. This is when the Lake Victoria Fisheries Service was founded and the first survey (fisheries) was done. During the colonial era, LVFS was replaced by the East African Freshwater Fisheries Research Organization (EAFFRO) in 1947. This organization was fortified after independence with the foundation of EAC in 1967, it however collapsed in 1977. With support from the Committee for Inland Fisheries of Africa (CIFA), the three riparian Partner States established the LVFO in 1994.

LVFO is a body of the EAC mandated to manage the fisheries and aquaculture in the East African region. It was established by the three partner states by the Convention of 1994.

Subsequently it is registered as a Regional Fisheries Management Organization under the UN Charter of the FAO. The organization has key partners: Fish processors and exporters association in the EAC member states, Beach Management Units and Fisheries management and research institutions. The partner states' fisheries activities is coordinated by the secretariat, based in Jinja, Uganda.

The main intentions of the organization are to synchronize national regulations for the development of the fisheries resources, strengthen coordination among the members and advance and adopt management and conservation processes. LVFO functions in regional and national dimensions therefore matters such as coordination, collaboration, harmonization and communication are in the realm of the secretariat. Policy review and development, implementation, extension, monitoring and enforcement are within the national jurisdiction.

## **2.6 National Frameworks for Fisheries**

The Fisheries sector is managed with an in depth legal and policy framework to give guidance to sustainable development and utilization of the resource. These are further backed up with institutional frameworks to ascertain that effective implementation of the laws and policies are adopted.

### **2.6.1 Constitution of Kenya, 2010.**

The manner in which the natural resources in the country should be managed is generally set out in the Constitution. It provides that the national values and principles of governance are binding in applying, interpreting and enacting any law. The national values include democracy, inclusiveness, transparency, participation of the people, accountability, rule of law, sustainable development among others. These principles are also applicable to the fisheries resource. The Constitution under article 69 (1) creates obligations on the state to ensure sustainable conservation, utilization and development of the natural resources and environment; safeguarding of the genetic and biodiversity; equitable sharing of accruing benefits; processes that are likely to threaten the environment should be stopped; environmental impact assessment, environmental audit

and monitoring systems should be established; and ensuring that the utilization of natural resources benefits of the citizens of Kenya.

### **2.6.2 Agriculture Fisheries and Food Authority Act 2013**

It was enacted with an objective to make provisions for the respective national and county governments' roles, to consolidate the laws on the regulations of agriculture and to provide for the establishment of the Agriculture, Fisheries and Food Authority. The Authority is charged with in consultation with the county government, perform the functions inter alia: administering both the Crop and Fisheries Acts according to their provisions; promoting best practices as provided in the Acts; collecting and collating data, maintaining a database on agricultural and aquatic products; and advising the national government and county government on agricultural and aquatic levies for the purposes of planning, equity and encouraging harmony in the sectors.

### **2.6.3 Fisheries (Management and Development) Act 2016.**

This act was enacted to make provisions for the development and conservation of fisheries resources in order to increase the livelihood of the population dependent on fishing and for the establishment of the Kenya Fisheries Services. The Cabinet Secretary shall give directions to the Director as provided for in the act who will be responsible for its administration. This Act has provisions for: the conservation and management measures of the resource; licensing and registration; export, import, trade and marketing of fish and its products; aquaculture; monitoring control and surveillance; information, data and record gathering and dissemination; establishment of Fish Marketing Authority; fish quality and safety and other actions.

### **2.6.4 Institutional Frameworks.**

Kenya Fishery Service was established under the Fisheries management and development Act 2016. The service is tasked with various functions; formulate and monitor the implementation of policies regarding the utilization of all fisheries resources; to ensure the appropriate conservation standards for the protection of the fisheries resources; provide education to create support and awareness from the public for fisheries

development; along with research institute- KMFRI to support and co-ordinate fisheries research; and to collaborate with stakeholders both at local and international level on issues within the range of this Act.

Beach Management Units are recognized under the Fisheries (Beach Management Unit) Regulations that was passed in 2007. This institution facilitates co management between the local people and the government- both at county and national level. This institution was implemented as a result of the state- centered approach of management being inefficient and ineffective in managing the fisheries resource.

## **2.7 Co-management of the Fisheries Resource.**

For the last twenty years, co management has been promoted as a way of enhancing efficiency and effectiveness of fisheries management by taking into cognition the resource users' inclusion in the management to promote ownership, understanding and commitment (Nunan, 2010). Carlsson and Berkes (2005) state that co management should not be viewed as an arrangement rather as a process with significant shift to focus on functions other than structures.

Article 69 (1) (d) of the Constitution of Kenya (2010) provides that states shall encourage the participation of the public in the protection, conservation and management of the environment. Participation involves being included in decision making, accessing environmental as well as accessing the judicial and administrative proceedings. Article 10 of the constitution also declares that participation and sustainable development are elements of the national principles and values of governance. These provisions encourages the local communities' engagement in the management and utilization of natural resources.

Devolution of some of the fishery management responsibilities to resource users and other stakeholders has been a popular response to the failing centralized management arrangement that had been put in place years ago. FAO (2006) defines co-management as an arrangement in which local resource users, government, external bodies (academia, NGOs and research organizations), and other fisheries stakeholders (boat owners, fish traders etc.) partner up and share responsibility in the decision making process of

fisheries management. It has been a common concept adopted all over the world for sustainable management of the fisheries.

Obiero *et al.* (2015) states that BMUs were created to improve the sustainable fishery management by involvement of communities to help in the oversight of fisheries rules and regulations. This approach, community based natural resource management, is characterized by a resolve to involve members of the community in the natural resources management, devolution of power and authority to the grass roots, inclination to defend local and indigenous property rights and desire of the inclusion to the modern management of natural resources the traditional values (Nelson and Agrawal, 2008). Beach Management Units includes everyone, on a local level, involved in fisheries resource. These are: fishermen, boat owners, net repairers, traders, boat builders and repairers, processors among others. BMUs forms a linkage between the local communities and government hence facilitating fisheries co-management. This leads to the integrated management at local and national levels to attain sustainable management of aquatic resources (Ngige and Jaekal, 2012).

The BMUs are composed of a BMU assembly and committee and sub committees in some cases. The BMU structure has a huge effect on the extent to which stakeholders and resource users have ownership of its actions and commitment to its objectives (Ogwang, 2006). Guidelines for electing members of the assembly and committee, are designed to promote: equity, democracy, transparency and accountability by maximizing the support of the institution. Membership of BMU assembly have the following criteria: a) It should be composed of crew members, boat owners. Chatterers, fishing gear and equipment dealers or repairer, managers, traditional fish processors and traders, boat owners and fisheries related institution working at a specific beach b) One has to register and be vetted by the region's fisheries administration body at inception in order to be a member c) Non-citizens should poses valid permits for working obtained from the Immigration Department and observe the measures put in place before the application of BMU membership. The absolute organ of the institution is the BMU assembly, as it approves development and management plans, by laws, budgets, audited accounts presented to it



by the committee. This organ is also authorized to approve, elect and impeach the committee members (Ogwang, 2005).

The BMU committee should be elected by the assembly in a democratic manner. Its representation should be; 30 % are allocated to boat owners, 30 % to boat crew, 30% to stakeholder and 10% fish traders. At least three members of the committee should be women. The committee members should be 9-15 in number. It constitutes of chairperson, vice chairperson, organizing secretary, treasurer among others (Ogwang, 2005). The BMU committee is tasked with these functions; a) propose bylaws for endorsement by the national authorities and eventually implement them; b) all boat owners and their fishing equipment should be registered and records maintained in collaboration with the central and local governments; c) easy identification of fishing gears and outboard engines by coming up with markings for licensed fishers; d) in collaboration with relevant enforcement authorities undertake monitoring, control and surveillance of the lake; e) inspection of boat owners and fisher for certifying and in conjunction with relevant bodies to guarantee that the licenses are granted to those within the BMU; f) identification of fish breeding zones on the basis of indigenous knowledge so as to clearly demarcate them as prohibited fishing zones; g) With the use of agreed formats, aid in the collection of data for frame surveys, catch monitoring and socio-economic investigations; h) Ensuring the marketing and fair pricing of fish and fish products through networking with other BMUs; i) Record and inspect boats that are visiting and give them permission to land where suitable; j) preparation of yearly work plans, budgets and present them to BMU assembly for approval; k) improve hygiene and sanitation at landing sites; l) formulation of proposal for funding, develop financial reports and present them to assembly for approval; m) and the committee should be part of the development organ in their area (Ogwang, 2005).

There are a number of guidelines to be followed when selecting the location of BMUs: they should exist within the national and local government boundaries, all BMUs should be at selected landing sites, the operational area of a BMU should have well defined boundaries which are in agreement with national government staff, every BMU should have not less than 30 boats at the landing site of fish (those with less are to join other

landing sites till the number is attained or exceeded) and joint BMU formation for instance on smaller islands that may be difficult due to administrative or geographic reasons, its guidelines will be given by regional government authorities and officials of the fisheries department.

BMUs in Kenya were formed in 2004 and were established on a system called beach committee arrangements that were already in existence dating back to early 1960s (Abila *et al.*, 2009). The Fisheries (Beach Management Units) regulation was passed in 2007 hence giving the BMUs authority to manage particular landing sites. Objectives of BMUs provided for in the regulations include; enhancing the organization of fish-landing stations, fishery resources and the ecosystem; supporting the management of the fisheries sector that is sustainable; capacity building for the members for efficient development of fisheries along with other stakeholders and recognising the different roles of the sections in the community in the fisheries sector. Obiero *et al.* (2015) states that the dominion of a BMU is a fish landing station that has been mapped and has well-known boundaries marked by the Director of Fisheries. Exclusive management rights over fish landing sites under the regulations have been given to BMUs. Despite the BMUs structure and mandate, the Ministry of Agriculture, Livestock and Fisheries is in charge of monitoring and supervising it.

BMUs in Tanzania were formed as subcommittees of the village's committee on security. Initially it composed of 10 -20 fishers with a commitment to sustainably manage the fishery resource. In 1998, there was a force to put up BMUs with 555 being attained at a certain point (Ogwang, 2005). In 2000, there was a reformation of the BMUs which led to a reduction in numbers, to 433. Their responsibilities and roles have since developed as they are supported by the Fisheries Act No.22 of 2003 and Fisheries regulation of 2009. Clear guidelines and institutional framework are spelled out in these laws. These provisions was expected to empower communities in exercising their legal rights by protecting the fisheries, improving production and income hence ameliorating the fisheries dependent livelihoods.

The concept of BMUs in Uganda was introduced in 1990s. The Fish (Beach Management) Rules 2003 no.35 provides a legal framework for the establishment and

operation of BMUs in Uganda. This law sets out the functions of the BMU as well as the roles of BMU assembly and committee. Ogwang (2005) notes that activities raising of awareness were ongoing at the time to sensitize stakeholders about BMU formation and operations.

Co management as mentioned earlier is coined from the word management. It therefore utilizes and applies the principles and functions of management. According to Vliet (2011) Henri Fayol created the first principles of management theory. The principles of management include: authority, discipline, division of work, remuneration, unity of command, unity of direction, equity, centralization, order, initiative, esprit de corps, stability of tenure of personnel, scalar chain and subordination of individual interest to the general interest. Upon these principles Fayol established the five functions of management namely planning, organizing, coordinating, commanding and controlling. According to Vliet (2011) these functions act as a points of reference so that challenges can be unravelled in a logical and creative way.

According to Thorn (2012) planning is a continuous process that can be highly specialized based on an organizations goal and requires active monitoring of the organizations environment to identify emerging opportunities. Vliet (2011) states that planning should be linked to and coordinated to different levels with respect to time and implementation. The process should also take into account the organizations flexibility and available resources so as to ensure continuity. Beach Management Units as a management body for the fisheries resource plans for its activities to ensure the resource's sustainable use. This is done through their frequent meetings where members share their ideas based on their individual experiences and decide on the best action plan for the current season. This can be manifested in restriction of certain fishing grounds that are primarily breeding zones as well as closed season for the replenishment of the resource. A schedule for patrolling the fishing grounds is also planned by the BMUs for the purposes of fulfilling the monitoring, controlling and surveillance function to curb IUU. These plans take into consideration the available resources.

Organizing is an important function of management as it ensures the organization's operations are effective by having adequate staff, capital and raw materials. An

organizational structure with well thought of division of work and task is of critical importance. In Beach Management Units, the organization function is seen clearly as there are a set of rules that spell out its organizational structure- BMU committee and assembly. Within the committee there are various positions such as the chairman, vice chairman, organizing secretary and treasurer. With the help of other members they create targets, plans on attaining the targets for the sustainable use of the fisheries resource. They create a sense of responsibility among the community and delegate authority.

Vliet (2011) states that coordination motivates and instils discipline among people in a group dynamic. It therefore leads to the harmonization of activities and as a result better functioning of the organization functions. Good leadership and clear communication are required for coordination to be achieved. This will lead to the positive influence of employee behaviour hence intended aims can be realized. Coordination is evident in the BMU, both horizontally and vertically. In terms of horizontal coordination, the activities of the committee members are coordinated with those of the assembly members to uphold the regulations and ensure sustainable utilization of the fisheries resource. Regular BMU meetings give the needed platform for coordination achieved through clear communication as stated above. Vertical coordination is realized as BMUs within the same region and the nation at large communicate with each other and share best fishing and management practices. This reduces conflicts of interests and attainment of a common goal. The BMUs also coordinate with the department of fisheries in the national and county level as required by the fisheries (BMU) 2007 regulations.

Controlling as a key element in the functions of management ensures that there is conformity between the set out plan and the activities that are carried out on a regular basis. Vliet (2011) notes that there four processes in the control domain. To begin with, performance standards should be established based on the organizations objectives. Secondly the actual performance should be measured and reported. The results are then compared with the set performance standards. Later preventive or corrective measures are taken into account as needed. The control function in the BMU is clearly manifested through the periodic review of existent rules to meet its desired outcome. In the event that this is not possible, the BMU opts to formulate its bylaw, specifically modified to the

regions conditions to achieve the outcome. These bylaws however have to be approved by state department of fisheries and in agreement with the 2007 regulations.

