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**ASSESSING THE IMPLICATIONS OF FISHING TECHNIQUES ON THE FISH  
POPULATION ON LAKE VICTORIA IN JINJA CITY, UGANDA**

**BY**

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UNIVERSITY**

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## DECLARATION

I OBOTE AMOS, declare that this research thesis titled “assessing the implication of fishing techniques on fisheries biodiversity, case study of Lake Victoria in Jinja city, Uganda” is my and has never been submitted by student of Busitema University or any other institution of higher education for award of any degree or any other qualifications.

Signature.......... Date .....11...../11...../2023.....

Reg. No: BU/49/2022/1221

## **APPROVAL**

This is to certify that this research report titled “assessing the implication of fishing techniques on fisheries biodiversity on Lake Victoria in Jinja city, Uganda” By Obote Amos has been successfully completed under my supervision and recommend it for submission to the Faculty of Natural Resources and Environmental Sciences, Busitema University with my approval.

Ms. Nyangoma Iumeldah

Signature .....  ..... Date ..... 11 / 11 / 2025 .....

## **DEDICATION**

I dedicate this research report to my dear beloved parent Ms. Atim Magrete, my sisters, brothers and all friends for their continuing support towards the achievement of these studies. I also dedicate it to my supervisor Lecturer Nyangoma Imelda for guidance and support during this research am undertaking.

## **ACKNOWLEDGEMENT**

Firstly, I convey my sincere gratitude to the almighty God who has brought me this far, blessed me with all the gifts of spiritual life, knowledge, wisdoms, and courage to go through my studies up to this far besides all the challenges and hardships.

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## **ACRONYMS AND ABBREVIATIONS**

|          |                                                        |
|----------|--------------------------------------------------------|
| ARDC:    | Aquaculture Research and Development Centre            |
| CAS:     | Catch Assessment Survey                                |
| CFBC:    | Capture Fisheries and Biodiversity Conservation        |
| CoE:     | Centre of Excellence                                   |
| CPUE:    | Catch per Unit Effort                                  |
| EAFRO:   | East African Fisheries Research Organization           |
| MAAIF:   | Ministry of Agriculture, Animal Industry and Fisheries |
| NaFIRRI: | National Fisheries Resources Research Institute        |
| NARO:    | National Agriculture Research Organization             |
| NARS:    | National Agriculture Research Systems                  |
| PARI:    | Public Agriculture Research Institution                |
| RFMOs:   | Relevant Regional Fisheries Management organization    |
| ZARDIs:  | Zonal Agriculture Research Development Institutes      |

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## **ABSTRACT**

This study examined the implications of fishing techniques on sustainable fisheries in Lake Victoria, Jinja City, Uganda, to provide relevant stakeholders with information to promote sustainable fishing practice on Lake Victoria.

The study used a descriptive cross-sectional design with quantitative method of data collected. The study was conducted among 79 fishers selected using systematic random sampling technique and quantitative data was collected from them using pretested interviewer-administered questionnaire developed on kobo-collect toolbox.

The collected data was downloaded