## **2.8 Governance of Fisheries**

Fisheries governance in terms of nature and performance has increasingly been viewed as essential through the provision of framework where fisheries can be more effectively and sustainably managed. Nunan (2010) states that improving governance is supported by the design of co management through the mechanisms including inclusiveness, representation and the integration of the structures and processes of co management within existing structures of government. Governance is defined as the regulation of the public realm through the establishment and stewardship of rules, the platform in which economic and social actors as well as the state interact to make decisions (Hyden *et al.*,2004). This means that interaction is key within the concept of governance.

Management and governance are often accepted as different terms though related, however in the fisheries sector it has been equated with co management in many incidences. Béné and Neiland (2006) argue that the two terminologies are similar and relatable but not interchangeable. They state that governance is about politics while management is concerned with action. Governance involves the sharing of power and responsibilities; it concerns the setting of objectives and policy agenda as well as the processes of implementing management measures. Management is about the implementation of actions and decisions in according to the rules in a technocratic manner. Co management is said to embody several principles of good governance: accountability, transparency, democracy, participation and legitimacy (Symes, 2006). This implies that co management can enable better governance as it potentially provides the kind of institutional arrangements and structures to support it, though this cannot be certain in practice.

These two concepts, governance and co management, have some characteristics and guiding principles in common, notably power sharing. Co management ensures power sharing and empowers those who in the recent past had little or without power in terms of managing the fishery resource. The governance concept takes into account the manner in

which power is distributed among the different stakeholders within the local community; how the people are engaged in the decision making process and how it affects their abilities to empower themselves as well as others. It aims to restructure relations in order to attain equal sharing of power (more of it) among interested stakeholders. Jentoft (2007) however cautions that power games and challenging of existing power structures are not eliminated by co management, hence he suggests that how power is shared within the fisheries management institutions should be questioned. Sharing of management and governing roles with non-state actors, predominantly resource users in the case of fisheries is a fundamental aspect both in co management and governance. Nunan (2010) states that co management as an approach that is widely accepted and understood cannot be essentially depended on to deliver the much needed enhancement in the management of fisheries resource. However improving fisheries governance through co management may strengthen the co- management's capacity to deliver through enhanced transparency, participation and accountability.

According to FAO (2018) Fisheries governance develops the principal objectives and principles of the sector. It unites the civil servants with the government hence harmonizing societal, sectorial and individual perspectives and maintain social stability and order and productive socio -ecological systems. Fisheries governance creates regulatory and policy frameworks. It further legitimates and balances interactions among the shareholders, implements decisions and regulations and maintains coherence across jurisdictional and time scales. Finally, it conditions the allocation of power, resources and benefits and maintains the governance system capacity to learn and change.

Rule of law is defined as the application of state power guided by and using published written standards that embody widely accepted social values and has a broad based public support (Johnstone, 2016) Rule of law is one of the key indicators of fisheries governance as it clearly spells out the standards and enforcement actions for institutions that manage the resource. In Kenya the provisions are made in the Fisheries Management and Development Act 2016 and Fisheries (Beach Management Units) regulations 2007. The rule of law also gives a broad based assessment of the civil society, representation, social support and compliance with policy for the community (Johnstone 2016). Rule of law is

one of the outcomes to be observed as being abided to in the management of Beach Management Units.

Accountability is the process in which officials and those seeking to influence them have to follow established structured rule that define the acceptable processes and outcome. They also have to clearly showcase that they have followed these procedures (Johnstone 2016). Accountability involves formal checks and balances that an institution is to have and it should be built into any constitutional architecture/structure. Accountability also requires external energy that insist that those in power should follow legitimate mandates and explain their actions. These include interest groups, people, civil society, the courts, the opposition parties and the media. This is also applicable within the managing bodies for instance BMUs as one part (assembly) can hold the other (committee) accountable for its actions.

Transparency requires that official or government officers should ensure that information is available to all and there has to be individuals or groups with reasons and opportunities to disseminate the information. These can include a responsible and reliable press, independent judiciary and an active civil society. As a result, transparency relies on a partnership between the government and community. The procedures and rules must be easily comprehensible to the community at stake hence making it open to scrutiny. An ideal transparent government should make it clear what is being done, what actions are taking place and in which manner, the individuals involved and by what standards the decisions are made.

Afterwards it should demonstrate that it has abided by those standards. It also has necessary limits: legitimate issues of security and the privacy rights of citizens form two such boundaries (Johnstone, 2016). Transparency enables the community to be informed of the rules and regulations governing a resource, the management plans put in place and those involved in the governing. This creates trust among the community and enhances the rate of compliance to the laws and rules. It also gives the community a ground level playing fields where they can protest to certain actions/ rules that may endanger the fisheries and subsequently put threaten their livelihoods.

Active and equal participation of the community in decision making ensures that the agreement is reached on mutual understanding of the challenges and management strategy put in place. The quality and effectiveness of a participation depends on the involvement of all stakeholders in decision-making. This is from the creation of a decision/ rule to its implementation. As a result there will be greater confidence in the end result and in the institutions that make political decisions. Participation of communities is provided for in the Constitution of Kenya, 2010 especially in the management of natural resources. As such BMUs are expected to engage the community in the management of the resource through participation. This will enable the management body to incorporate indigenous knowledge with scientific findings hence leading to a sustainable development of the fisheries.

## **2.9 Fisheries of Lake Victoria**

Lake Victoria supported various species fishery dominated by haplochromines cichlids and tilapiine until the 1970s. There were more than 20 genera non cichlids fishes, important subsidiary fishery. These were the lungfish (*Protopterus aethiopicus*), catfish (*Bagrus docmak*), *Schilbe intermedius*, *Clarias gariepinus*, *Synodontis spp* and *Labeo victorianus* (AU-IBAR, 2016). With the introduction of some species in the 1950s, the above mentioned species declined and eventually disappeared. The introduced species were *Tilapia zilli*, *Tilapia rendalli*, *Lates niloticus*, *Oreochromis niloticus* and *Oreochromis leucostictus* (Kayanda *et al.*, 2008). The predation by Nile perch *Oreochromis niloticus* caused a reduction of the haplochromines hence its fish biomass decreased from 83% during the 1970s to 1% in the mid-1980s. This was topped up with competition of food and space by *O. variabilis* and *O. esculentus* causing near extinction of indigeneous tilapiines.

Lake Victoria has experienced dramatic ecosystem changes in the recent past resulting to the extinction of more than 500 endemic haplochromine species (LVFO, 2015 a). The lake ecosystem and its satellite wetlands currently sustains more than 190 different fish species. The commercial fishery is dominated by three species; the Nile tilapia (*Oreochromis niloticus*), the predatory Nile perch (*Lates niloticus*), and Dagaa (*Rastrineobola argentea*) constituting over 95 % of total fish catch in Lake Victoria (AU-



IBAR, 2016). From the catch Assessment Surveys, the total fish landings from 2011 to 2014 have been approximately 1 million tonnes with an increasing beach value from US\$ 550 Million in 2011 to US\$ 840 Million in 2014. The estimated production of Nile perch was 198,624 tonnes in 2011 with slight increase to 251,063.0 tonnes in 2014; while Dagaa production was 456,721.20 tonnes and increased to 509,598 tonnes respectively. This shows that the value of Nile perch in 2014 at beach level was relatively high compared to that of Dagaa. The export value of Nile perch is estimated to be US \$300 million, this increase is due to the new market and high price for fish maws (LVFO, 2015b).

World bank 2009 states that production of fish from Lake Victoria is approximately 1,000,000 metric tonnes per annum and income generated from the resource provides nutrition and food security and subsequently supports more than three million livelihoods partly by providing direct employment for more than 800,000 individuals. The assessment of World Bank further states that the lakes fishery contributes to the GDP of the member states as follows: Uganda 3%, Tanzania 2.8% and Kenya 2%.

## **2.10 Theoretical Framework.**

### **Common Pool Resource Theory**

Common Pool Resource theory states that property/ ownership rights and user rights has a huge bearing on how the natural resources are used. It determines who is able to access the resource, when and in which form it can be used. Dietz et al 2003 states that CPR are resources to which many individuals have access to and a person's consumption reduces the availability of the resource to others. Property rights includes: rights to use and consume the resource, to exclude others from its use, to obtain income from it, and to transfer these rights temporarily or permanently through sale. These rights are generally unrestricted despite them being exclusive. This means that the government always limits the owner's options by imposing regulations in terms of how they can use the resources (Bressers and Kuks, 2004). In this regard, the fisheries resources can be exploited only under regulations such as seasonal and area restrictions of fishing grounds and gear restrictions (Eggert & Ellergard 2003). It is important to note that whereas fishers have

'user' right, they lack absolute 'ownership' rights. This implies that they are unable to exclude others from using the resource despite having the right to utilize it and obtain income from it.

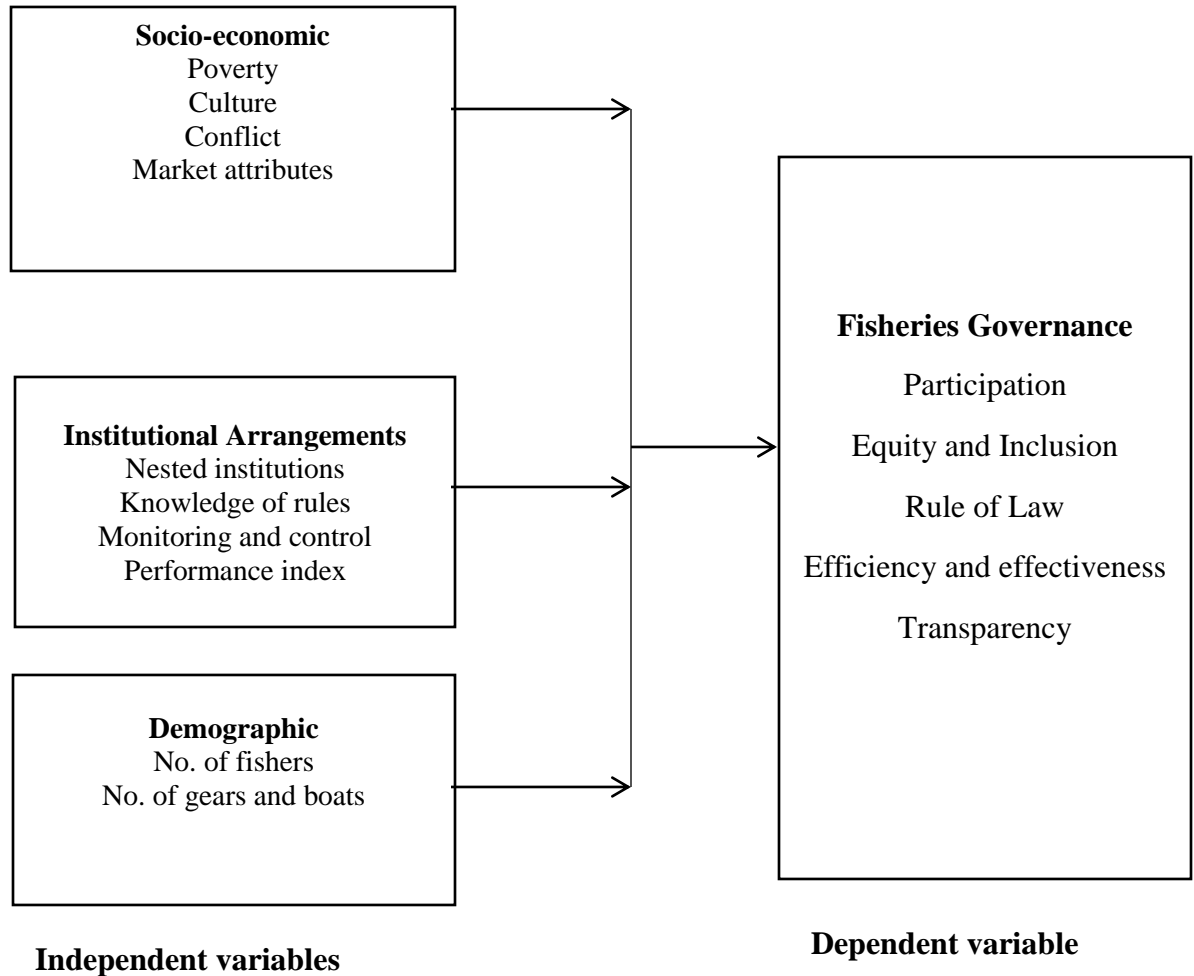
This theory came to existence after scholars challenged the assertion of tragedy of commons. Common pool resources are accessible to people hence liable to overuse leading to tragedy of commons. Basutro (2015) states that this phenomena occurs when the interest of individuals and groups are in conflict. He takes note of the fishing sector in particular stating that fishermen will be tempted and ultimately harvest a lot of fish as possible, because if they do not, others will. The tragedy of commons occurs in the long run which was not intended for but would be better avoided in the first place. The common resource theory argues that the tragedy of commons has been avoided where institutional arrangement are present. Majority of the arrangements aimed to regulate individual actions through rules that users agreed to abide by so that everyone could take into account the social; benefits and cost of using the common- pool resource.

According to Sterner & Kathuria (2002) there are principles for managing common pool resources. These include: a) clearly defined boundaries which enables the management to shut people out and effectively manage those on the inside; b) Usage and maintenance rules should be adapted to the local conditions c) decision making should be democratic in manner, this implies that users such as fishermen can participate in the process; d) Effective monitoring to be done by the users themselves. Observing activities of the other party should be included in the process itself; e) Graduated sanctions should be implemented that are adapted to local knowledge and situations, and starts with weak punishment and increases; f) Mechanisms of conflict resolution that are cheap and of easy access and built into the system. g) Government should approve the institution. Local formation of the processes and rules, bottom up, must be view as legitimate higher up in the hierarchy, in a company for example. In practice, this means that things must be decided and formed from the bottom and up, and it must be alright from the top and down. h) In the case of larger common-pool resources, organization in the form of multiple layers of nested enterprises, with small local CPRs at the base level, that is: to handle larger common we nest meeting places, from the bottom up (Ostorn, 2015).

Ogello *et al.*, 2013 states that Lake Victoria is an example of a common pool resource. Individuals using Lake Victoria have jointly come up and established agreed rules and regulations in order to improve their joint outcome. This is seen in the establishment of Beach Management Units along the lake and on Island- Migingo where fishers and boat owners have converged to formulate rules in order to ensure sustainable fishing activities. These rules include but not limited to restriction of fishing gears, limitation on fishing vessels, closed seasons and areas. The BMUs in the lake have the same guidelines on their formation and operation. As such the different BMUs' regulations are in harmony with each other, this also applies to the bylaws that are passed and implemented. This institutional framework, BMUs, represents individuals jointly setting agreed rules that they adhere to hence furthering the group's interest by fishing sustainably. As a result the regulations in place avoids the situation of 'tragedy of commons'. The common pool theory was chosen for this study as it offers a set of principles that are similarly present in the BMUs that aid in attaining success of managing common pool resources. Given the common resource theory that addresses the key role of institutional arrangement and collective action in the management of the CPR, it was found to be a suitable theory. Furthermore the theory supports decentralization and local management reforms as is the case in this study.

## 2.11 Conceptual Framework

A conceptual framework shows the relationship between the dependent variables and independent variable in a diagrammatical manner (Kothari 2014).



**Figure 2.1: Conceptual Framework modified from Institutional Analysis framework (Obiero *et al.*, 2015)**

Conceptual frameworks are useful in providing a set of possibly relevant variables and the attributes to use in the design of data collection instruments, field work conduct and the analysis of findings about the sustainability of framework chosen. This helps in the identification of factors that may affect the likelihood of particular policies enhancing sustainability in one type/ size of a resource system. Institutional Analysis framework (IAF) was identified and used in the examination of key factors affecting the BMU institution and co management outcomes in the fishery of Lake Victoria. Institutions constitute the central element in co management analysis. In this framework, an institution is defined as the rules of the game in a society; or the humanly devised constraints that shape human interactions and are affected by social, cultural, economic factors. The IAF framework aids us to have a better understanding of the multidimensional relationships of casual influences arising from socioeconomic, biophysical, demographic and institutional and that are part of and affect the institution (Agrawal, 2001). Ostorm *et al.* (2009) states that these casual classes are instrumental in influencing the resource governance outcomes.

These casual variables may have an impact on the management of the BMUs. As a result it will affect the governance of fisheries. Socio economic variables have an impact on the management of BMUS. The market attributes under the economic variable, influences the incentives for resource use activities, effort levels and enthusiasm for compliance with fishing rules. Abila *et al.* (2015) notes that some of the market variables include stability of demand and supply in terms of quantity and price, market structure, market availability and location, credit/ market relationships and changes in market and market operations. Poverty may inhibit the amount of knowledge and information available to the community hence unable to understand and abide to the rules put in place. It may also lead to overexploitation of the resource with the use of illegal gears in order to increase their earnings and improve their livelihoods. Poverty can also hinder the fishermen from acquiring efficient modern gears that lead to increased fish catches. Culture has a bearing on the fishing activities, such that the Luo (predominant Kenyan tribe in the island) men are tasked with fishing while women have the role of processing and trading the resource.

It is argued by the community members that women were not allocated the task of fishing due to its labor intensive nature and their presence on turbulent waters puts their dependents at risk as they are the backbone of the families. They also mostly engage in fishing activities at night. Conflict within and among the BMUs as well as between the two countries claiming jurisdiction for Migingo Island poses a challenge in the management of the fisheries resource. Lack of peace and harmonization of regulations governing the fisheries can eventually lead to gaps that gives room to over exploitation of the resource. Conflict may also lead to the exclusion of some users in harvesting the resource.

Institutional arrangements have an impact on human behavior and choice which ultimately affects the interactions and outcomes on the fishery resources. The institutional variables include those related to representation and inclusion of users in decision making processes; enforcement of rules and regulations; creating awareness of the laws and rules that support the management of the fisheries resource; monitoring, control and surveillance and cooperation, collaboration and coordination with external authorities such as other BMUs in the region and the Fisheries department under Ministry of Livestock, Agriculture and Fisheries. Abila *et al.* (2015) states that institutional arrangements structured by related variables shapes the incentives and disincentives the resource users face to coordinate and cooperate in resource governance, use and management hence affecting the users' actions.

Demographics factors include the number of boats and gears operational in the lake, number of fishers per unit area among others. These attributes affects the catch per unit area as the higher the number of fishers and boats there are, the more there is competition hence reduced catch per unit area. Advanced fishing gears has a bearing on the fish catches for example use of motor (engine) boats as compared to boats that are paddled and sailors. The demographic attributes may have an effect on the management of the fisheries resource since as the numbers of boats and fishers increase the more difficult it is to monitor and control their fishing activities by the authorities in charge.

The biophysical characteristic of a resource usually influences the harvest behavior in terms of the fishing activity and technology. For instance, a perceived low fish population

in Lake Victoria can lead to a further overexploitation of the fishery by those using smaller nets to catch more fish. An individual's harvesting activity subtracts from the quantity of fish available for other to catch. Scholar have identified high levels of variation in biophysical factors and therefore resource flows, as the source of pressure for local cooperation and self-organization (Agrawal, 2001).

## CHAPTER THREE: RESEARCH METHODOLOGY

### 3.1 Introduction

This chapter covers the study area, research design that was employed during the study. It also focuses on the sampling technique and sample frame chosen for the study.

### 3.2 Study area.



**Figure 3. 1: Map of Lake Victoria, Migingo Island adapted from Daily Mail, UK.**

The study area is located in L. Victoria which covers 17% on Kenya's shoreline while Tanzania's and Uganda's shoreline is 33% and 50% respectively. Lake Victoria's total surface area is approximately 68800 km<sup>2</sup>. The Lake with a mean depth of 40m, straddles the equator and touches it on the northern reaches (Awange and Ong'ang'a, 2006). Migingo Island covers a total surface area of 0.49 acres. According to Wikipedia (2019) Migingo Island along with the other two are shown to be on the Kenyan side, when 1926 the Kenya Colony and Protectorate Order in council awarded the islands to Kenya. The Island is located east of the border of Kenya and Uganda, approximately 510 meters away within the lake. The land in Migingo is rocky, rugged and with little vegetation. It is one of the three island in close proximity.



The largest of the three is Pyramid Island located south of Migingo Island approximately 2 kilometers away and to the north, 11 kilometers from the Tanzanian border. To the east of Migingo, about 200 meters is Usingo Island. The Island is reported to be 10 to 15 meters above the lake level. Migingo Island is known as the iron clad island due to the iron structures (dwellings) all over it.

According to the Kenyan census in 2009, the population of the island is said to be 131 people. The densely populated Island has citizens from the three neighboring countries namely; Uganda, Kenya and Tanzania. Majority of the inhabitants being fishermen and fish traders since the surrounding waters are good fishing grounds for Nile perch, the fishery which is quite lucrative. Migingo Island was claimed by both Uganda and Kenya during the period of 2008 to 2009. A diplomatic row occurred as a result over the territorial ownership of the Island. Joint re-demarcation of the border line was done on June 2009 and it was established that indeed the island was on the Kenyan side. The Ugandan leaders agreed with this but added that the Kenyan fishermen were illegally fishing in their territorial waters. This has been the main bone of contention between the two countries and subsequently there has been relative peace in Migingo, with conflict occurring sporadically.

### **3.3 Research Design**

The study is a qualitative research that used a descriptive research design. This research design is described as a particular phenomenon or situation under study. Lambert and Lambert (2016) states that the aim of qualitative descriptive studies is to obtain an in depth summary of specific events experienced by individuals or groups of individuals. This approach is useful to researchers as they want to know, regarding events what was involved, where did things take place and who were involved. The qualitative nature of data that is mostly collected is knowledge, attitude, beliefs and opinion of the people. According to Kothari and Garg (2014) in descriptive research design requires the researcher to accurately define what he desires to measure and find acceptable approaches for measuring it. This is to be done hand in hand with a well-defined population he aims to study.

### **3.4 Target Population**

Target population is defined as all members of a real hypothetical set of objects, people or events from results of the study will be generalized from by the researcher (Borg *et al.*, 2001). The study focused on the BMU members and major stakeholders who comprised of boat owners, fishermen/ boat crew, fish traders and service providers. These individuals were the main stakeholders in the fishing sector as they were on a daily basis directly engaged in the domain. Their insight, knowledge and input was essential in the study of the BMUs.

### **3.5 Sample Frame**

A sample frame comprises of all units that are potential members of samples being selected (Kothari and Garg, 2014). The sampling unit for the study was the Misingo BMU. This institution brings together the different stakeholders for the co management of the resource. The opinions of the BMU members and stakeholders are sought so as to gain an understanding of fishery management-related activities and the variables that might affect these activities. Kothari and Garg (2014) notes that the list of sampling units should be correct, comprehensive, reliable and appropriate. They further note that it is of great importance for the source list to be representative of the population as possible.

### **3.6 Sampling Technique and Sample Size**

The survey made use of a two stratified random sampling technique in order to achieve its purpose and obtain a representative sample. Under the stratified sampling, population is divided into several subpopulations that are generally more homogenous than the total population. The subpopulations are called 'strata' and then items are selected from each stratum to constitute a sample (Kothari and Garg 2014). As a first step, participants were chosen based on their membership in the Misingo BMU. They were selected to gain a deeper insight on fisher management related activities and the variables that may have an impact on these activities. Secondly the participant were selected based on their occupation, those that are direct stakeholders in the fisheries resource. These were boat owners, fishermen, traders and service providers. From these two strata the respondents were selected randomly ending up with a total of 50 respondents. The advantage of this

method was that it gave the guarantee of equitable distribution of wanted population characteristics through the selection of persons in the strata list and minimize selection bias and hence sampling error (Monyi and Namusonge, 2017)

According to Thomas (2013) it is important that a sample should be large enough to be used so that the obtained effect or results will be of practical significance and has higher probabilities of being detected from the study. A proportionate size of approximately 50 respondents out of 131 the islands population were selected for the study. Mugenda (2003) indicates that a sample size should be an adequate sample for reliable data analysis and allows testing for significance of differences between estimates.

### **3.7 Data Collection**

#### **3.7.1 Primary Data**

This is the collection of data from the initial source or source of information. The primary research was conducted through observations and using questionnaires and semi structured interviews. These contained a set of questions that was filled by either the researcher or respondent. Orodho (2009) states that questionnaires is quite preferable due to its ability to collect large amounts of information, ensure anonymity, takes a short times span, permits the use of standardized question and have uniform procedures beside being in easier to complete.

During field visits, observation was used as an overarching method for the research project. This was through informal conversations with locals and participation in daily activities so as to gain insights and knowledge of structures, traditions, ways of living, and worldviews.

The questionnaire had both closed and open questions which will be predetermined and standardized. For easy analysis, close ended questions were used as they were in immediate usable form and were easier to administer and economical in terms of time and money (Mugenda *et al.*, 2003). The open ended questions on the other hand gave respondents the freedom to answer them in their own words. The responses gave an insight into the respondent's feelings, background, attitudes and knowledge. The

administration of questionnaires was useful for selecting respondents for the semi-structured interviews. The questionnaires were administered to the stakeholders in the fisheries sector- boat owners, fisher folk, traders and service providers.

The questionnaire consisted of five main sectors. The first section covered the bio data of the target population. The second section focused on the management of the BMUs that involved its structure and function. Section 3 enquired about the implementation of the regulations. The fourth section focused on community participation and the fifth on the effect of the management of BMUs on fish stocks.

As the main component of this research was concerned with current operations of the BMUs, semi-structured interviews (SSI) will play a central role. Key informants such as representatives from the county government, the fisheries director as well as the chosen members of the BMUs are expected to conduct interviews with, in order to give insight into the topic of study.

Interviews provides the interviewer with a unique opportunity to engage with the respondent in a structured, yet informal way. As it is open-ended, the interview can take as many directions as the interviewer lets it, which creates opportunities for new knowledge and insights. The major objective of a SSI is to gain knowledge about the individual's point of view (Strang, 2010; Mikkelsen, 2005).

### **3.7.2 Secondary Data**

This was obtained from extensive and thorough literature review through the internet, review of journals, books, articles, published and unpublished theses, Constitution of Kenya 2010, Fisheries (Beach Management Units) regulations 2007 and other international, regional and national legislations. The researcher made use of the data from the management of BMUs from the fisheries department in Kenya.

### **3.7.3 Data Analysis and Presentation**

Once the data was collected, the kit was sorted such that identification of incomplete or inaccurate responses were corrected to improve their quality. Data was then coded and entered in a computer worksheet- Statistical Package for Social Sciences (SPSS) version

20.0 and Excel for further analysis. Qualitative data was analysed using content based on analysis of meanings and implications emanating from respondents' information and documented data. This kind of data provided insightful explanations and descriptions that demonstrated the chronological flow of events as well as leading to chance findings. Afterwards, simple descriptive statistics such as frequency counts, means and percentages were used to analyze this data. The results were presented using frequency distribution tables and bar graphs. Quantitative analysis goes further to test the theories in the theoretical framework behind the study and prove or disapprove it.

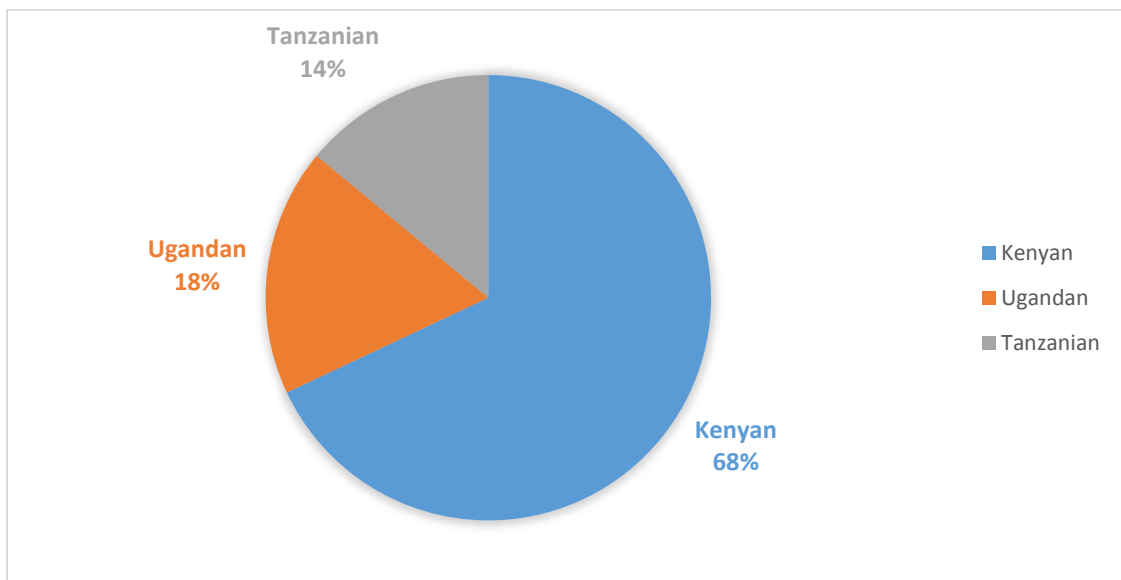
## CHAPTER FOUR: RESULTS

### 4.1 Introduction

This chapter presents the results of the study findings, taking into consideration the research objectives, questions and hypotheses. The findings were entered in the Statistical Program for Social Sciences and the results were presented in tables, charts and graphs.

### 4.2 Demographic characteristics

#### 4.2.1 Nationality

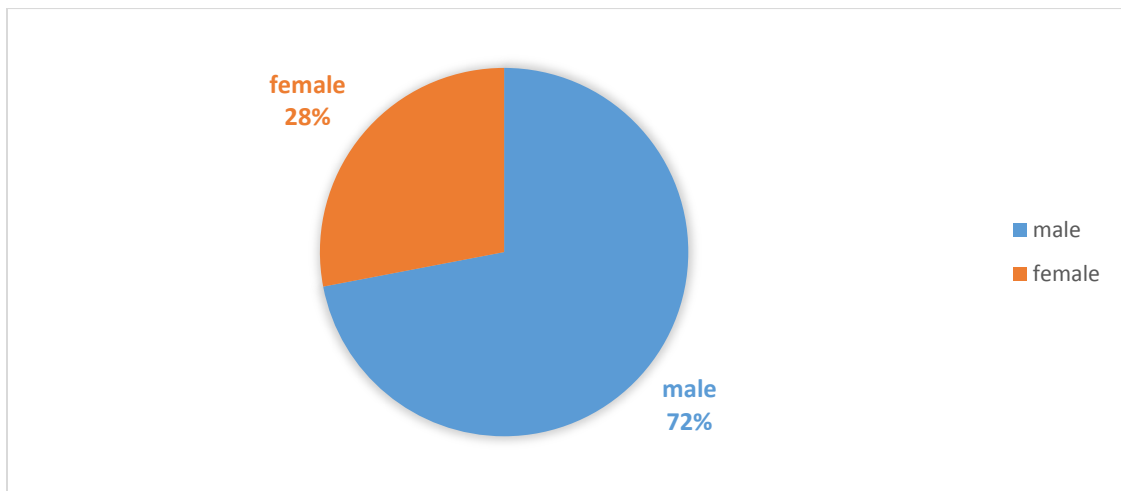


**Figure 4. 1: Pie Chart of Respondents' Nationalities**

The respondents under the study were Kenyans 68% while 18% were Ugandans and 14% Tanzanians. The Islands population consists of the three mentioned nationalities due to its central location in the lake and the neighboring good fishing grounds. Most of the respondents were Kenyans due to the close proximity of Migingo Island to the Kenyan coast as compared to the other two countries. The islands population consists mainly of migrant fishermen from the three countries hence dynamic in nature.

Most of the fishermen opt to return and reside on the mainland due to the islands high population density 65,000 kilometer square (Wikipedia) and lack of or poor essential amenities such as schools, health care, electricity and sanitation facilities. It is however important to note that the Island's economy is heavily dependent on the fisheries resource and uses the Kenyan shilling currency. This is because it has the highest valued currency unit among the three countries currencies. This implies that Ugandans and Tanzanians earn more when they land their catches at the Island since the transactions are done in Ksh.

#### 4.2.2 Gender



**Figure 4. 2: Pie chart of Respondents' gender**

The male represented 72% of the respondents in the study while 28% were female. This can be attributed to how the roles in fishing activities within the region are divided according to gender (Lwenya *et al.*, 2018). Majority of the fishermen, boat owners and service providers are male while traders and fish processors are mostly female.

### 4.2.3 Position in Beach Management Units and occupation

**Table 4. 1: Cross tabulation of the position in the BMUs and occupation of respondents**

	Occupation				Total
	Boat owner	fisherman	Service providers	Trader	
position committee	18%	2%	4%	6%	30%
non member	6%	32%	14%	18%	70%
Total	24%	34%	18%	24%	100%

The respondents in the study were nonmembers of the BMU but direct stakeholders in the fishing domain. These mostly consisted of fishermen, boat owners and service providers. The BMU committee members formed 30% of the respondents while 70% were non-members of the Migingo BMU. These figures can be attributed to the fact that the Migingo BMU comprises only of a committee and lacks an assembly. The representation of fishermen in the BMU committee was poor while boat owners was high. From the table above it can be observed that the occupation of an individual has a great impact on their position in the BMU committee. Boat owners are more likely have a higher chance of being committee members than traders, service providers and fishers. This implies that they generally have a strong influence on the decision making processes of the fisheries management in the Island.



#### 4.2.4 Occupation and Education.

**Table 4. 2: Cross tabulation of occupation and education of respondents**

		Occupation				Total
		Boat owner	fisherman	trader	Service providers	
education	primary	10%	20%	8%	4%	42%
	secondary	16%	14%	8%	12%	50%
	tertiary	0%	0%	6%	2%	8%
Total		26%	34%	22%	18%	100%

Most of the respondents had basic education, 42% had reached the primary level while 50% had attained secondary education. The remaining 8% had reached the tertiary level. Education is an important factor in the development of a community as it empowers individuals, enlightens their thought process and enables them to make informed decisions that will positively impact their region. 92% of the respondents have basic education (primary and secondary) and it could be attributed to the high poverty levels in the region. Indicators of international poverty includes; inability to acquire the basic goods and services necessary for survival with dignity, low levels of health and education, income of less than \$1.25 a day, poor access to clean water and sanitation, inadequate physical security, lack of voice and insufficient capacity and opportunity to better one's life (World Bank, 2008). These indicators are similar to those on the Island for lack of health facilities and schools, inadequate sanitation facilities and inadequate physical security.

The respondents were mainly fishermen and boat owners, 34% and 26% respectively while the traders were 22% and service providers were 18%. These respondents are the main stakeholders in the fisheries management and they have vast knowledge on the resource in terms of economic and ecological factors. From the table above it can be concluded that majority of the traders were highly educated unlike the fishermen and boat owners. The fishermen are particularly a disadvantaged group. This is because they are direct stakeholders in the fishing community and they should be in a position to fully

comprehend the rules and regulations of the resource. In this event of them having basic education, they are vulnerable to their rights being exploited and unequal distribution of benefits

### 4.3 Management of Beach Management Units

#### 4.3.1 Structure of Beach Management Units

**Table 4. 3: Table of respondents’ view on the representation in the BMU committee**

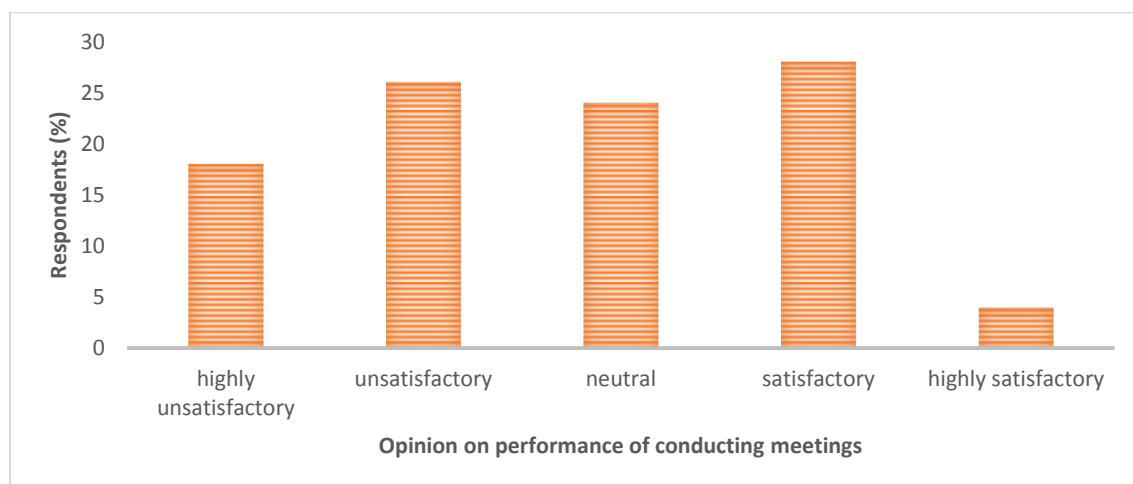
Group	Low	Moderate	High	Total
Women	92%	8%	0%	100%
Boat owners	4%	22%	74%	100%
Traders	42%	50%	8%	100%
Fishermen	70%	18%	12%	100%

From Table 4.3 various stakeholders are represented in the BMU committee. This enables exchange of ideas and adaptation of the best practices in managing and governing the fisheries resource. Muigua (2016) states that allowing and encouraging views from different groups to affect the outcome may increase the compliance, deter violations, and contribute to a more realistic and responsive management of natural resources. As indicated in the table the gender representation in Migingo BMU was low, this shows that there are few women in the BMU committee compared to men. According to Lwenya *et al.* (2018) the division of labor in Kenya’s fishing community is clear cut and it is culturally defined. Traditionally men have been known to spend more time in fishing than women. This can be attributed to the labor intensive nature of fish harvesting usually taken up by men and women’s role of taking care of the family that requires them to attend to household matters. As a result of this division, women have been marginalized in the decision making process of the management of the fishery resource hence few are represented in the BMU committee. Boat owners on the other hand are reported to have a higher number in the committee.

According to Nunan (2007) when it comes to fishing- related decisions, boat owners are main decision makers. They invest in the fishing industry, consider input needs such as boat repairs and cost of nets, oversee the sale of fish and payment of crew as well as monitor the catches. Their numbers in the committee can be attributed to the above mentioned critical roles they play. This implies that they can sway the decision making process to their advantage at the expense of other groups. There is therefore a reduction in the diversity of solutions and alternatives in managing the BMU as the boat owners may intimidate and even frustrate efforts from the groups with fewer representation. The representation of traders is reported to vary between low and moderate while fishermen are deemed to have low numbers in the BMU committee.

#### 4.4 Functions of Beach Management Units

##### 4.4.1 Conducting meetings

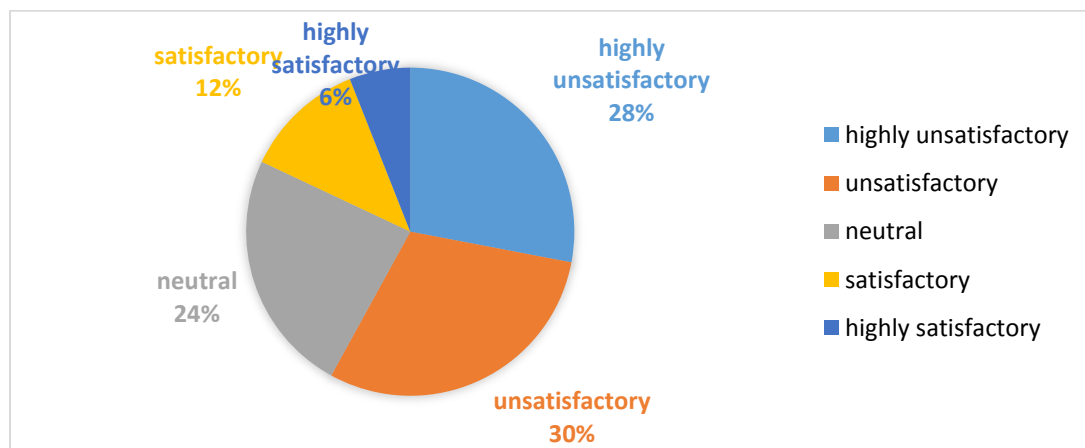


**Figure 4. 3: BMUs performance on conducting meetings**

From the study that was conducted, most of the respondents were not satisfied with the BMUs performance on conducting meetings. The table above indicates that 18% and 26% of the respondents were highly unsatisfied and unsatisfied respectively. 24% had a neutral stand while 28% were satisfied and 4% were highly satisfied. According to Ogwang (2005) the harmonized BMU guidelines state the BMU assembly should have meetings once every three months while the BMU committee should meet once every month, both meetings should be convened by the chairperson. Conducting meeting has

been used as an indicator of BMU performance (Luomba, 2013) because this is an avenue for promoting dialogue between representative stakeholders' hence enhancing participation and transparency. This platform makes room for discussion of the effectiveness of the present management plan, strategies to be amended or introduced and formation of bylaws that seeks to enhance sustainable fisheries and improvement of livelihoods. Pomeroy *et al.* (2011) argues that co management should be viewed as a process of resource management, not as a single strategy to solve all problems of fisheries management, that matures, adjust and adapt to changing conditions over time. As such conducting meetings on a regular basis enables the review of strategies that matures over time to adjust to changing conditions in order to be effective and efficient in the long run.

#### 4.4.2 Patrols of fishing grounds



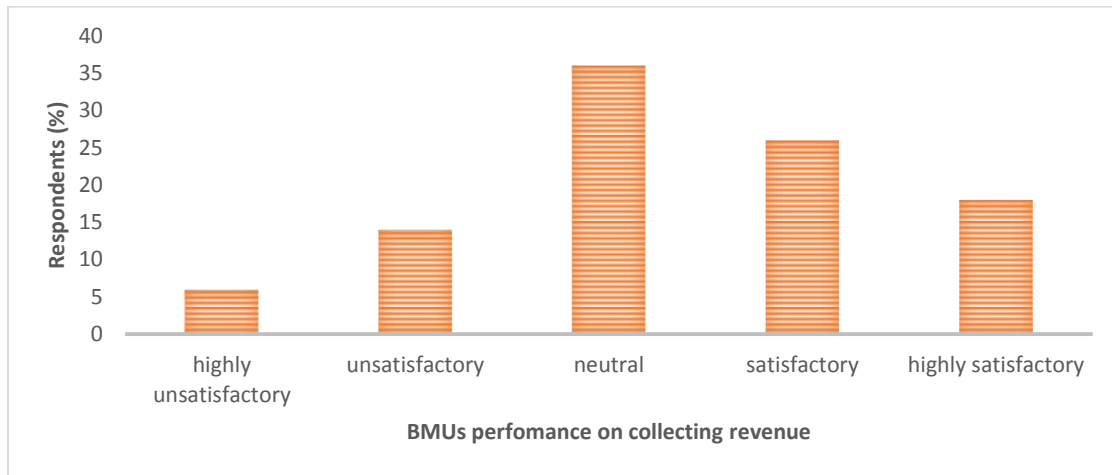
**Figure 4. 4: BMUs performance on patrolling fishing grounds**

Patrols on the fishing ground are made to ensure compliance to the regulations in order to reduce the incidences of illegal unregulated and unreported fishing activities. BMUs are tasked with patrolling fishing grounds in order to facilitate sustainable fishing activities. Respondents from the study revealed that they were unsatisfied with the patrol activities, 30% unsatisfied while 28% highly unsatisfied. 24% took a neutral position while 12% were satisfied and 6% highly satisfied with the patrols efforts put in place by BMUs. From the semi structured interviews, this observation corresponded with the management

of the BMU as the chairman stated that the Kenyan national and county governments had failed to purchase a patrol boat for their use- Mingingo BMU.

This has therefore hampered their efforts to undertake this activity. However the Ugandans have a patrol boat that is used to ensure that fishing vessels have registration numbers and that other nationalities don't wander into their fishing grounds. Patrolling of fishing grounds represent the Monitoring, Control and Surveillance (MCS) function of Beach Management Units. The MCS function usually acts to reduce and stop illegal, unregulated and unreported (IUU) fishing. IUU fishing is usually in the form of; Illegal fishing and fish landing, illegal or misuse of fishing gears, unregulated, unreported or undocumented domestic and regional fish trading, fishing during the legally closed seasons or in closed breeding areas and fishing of undersize fish and landing them in undesigned landing sites (Kariuki 2012).

#### 4.4.3 Collecting revenue

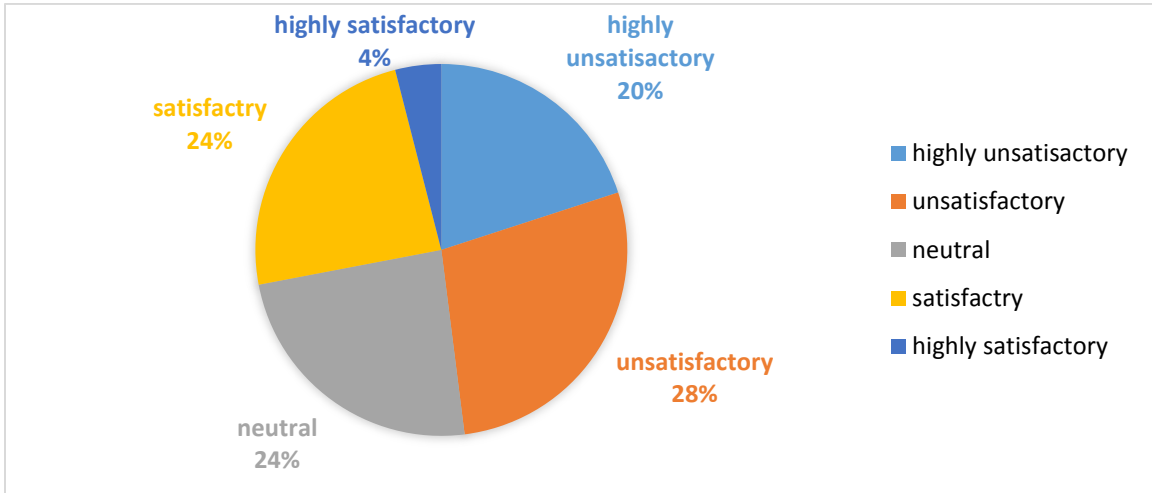


**Figure 4. 5: BMUs performance on collecting revenue**

Collection of revenue is a source of income that enables the BMU to undertake its roles and operations effectively. Majority of the respondents were satisfied with this activity, 26% were satisfied and 18% were highly satisfied. Quite a number, 36% were not sure of the performance. Few of respondents 6% stated that they were highly unsatisfied and 14% unsatisfied with the efforts put in place to collect revenue. The chairman of the

BMU stated that they imposed a 20% commission on the total quantity of fish landed in the Island per boat/vessel.

#### 4.4.4 Formulation of by laws



**Figure 4. 6: BMUs performance on Formulating by Laws**

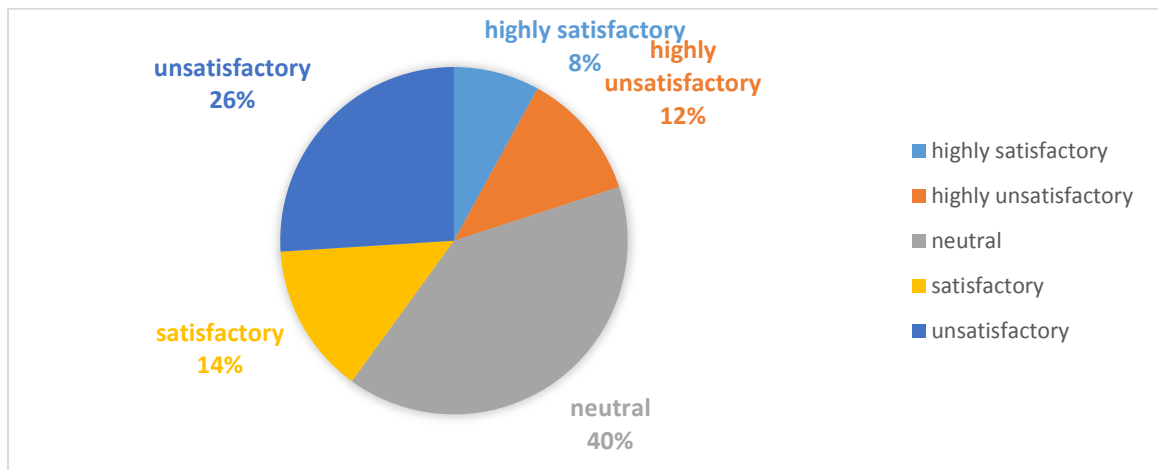
Bylaws are rules that govern a specific BMU and are in harmony with the BMU regional guidelines. However it needs to be compatible with the general regulations and approved by the Director of fisheries. Most of the respondents indicated that they were highly unsatisfied 20% and unsatisfied 28% with the formulation of bylaws. 24% took a neutral stand while 28% were satisfied (4% highly satisfied and 24% satisfied). The unsatisfactory state of most of the respondents on the above mentioned function could be attributed to its non-participative nature, only committee members are involved in the formulation.

**Table 4. 4: Cross Tabulation of Frequency of Meetings and Formation of by Laws**

		Formulation of bylaws					Total
		highly unsatisfactory	unsatisfactory	neutral	satisfactory	highly satisfactory	
Frequency of conducting meetings	weekly	0%	2%	0%	0%	0%	2%
	monthly	2%	0%	2%	10%	0%	14%
	randomly done	18%	26%	22%	14%	4%	84%
Total		20%	28%	24%	24%	4%	100%

Majority of respondents indicated that meetings were conducted on a random basis. On the other hand most of the respondents were not satisfied with the level of formulating by laws by the BMU. The comparison between these two factors indicates that the absence of regular meetings makes it difficult for the BMU members to discuss arising issues and formulate bylaws that addresses the situation.

**4.4.5 Inventories**

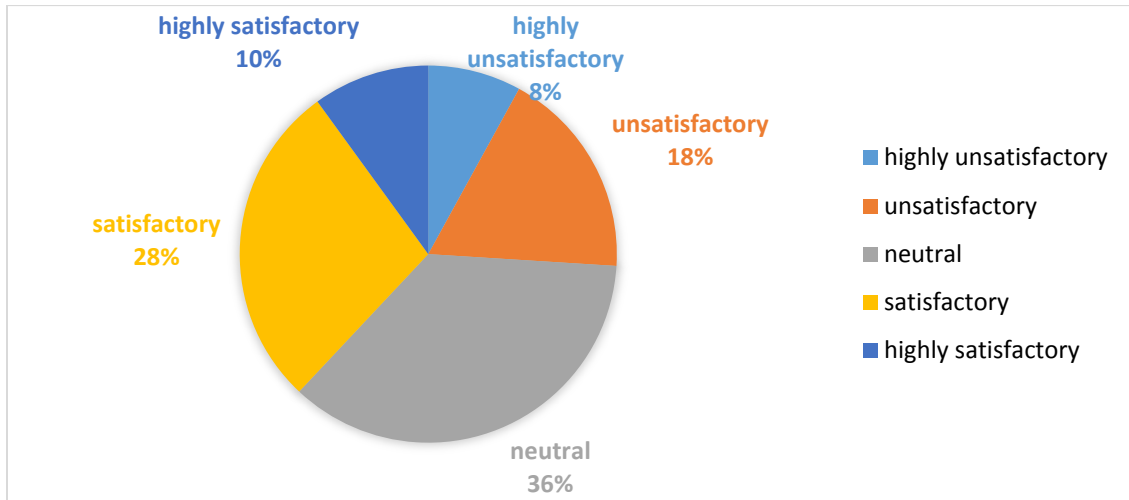


**Figure 4. 7: BMUs performance on keeping inventories**

Majority of the respondents were unsatisfied with the BMUs performance on keeping inventories- 12% highly unsatisfied and 26% unsatisfied. 40% took a neutral stand while 8% were highly satisfied and 14% satisfied. Keeping inventories by the Migingo BMU

seems to be a challenge that could hinder the collection of data for monitoring and future planning. The poor performance in this function could be attributed to lack of knowledge on how to perform it and its importance.

#### 4.4.6 Confiscating illegal gears



**Figure 4. 8: BMUs performance on confiscating illegal gears**

BMUs confiscate illegal gears in order to ensure that immature fish are not captured hence enabling the regeneration of the resource. 38% were satisfied with the efforts put in place to ensure that illegal gears were confiscated. A large number, 36% of respondents were unsure while 26% were unsatisfied with the interventions of confiscating illegal gears.



**Table 4. 5: Cross tabulation of the frequency of patrols and confiscating illegal gears.**

		Confiscating illegal gears					Total
		highly unsatisfactory	unsatisfactory	neutral	Satisfactory	highly satisfactory	
Frequency of patrols	daily	4%	2%	8%	4%	2%	20%
	monthly	2%	0	0%	0%	0%	2%
	never done	0	6%	12%	16%	6%	40%
	randomly done	2%	10%	16%	8%	2%	38%
Total		8%	18%	36%	28%	10%	100%

Table 4.5 shows the cross tabulation done for the frequency of patrols undertaken and confiscation of illegal gears. The respondents were contented with the confiscation of illegal gears by BMU. However majority also stated that patrols were randomly and never done, 38% and 40% of respondents respectively. This indicates that confiscation of illegal gears was not dependent on the patrol operations made by the BMU.

#### **4.5 Implementation of Regulations**

##### **4.5.1 Compliance.**

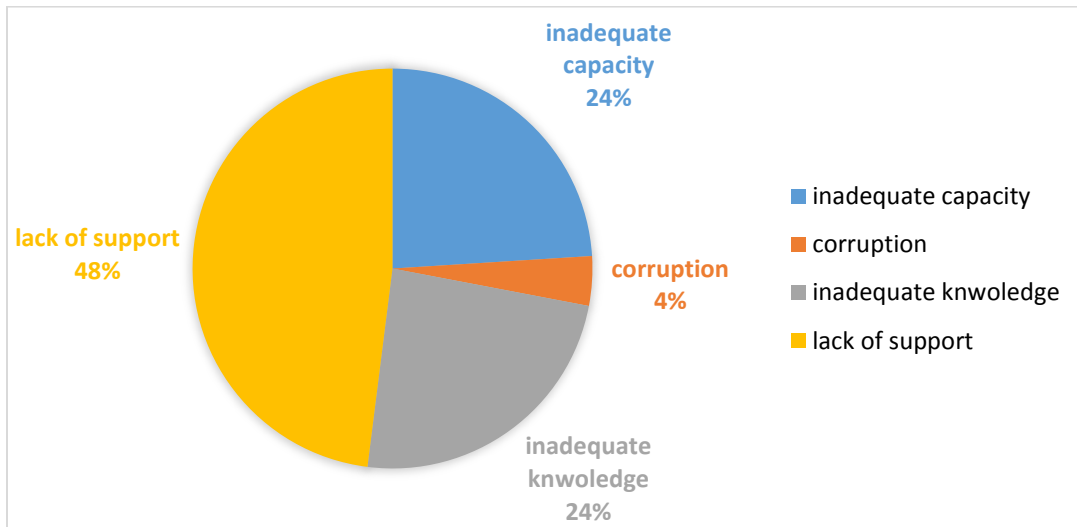
**Table 4. 6: Cross tabulation on compliance to regulations and frequency of patrols made.**

		Level of compliance			Total
		high	Low	medium	
Frequency of Patrols made	daily	2%	2%	16%	20%
	monthly	0%	0%	2%	2%
	never done	6%	2%	32%	40%
	randomly done	8%	12%	18%	38%
Total		16%	16%	68%	100%

Majority of the respondents 68% stated that the level of compliance to the regulations was moderate while compliance at both extremes were equal 16% low and 16% high. The table above reports patrols of fishing grounds is randomly or never done. The relation between the two factors depicts that patrols don't have any impact on the compliance to regulations.

#### 4.5.2 Constraints

According to majority of the respondents, 48% stated that lack of support from the national and county government was a constraint to the management of BMUs. The territorial conflict between Kenya and Uganda over the Migingo can be attributed to the minimal support of government to the BMU as they fear worsening the existent situation. Figure 4.8 reveals that inadequate capacity and inadequate knowledge were constraints in implementing regulations, each with 24%. Only 4% of the respondents stated that corruption was a challenge.



**Figure 4. 9: Constraints to the implementation of regulations.**

### 4.5.3 Availability of resources

**Table 4. 7: Table on the adequacy of resources**

Resources	More than adequate	Adequate	Inadequate	Not available	Total
Funds	2%	6%	50%	42%	100%
Equipment	4%	0%	38%	58%	100%
Manpower	16%	64%	8%	12%	100%
Legal power	44%	30%	12%	14%	100%

Funds were deemed to be inadequate by the most of the respondents under the study as 50% of the respondents attested to it. 42% of the respondents however stated that the funds were not available. Inadequate funds by BMU could be attributed to lack of support from the government as well as corruption since funds collected through revenue are not channeled back in to the development of the BMU.

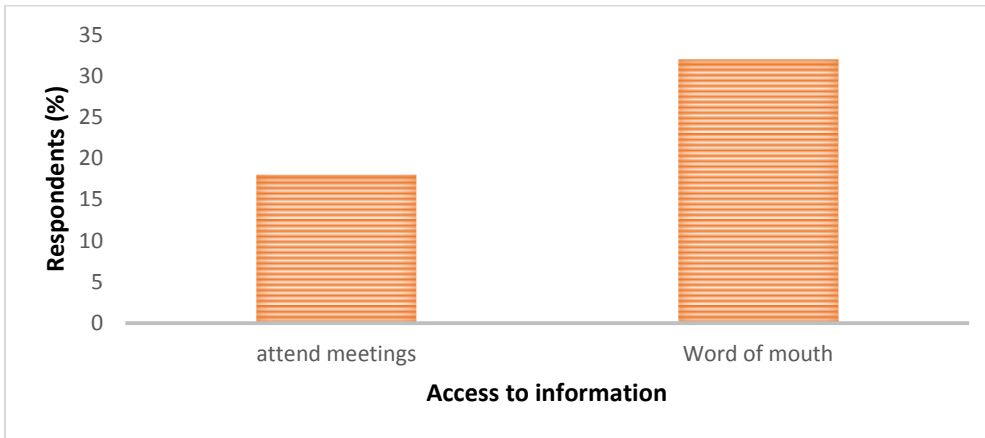
Equipment for undertaking management of BMUs was reported to not be available by 58% respondents. Additionally 38% of the respondents said that they were inadequate. Inadequate capacity of the BMU hinders them from acquiring adequate equipment that would enable them manage and govern the fisheries resource efficiently.

Most of the respondents attested to the fact that manpower was adequate as the island attracts citizens from Kenya, Uganda and Tanzania. Legal power was considered to be adequate by the respondents as a resource for BMUs to perform their duties. This could be attributed to the fact that BMUs are recognized under all the three countries and knowledge of the national fisheries regulations.

These resources are essential for the management of Migingo BMU as they provide the needed means to implement the regulations. Equipment such as outboard engines and boats, protective clothing, torch, communication appliances among others.

## 4.6 Community participation

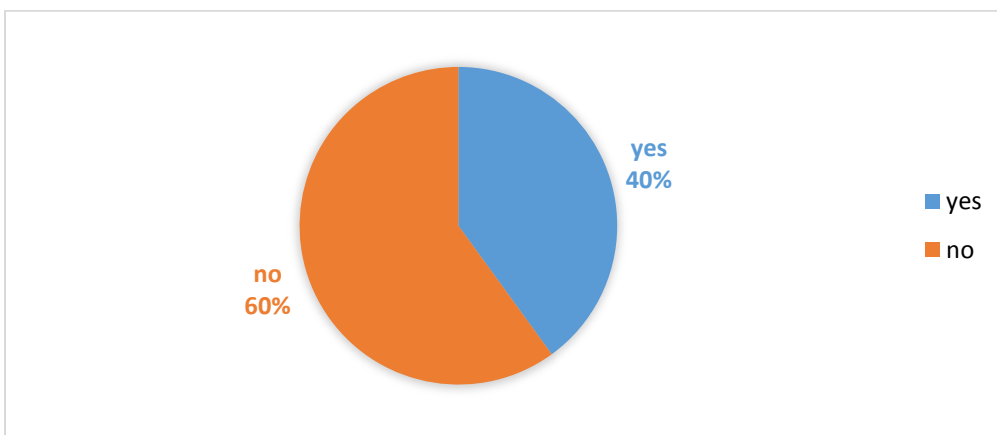
### 4.6.1 Access of Information



**Figure 4. 10: Respondents access to information concerning BMUs**

Information should be made widely available by the state to encourage public awareness and participation (Muigua, 2016). Access of information is limited due to the inadequate infrastructure of the Island- no electricity. From the study that was conducted, 64% of the respondents accessed information pertaining to the management of BMUs through word of mouth. This kind of communication could lead to information being distorted therefore unable to achieve its intended purpose. The remaining 36% indicated that they attended meetings hence acquired the information. This occurrence could be attributed to the fact that BMU committee members are the only respondents who attended meetings.

### 4.6.2 Interest of the Community



**Figure 4. 11: Community's interest represented in management of BMUs**

Direct user involvement in negotiations is believed to increase the legitimacy of rules and leads to better compliance (Muigua 2015). The figure above shows that majority of the respondents 60%, felt that the community's interest were not being represented by the BMU. The rest, 40% had the alternative opinion. Most of Migingo's occupants felt ignored by the BMU as their opinions were rarely sought after as they are excluded from meetings and they could hardly access information on BMUs operations.

#### 4.7 Testing of Hypotheses

##### 4.7.1 Hypothesis 1

H0; Community participation does not influence the efficient management of BMUs.

H1; Community participation influences the efficient management of BMUs.

**Table 4. 8: Cross tabulation of the manpower resource and confiscation of illegal gears**

Manpower	Confiscation of illegal gears		
	Monthly	Randomly	Total
Adequate	19	21	40
Inadequate	5	5	10
<b>Total</b>	<b>24</b>	<b>26</b>	<b>50</b>

$$\text{Chi-square } X^2 = \Sigma (O-E) = 0.887448$$

$$\text{Number of degrees of freedom } df = (r-1)(c-1) = 1 \times 1 = 1$$

Critical value at 1 degrees of freedom and 5% degrees of significance was 6.314

The calculated value is less than the critical value hence we reject the null hypothesis and accept the alternative. Therefore, community participation influences management of the BMU as they provide the needed manpower to ensure critical roles are carried out.

### 4.7.2 Hypothesis 2

H0; Efficient management of BMUs does not lead to the implementation of regulations.

H1; Efficient management of BMUs leads to the implementation of regulations.

**Table 4. 9: Cross tabulation of the arrest offenders and compliance to regulations**

		compliance			Total
		high	low	medium	
arrest offenders	satisfactory	5	7	19	31
	unsatisfactory	6	5	8	19
Total		11	12	27	50

$$\text{Chi-square } X^2 = \Sigma (O-E) = 0.341377$$

$$\text{Number of degrees of freedom } df = (r-1)(c-1) = 1 \times 2 = 2$$

Critical value at 2 degrees of freedom and 5% degrees of significance was 2.920

The calculated value is less than the critical value hence we reject the null hypothesis and accept the alternative. Therefore, efficient management of BMU leads to the implementation of regulations for instance arresting offenders instills fear on the fishers hence they comply with the regulations put in place.

### 4.7.3 Hypothesis 3

H0; Implementation of regulations has no effect on the fish stocks.

H1; Implementation of regulations has an effect on the fish stocks.

**Table 4. 10: Cross tabulation of fish stock trend and compliance to regulations**

		compliance			Total
		high	low	medium	
fish stock	Increasing	6	5	8	19
	decreasing	7	9	15	31
Total		13	14	23	50

Chi-square  $X^2 = \Sigma (O-E) = 0.885848$

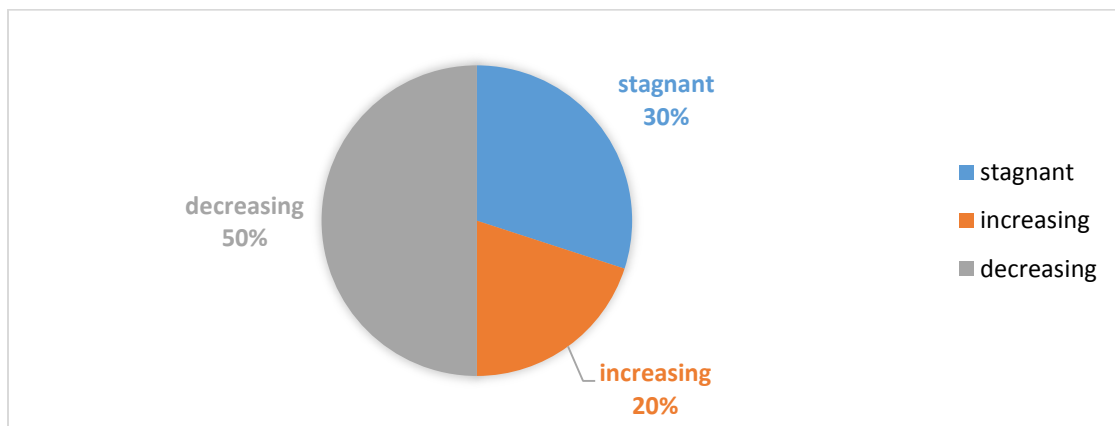
Number of degrees of freedom  $df = (r-1)(c-1) = 1 \times 2 = 2$

Critical value at 2 degrees of freedom and 5% degrees of significance was 2.920

The calculated value is less than the critical value hence we reject the null hypothesis and accept the alternative. Therefore, implementation of regulations has an effect on the fish stock. This is reported from the study since the fish stock decreased due to the ineffective implementation of regulations.

#### 4.8 Fish stocks

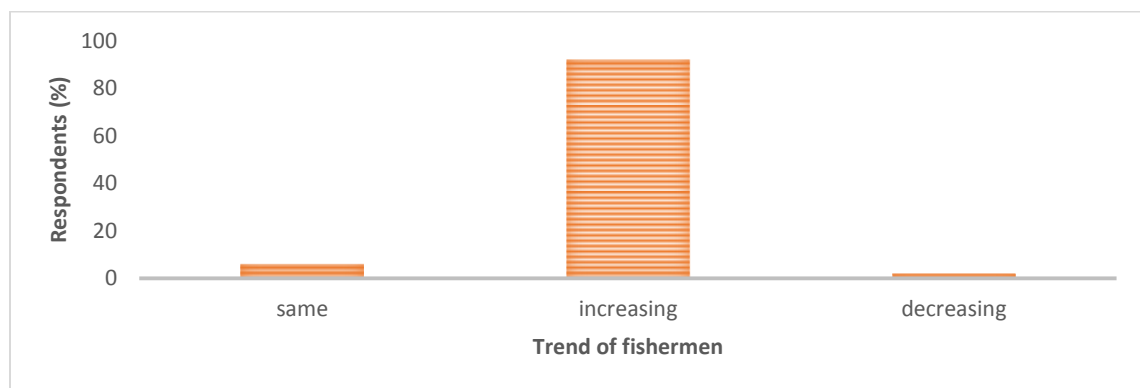
##### 4.8.1 Trend of fish catch



**Figure 4. 12: Trend of fish catches**

50% of the respondents reported that fish catch had in the recent times decreased while 30% said that it was stagnant. The remaining 20% stated that there was an increase on the fish catches from the lake. The decrease in fish catch could be attributed to the rising number of fishermen hence increased effort to capture the fisheries. The main fish species landed at the Island is Nile perch, making it the principal target species. Most of the fishermen in the Island deal with (land and trade) the Nile perch as it earns a higher income compared to other fish species- tilapia and mud fish. This can be attributed to the export market it enjoys. According to the BMU chairman, fish processors in Kisumu and Nairobi have allocated their buying agents on the Island who deliver fish on refrigerated trucks waiting along the mainland beaches.

#### 4.8.2 Trend of fishermen

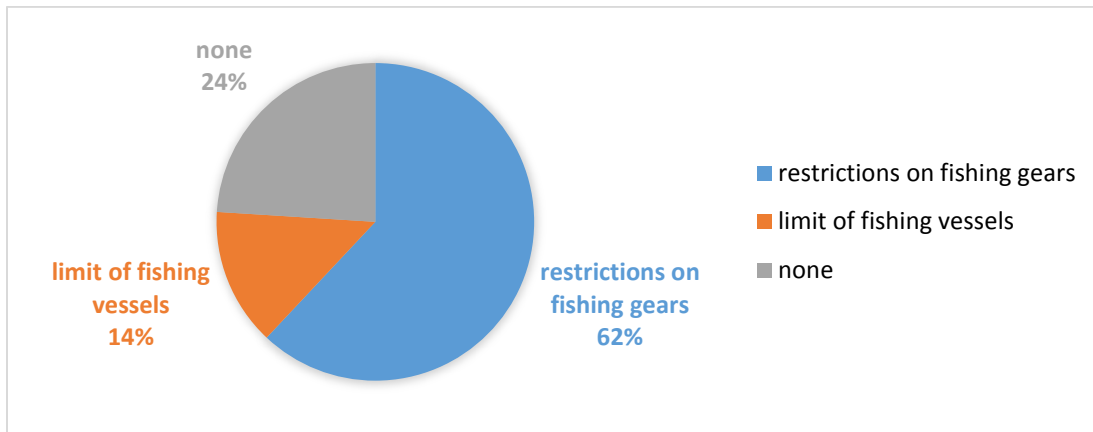


**Figure 4. 13: Trend of fishermen in Migingo Island**

As reported by 92% of the respondents, the number of fishermen in Migingo Island has increased. 6% of the respondents stated that the numbers had been the same while 2 % said they were decreasing. According to the BMU chairman over 200 boats on an annual basis operate in the waters around the island and land their fish. The rise in the number of fishermen can be traced to the landing site in Migingo Island where they can sell the fish to be stored in coolers hence avoiding post-harvest losses.



### 4.8.3 Measures put in place by BMU



**Figure 4. 14: Measures put in place by BMU**

62% of the respondents stated that the BMU had imposed restrictions on the fishing gears to be used. 14% stated that there was a limitation on the number of fishing vessels in the area. On the other hand 24% reported that there were no measures put in place by the BMU to ensure sustainable fishing. The measures put in place were limited to two as the BMU lacked funds and equipment needed to implement more measures on fishing activities. The semi structured interview with the chairman revealed that they had imposed restrictions on the fishing gears as those caught with illegal gears were arrested and made to pay hefty fines. He further stated that there was no limit on the number of fishing vessels landing fish in the area. According to Earth summit (2002) there is a lot of difficulty in limiting entry to fishing grounds for the fishing community and reducing the rate of overexploitation of fisheries. This may be attributed to the rapid population growth of fishing communities as the sector is frequently regarded as an employer of last resort. Additionally, the fisheries remains to be an open access resource and the prevailing state of inadequate resources to introduce adequate conservation and management approaches. As a result the fisheries gradually declines under the heavy fishing pressure and there is a shift in species composition often in favor of smaller species, lower on the trophic scale for instance Daga (Rastrinoboela argenta).

## **CHAPTER FIVE: DISCUSSION, CONCLUSION AND RECOMMENDATIONS**

### **5.1 Introduction**

This chapter covers the research findings and discussion drawn from the study.

### **5.2 Discussion**

#### **5.2.1 Respondent's demographics**

The location of Migingo Island in Lake Victoria makes it accessible to citizens of the three member states- Kenya, Uganda and Tanzania that share the water body. Its close proximity to Uganda and Tanzania makes it a common stop over as the shores of the named countries are quite far. The fishing grounds on the waters around the Island are good hence attract fishers from the three countries. The economy of the island is driven by the fishery resource hence boat owners and fishermen form a huge number of the dwellers in the Island.

#### **5.2.2 Beach Management Units- description, structure and functions**

Co management of the fisheries resource was introduced in East Africa to ensure the sustainable use and management of the resource between the government and the community. As a result BMUs were formed not only in Kenya but also in Uganda and Tanzania. BMUs in Kenya operate under the Director of fisheries and they are governed under the Fisheries (Beach Management Units) regulations 2007. The island has one BMU- Migingo BMU as well as one fish landing station. The BMU is jointly operated by Kenya and Uganda, each country having a chairman. This has been the order so as to reduce the wrangles between the two countries brought about by the disputed jurisdiction of the island. Despite the joint operations, Kenya's administration in managing the fisheries is more dominant than that of Uganda's.

According to Ogwang 2005, BMU should consist of an assembly and committee. The assembly membership should be of crew members, boat owners, fish processors and traders, boat makers, fish gear dealers\repairs and other fisheries related institutions operating at a particular beach. The BMU committee on the other hand should have a

maximum of 15 members and they should represent boat owners, crew (fish laborers), stakeholders and fish traders. The study revealed that the BMU had a committee but lacked an assembly. The committee had 15 members, majority being boat owners and the least represented were the fish crew/ fishermen. As a result the former are generally more powerful, wealthier and are more influential on decision making than the boat crew. Ideally the fishermen should form 30% of the committee as noted in the harmonized BMU regulations, however this is not the case hence low inclusivity of the stakeholders. The absence of an assembly implies that the committee is not kept in check in terms of carrying out its roles as well as no one to oblige to the set regulations. Presently, the committee implements its roles on boats that land their fish in the island. These boats however have registration numbers belonging to BMUs from the mainland of Kenya, Uganda and Tanzania.

Gender representation in Migingo BMU: Men and women were both traditionally involved in fisheries but in different capacities- each performing separate roles. Men spent more time in actual fishing activities than women. In some incidence however, women were permitted to fish in the rivers or close to the beach although with less efficient technologies such as fishing baskets. This division of labor can be attributed to culture (Luo) where women were obligated to be near homes in order to take care of the family. In present times, men are still dominant in the actual fishing as in the ancient times but women are increasingly engaged in the fishing sector particularly in the post-harvest stage, where they play an important role, involving handling, processing, transportation, marketing and value addition of the resource. Recent trends have reported that women are buying fishing gears and getting involved in the fishing activities. As a result, men together with women are actively involved in the sustainable exploitation and utilization of the fisheries resource.

Despite the direct and central role the women play, they are rarely involved in the decision making process of the fisheries. This is clearly showcased by their minimal numbers in the BMU committee. Effective and meaningful participation of women in the fisheries management is greatly hampered by their subordinate positions at the household and community level. Additionally, they have minimal access to and control over

production resources and over benefits. Lwenya *et al.*, (2018) argues that women are systematically discriminated against in all social groups particularly in the system of governance that allows for the dominance of a few social groups to the expense of others. Such power structures further cause imbalance, marginalization, suffering and conflict. It is however important that each and every member of the community have a sense of belonging so as to have an incentive to sustainably develop and use the fisheries. Women's views should therefore be sought after in the management of BMUs due to the central position they occupy so as to critically influence aspects of resource allocation in the fisheries. Integrating women's knowledge in fisheries governance through their inclusion in institutions that make decisions over the resources creates an opportunity for empowerment. (Ngwenya and Mosepele, 2012). Creating greater gender equity will contribute to building peaceful, democratic and prosperous societies. Women should therefore be economically and socially empowered to effectively participate in fisheries management. They should further be encouraged to organize themselves into support groups to; attain access to credit and fishery resources; to encourage appropriate fishery practices; and to diversify in non-fishing activities to ease pressure on the fisheries.

The absence of an assembly in the Migingó BMU implies that there is no organization of people to be managed therefore its operations tends to be different from the other BMUs. This is in terms of the functions performed for example issuance of permits, registration numbers among others that are not done in the Island. Nearly all of the fishers and fishing vessels that land fish in the Island are part of a BMUs located in either of the three countries. This requires them to follow their countries' BMU regulations. Lack of the assembly also brings up the validity of the committee's formation which ideally (the members) should be selected by the assembly.

The study reported that the BMU's performance in conducting meetings, patrolling the fishing grounds, formulating by laws and keeping inventories was poor. This coincided with the frequency at which the activities were being carried out- randomly or never done. The collection of revenues and confiscation of illegal gears by the BMU had a high ranking in performance. These results indicates that the BMU has minimal impact on the management of the fisheries resource. This is so since platforms where stakeholders

exchange ideas is limited hence inhibiting chances of formulating bylaws that could address challenges to the co management of fisheries. Accountability and transparency is also hindered as the inventory keeping is not as detailed as it ought to include details such as quantity and size of fish over a period of time, number of fishermen and number of vessels operating in fish landing sites. The rate of performance in the BMU functions can be linked to the incentives that comes along with them. The high performance in the collection of revenue and confiscation of illegal gears can be attributed to the monetary benefits it begets to the BMU officials. This is so as it is mandatory for fisher's landing their resources to pay a commission to the BMU and those found with illegal gears pay hefty fines. As observed BMU officials are keen to explore avenues that have upfront direct benefit to those whose benefits are long standing, improves the community's livelihood and sustainably exploits the fisheries resource.

### **5.2.3 Implementation of regulations**

The study established that lack of support from national and county governments, inadequate knowledge and capacity were the major constraints in implementing the regulations. The disputed territorial status of the island has caused the BMU to be disassociated from the government's (Kenya) efforts in ensuring sustainable co management of the fisheries. As a result there is insufficient funds, skills and equipment to perform crucial roles. This implies that the functions of the BMU are not carried out effectively for example patrol fishing grounds as they don't have equipment- patrol boat and night goggles.

### **5.2.4 Fish stocks**

As identified in the study, the total fish catches had decreased in the recent past while the number of fishermen landing fish in the island had increased. This clearly indicated that the BMU doesn't have restrictions on the number of vessels operating on the neighboring fishing grounds. This exposes the resource to a lot of fishing pressure which ultimately leads to the over exploitation of the valuable resource. Fishers might also opt to use illegal gears in order to benefit from the stiff completion. The decline of fish stocks can also be attributed to the ineffective implementation of the existing regulations.

Implementation of the rules are hindered by inadequate resources, lack of support and inadequate knowledge as mentioned above. The decrease in the fish catches can therefore be an indicator of the inefficiency and ineffectiveness of the management of the BMU.

### **5.2.5 Summary**

Conflict over Kenya and Uganda over Migingo Island has had a huge impact on the management of the BMU. These disputes have caused the Government of Kenya to distance itself from any developments specifically in the context of the fisheries resource in respect with BMU operations. This is showcased by the unavailability of support by the government in terms of funds, equipment and skills that put a constraint on the tasks of the co management unit. Lack of knowledge on the structure of the BMU also seems to be a challenge as the existent one comprises of only the committee and not the assembly. As a result they are unable to effectively carry out their functions as stated in the Fisheries (BMUs) regulations 2007. This can have serious implications on the fisheries resource as prohibited practices in other BMUs can be carried out in the Island due to the gaps in the management system.

Governance of the fisheries resource through the Migingo BMU (co management) is wanting. The element of equity and inclusiveness as a principle of the fisheries governance in the Migingo BMU was not at par with the set regulations and guidelines of fisheries management. This was clearly seen in the overall low numbers of women in the BMU unit (committee and assembly). Equity implies recognition of the rights holder as primary decision-makers. Gender equity is particularly a key component of good governance of natural resources including that of the Lake Victoria fisheries. Gender has been considered as a variable by United Nations Conference on Environment and Development and Women's Action Agenda 21, embedded in the access and control over natural resources. It also continues to shape the viability of livelihoods and prospects for sustainable development (Ngwenya and Mosepele, 2012). Economic and social disparities caused by lack of access and representation in decision-making processes are likely to adversely affect not only gender equity, but also the viability and growth of the rural economy in itself. Countries with improved gender equity have higher levels of economic growth and social well-being. Gender equity is important in fisheries

governance and achievement of Sustainable Development Goal 5- Gender equality and empowering all women and girls.

The BMU guidelines provides that at least three out of the fifteen members of the BMU committee should be women (Ogwang 2005). This represent one fifth of the committee. Should the two thirds gender rule bill be passed by parliament (Kenya), the above mentioned provision of women representation in the BMU is to be amended to accommodate former rule. The two thirds gender rule is supported in the Constitution of Kenya 2010, article 81 (b) which states that the not more than two thirds of the members of elective or appointive bodies shall be of the same gender. The introduction of gender quotas in different countries across the globe has been necessitated by the low proportional representation of women in governance and political structures.

The equity and inclusiveness principle is also highlighted in the study by the poor representation of fishermen in the BMU committee. Ordinarily, fishermen should form 30% of the BMU committee as provided for in the BMU guidelines (Ogwang 2005). This act excludes the fishermen community from most of the decision making processes which raises concern as they are directly involved in the utilization of the resource (harvesting). Nunan (2010) states that it is important for an organization to provide platforms for its stakeholders to enhance their well-being as it gives a compelling message regarding its reason for existence and its value to the society.

Involving more fishermen in the BMU committee will therefore enable the institution achieve its targets because the regulations will be readily embraced by the dominant group. The above mentioned principle comes to play again, in terms of the nationality of members in the BMU. From the study, majority of the BMU members are Kenyans despite the island strategic location and dynamic population. Migingo BMU should therefore endeavor to include Ugandans and Tanzanians as members in the committee and assembly level. This will improve the coordination hence there will be concerted efforts in sustainably utilizing the resource. It might also reduce the conflicts experienced over the years over the fisheries resource.

Rule of law - this principle states that the local authorities- BMUs- should abide to the regulations and laws put in place for the co management of the fisheries resource as well as the judicial decisions on the matter. The adopted activities should be in accordance with the procedures spelled out by the law and enforcement of regulations should be impartial. Migingo BMU has attempted to uphold the rule of law by performing the functions outlined in the BMU guidelines and fisheries (Beach Management Unit) regulations of 2007. However the structure of the BMU institution is not at par due to the absence of an assembly. This arm of the institution keeps the committee in check and holds them accountable for their actions. Its absence therefore means that the BMU committee can get away with actions and procedures that do not follow the established laws. The rule of law is not wholly upheld by the BMU, this could be a hindrance to the institutions operations in the long run.

Effectiveness and efficiency- this refers to a state where the practices created and implemented by an institution produces the desired outcomes hence able to meet the stakeholder's needs while maximizing on the resources at its disposal. These resources can be natural, human, technological, financial and environmental. From the conducted study it revealed that only three out of the seven functions were performed satisfactorily. As such the results failed to attain the desired objectives of high performance in the seven functions. This shows that the Migingo BMU is ineffective in the management of the fisheries resources due to the poor performance of its functions. In terms of efficiency, the BMU doesn't fully maximize on its resources. Migingo has a lot of human resources at hand however it doesn't utilize it to patrol the fishing grounds to deter illegal fishing. The revenue collected from the fishermen by the BMU can also not be accounted for as there are little or no infrastructural development that could aid in the performing its operations. As a result of the BMUs ineffectiveness and inefficiency, the stakeholder's needs are barely met as the livelihood of the community is threatened due to unsustainable utilization of the resource.

Transparency -this principle dictates that information on fisheries management should be freely available and directly accessible to the stakeholders who will be directly affected by its implementation or lack of it thereof. Moreover the information should be in easily



understandable forms and provided through relevant media that can reach the stakeholders. It also provides that decisions made and their enforcement should be in compliance with the set regulations and rules. The aspect of transparency in the Migingo BMU operations comes to play on the accessibility of information to the community and stakeholders. As indicated in the study, information is accessed mostly through word of mouth. This avenue of relaying information may lead to the alteration of information and it is not a guarantee that it will reach all the intended stakeholders. Records of inventories taken over the past months by the BMU are not comprehensive as they ought to be. This function of the institution is also said to be poorly performed, therefore information on the numbers of fishers and vessels as well as the quantity (kg or tonnes) and quality (maturity, age and species) of fish harvested is scanty. Assessment of the resource would therefore prove to be difficult due to lack of substantial information.

Lack of information on the operations of the institution in terms of decisions made and its implementation makes it difficult for stakeholders to hold the BMU committee accountable for its actions and procedures taken. The actions and procedures may therefore fail to uphold the established rules and regulations. As a result of withholding information, majority of the community members state that the BMU doesn't represent the interest of the community. Reliable and ready access of information would create awareness on the BMUs operations leading to increased participation and enhanced ownership of the institution by the community.

Participation- this principle states that those who are affected by a decision- stakeholders and community members have a right to be involved in the decision making process. Article 10 of the Constitution of Kenya 2010 states that participation is one of the guiding values and principles of the nation. As such, equal participation is key to good fisheries governance. Community participation gives the members a chance to be informed of the current co management practices, influence the decisions made and be involved in the implementation of the decisions. According to Belgrade Open School (2016) there are four levels to public participation. These include: i) Citizens are informed of the current state of affairs; ii) Information from citizens regarding the matter at hand for example fisheries resource is requested and recorded; iii) citizens are included in the process of

drafting regulations/ making decisions; iv) citizens actively cooperate and participate in the implementation of the regulations/decisions. From the study findings, Migingo BMU has taken little to no effort in creating awareness among the community members hence they have a limited knowledge on regulations guiding the management of the fisheries. Avenues for sensitization are lacking as the BMU rarely involves the community in meetings. As such information is passed mostly through word of mouth. Exclusion from the meeting implies that they cannot influence the decision made particularly formulation of bylaws hence strained support in implementation and compliance.

In conclusion, exchange of ideas, views and indigenous knowledge that could be adopted as best practices are therefore lacking due to inequity hence inefficiency in the co management of the resource. The Migingo BMU cannot be held accountable of their operations due to inadequate and inconsistent inventory keeping and data collection activities. This denies them a chance to review the information on the resource that would enable them to determine their strengths, weaknesses and opportunities that would form a solid foundation on which management plan of the fisheries could be formed and subsequently implemented. Participation of the community needs improvement to ensure that decisions made are legitimate that could result to enhanced compliance with the regulations. Access of information would create awareness on the BMUs operations leading to ownership by the community.

#### **5.2.6 BMUs role in responsible fisheries and community development.**

This institution enables collective action from the community to foster responsible fishing, and it is recognized by the Government's Director of fisheries. BMUs are tasked with enforcing the rules and regulations that are stipulates in the Fisheries regulations of 2007. They are also expected to engage with the community members in their activities and make use of their opinions and indigenous knowledge to come up with bylaws best suited for the local environment, needs and demands so as to enable responsible fishing. Engagement with the community will enable the BMUs to provide information of scientific backings that were unknown to the members. These insights will enlighten them to see the effects of their actions on the fisheries resource in the long run. As a result, there will be changes in the attitude and behavior of the stakeholders in the fishing

sector hence having a positive impact on the fishing activities (such as use of the legal gear) to ensure the resource's sustainability.

BMUs' function of monitoring, controlling and surveying the fishing grounds in a consistent manner deters fishers from engaging in illegal, unreported and unregulated fishing activities. This instills fear hence the fish harvesting methods that are employed are safe for the fisheries and the environment they are dependent on. BMUs deter offenders with the hefty fines while they create incentives for individuals to abide to the law. Keeping records and collecting data at fish landing sites is an important role in safeguarding the lakes fish stock. These records will provide information on the number of vessels, boat crew are present as well as the catch per unit area (species, quantity and quality). These data provide a ground for inferences and survey hence able to establish the trends of fishers, fishing activity and fish stock. Appropriate measures can therefore be taken in specific areas of need for responsible fishing activities. Sustainable management of the resource ensures that employment from the sector is a viable means of improving ones livelihood as well as food security to the community as fish is rich in animal proteins.

Community development as result of the BMU institution can be achieved in various ways. Through a well-established credit and savings scheme, stakeholders would be able to improve their living standards by investing their earnings in various money generating activities. This would reduce their dependency on the fisheries resource making them less vulnerable to the shocks on fish stocks due to climate change or overfishing. With the required resources, they would venture into aquaculture which would augment on the capture fisheries hence reducing the fishing pressure allowing the resource to replenish itself. BMUs have a role in organizing the fishers for marketing activities. This organization will give them a bargaining edge hence fishers are able to earn more from the resource. This implies that their living standard will improve and they will break away from the poverty cycle that has been prevalent in the region. The BMU institution can improve the physical infrastructure and social facilities in the Migingo Island- it will be solving incumbent societal problems while raising funds for the operation of the BMU.

### **5.3 Conclusion**

The study's findings indicate that the BMU comprises only of a committee and lacks the assembly. The BMU committee is highly dominated by boat owners and there is low representation of fishermen, women and the nationalities present. The BMU's structure is weak due to lack of assembly and no equity and inclusiveness in the composition of the BMU committee. As a result, the management of the Migingo BMU is neither efficient nor effective.

The BMU only performs three out of seven functions satisfactorily. These include: collection of revenues, confiscation of illegal gears and arrest of offenders. The remaining duties- conducting meetings, patrol of the lake, formulation of bylaws and keeping of inventories are performed unsatisfactorily. The three functions performed to the required standard implies that funds are generated hence an economic incentive and there is a reduction in the illegal, unregulated and unreported fishing activities.

It was noted that community's participation aids in the management of BMUs by providing the needed manpower in cases of identifying offenders. However their opinion during decision making processes are rarely sought after and they can hardly access information concerning the BMU. In the event they do, it is mostly through word of mouth.

The study further reports that the management of the BMU has an effect on the implementation of the regulations. The operations of the BMU in terms of undertaking functions has elicited moderate compliance to the regulations. The confiscation of illegal gears and arrest of offenders has instilled fear on the fishers not to engage in unsustainable fishing while lack of a patrol system in place makes room for illegal fishing activities to be undetected.

Implementing regulations was said to be hindered by inadequate resources- funds and equipment as well as various challenges. These include lack of support from the government; inadequate capacity; and inadequate knowledge to operate its functions. Non effective Implementation of regulations has caused a decrease in the fish catches. The number of fishermen that land at Migingo's landing site is on the rise. In order for

effective management of the Migingo BMU to be attained, its assembly should be formed to include and represent shareholders equally. With the complete structure of the BMU in place, they should be supported by the government through capacity building to equip them with skills and allocation of funds and equipment to perform their duties efficiently.

#### **5.4 Recommendations**

The following recommendations arose from the study that was conducted. They were categorized in terms of the duration that would take for their implementation- short, medium and long term.

##### **Short term**

a) Training of the BMU members on its management roles in relation to structure, functions and legal power to improve its impact on sustainable fisheries activities. A representative from the fisheries department representing the County and National Governments should train the members and interested stakeholders on the structure and functions so as to ensure an efficient management of the fisheries through the BMU.

b) Capacity building of the community to inform them of the operations of the Migingo BMU and its importance on the fisheries management and consequently on the socio-economic development of the Island. The Migingo BMU alongside the County Government should take this initiative of creating awareness by holding meetings/ barazas on a regular basis where every member of the community is invited and informed of the importance of the resource and legal structures in place to manage and govern the fisheries.

##### **Medium term**

c) Support from the County and National Governments in terms of funds and equipment that will enable BMUs to effectively carry out their duties. This would improve the operations of the BMUs and foster a stronger collaboration between the levels of management. As a result there will be increased information sharing that may lead to better planning of the fishery resources for sustainability.

d) Equal Inclusion of all stakeholders in the co management of the fisheries resource. An empowered community that is well informed of the regulations governing the resource will ensure that all the stakeholders are well represented and included in the BMU committee and assembly.

**Long term**

e) Use of technology in the management of BMUs by create an app that aids in record keeping for the BMU officials hence enabling them to plan for future endeavors. Use of drones to patrol the fishing grounds. This will reduce the cost and it is highly reliable. Innovations should be undertaken by the fishing community, research and academic institutions. The BMU should gather its resources and invest in these technologies to make management more effective.

f) Improvement of physical infrastructure and social amenities within the Island such as fish landing stations, dispensaries and sanitation. Community based organizations should be formed and take up the above mentioned roles. This would not only improve the infrastructure in the region but also create an alternative source of employment hence reducing the pressure on the fisheries.

g) Further research should be done on the fishing communities, the fisheries resource and the Lake Victoria ecosystem in order to understand how successful governance and management can be accomplished.

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## APPENDICES

### Appendix I : Questionnaire

I am LUCKY CINNY; a student at the Wangari Maathai Institute, University of Nairobi. I am pursuing the degree of Masters of Science in Environmental Governance. As part of my studies, I am expected to present a project towards that fulfillment. My project is on the assessment of Beach Management Units on Fisheries Governance in Mgingo Island, Kenya. This questionnaire will therefore enable me to gather information towards this endeavor. You are therefore urged to be as impartial as much as possible in giving your information. Responses given would be treated with much confidentiality and for academic purposes only.

Thank you.

Questionnaire code.....

Date.....

#### Part 1: Bio data

1. Gender (Tick  $\surd$  one)

a) Male

b) Female

2. Nationality (Tick  $\surd$  one)

a) Kenyan

b) Ugandan

c) Tanzanian

3. Position in BMU (Tick  $\surd$  one)

Committee

Assembly

non member

4. What is your highest level of education?

Primary

Secondary

Tertiary

University

**Part 2: Management of Beach Management Units.**

5) How can you rate the performance of the BMUs? Tick appropriately. (√)

Performance	1	2	3	4	5
Conduct meeting					
Formulate by laws					
Keep inventories					
Confiscate illegal gears					
Arrest offenders					
Prosecute offenders					
Patrol fishing ground					
Resolve disputes/conflicts					
Collect revenue					
Data collection					

Key: 1= highly unsatisfactory 2=unsatisfactory 3=Neutral 4=satisfactory 5= highly satisfactory



6) How often are these activities carried out by the BMUs? (Tick  $\surd$  one)

Frequency of function	Daily basis	Weekly basis	Monthly basis	Never done	Randomly done
Formulate by laws					
Arrest offenders					
Keep inventories					
Patrol fishing grounds					
Confiscate illegal gears					
Resolve disputes\conflicts					
Prosecute offenders					
Collect revenue					
Receive visitors on ground					
Keep inventory					
Fish marketing activities					
Conduct meeting					

7. Representation of BMU membership

Indicator	Low	Moderate	High
Women			
Boat owners			
Fishing traders and processors			
Service providers ( restaurants and hotels)			

**Part 3: Implementation of regulations**

8. What actions have been carried out to ensure awareness of the BMUs 2007 regulations?

9. What is the level of compliance to the regulations?

High  Low  Medium

10. What are the major constraints for BMUs implementing regulations?

- a) Inadequate capacity to enforce measures
- b) Corruption
- c) Inadequate knowledge
- d) Lack of support from stakeholders/ government
- e) Others (mention)

11. How would you term the adequacy of resources needed to implement the regulations?  
 (Tick ✓ one)

Key 1=More than Adequate 2=Adequate 3=Inadequate 4=Not available

Resources	1	2	3	4
Funds				
Skills				
Equipment				
Manpower				
Time				
Legal power				

**Part 4: Community Participation**

12. How have you been involved in BMUs activities?

13. How do you access the information from BMUs?

Attending meetings  Word of mouth  Radio

14. Does the BMUs represent the interest of the community? Yes

**Part 5: Fish stocks**

15. What is the trend of fish catches since the formation of BMUs?

Stagnant  Increasing  Decreasing

16. What is the size of fish caught from the Lake?

Mature       Immature

17. Which species of fish are caught from the lake?

Nile perch       Tilapia       Omena       Others

18. What has been the trend in numbers of fishermen in the area?

Same       Increasing       Decreasing

19. What measures have been put by BMUs to ensure sustainable fishing?

- a) Closed season
- b) Closed areas
- c) Restrictions on fishing gears
- d) Limit on number of fishing vessels
- e) Others

## **Appendix II: Semi Structured interview guide.**

- 1) Organization you work for?
- 2) What is your job position?
- 3) How many BMUs are in the area?
- 4) What actions have been carried out to ensure awareness of the BMUs 2007 regulations?
- 5) Are the guidelines stated in the BMUs regulations of 2007 effectively carried out?
- 6) What are the challenges are faced in the implementation of the regulations by BMUs?
- 7) Does the conflict of jurisdiction affect BMUs operations and implementation of regulations? (In terms of which law to adopt- Kenyan or Ugandan)
- 8) Does the community take ownership of the BMUs?
- 9) Are the women and youth adequately included in the operations of the BMUs?
- 10) Does the community have access to BMU related information?
- 11) What are the ways in which information is disseminated from the BMUs to the community?
- 12) Are there public awareness programmes to sensitize the community on the role of BMUs?
- 13) Is there cooperation and collaboration between BMUs, county government and director of fisheries within the island?

**Appendix III:Migingó BMU photo**

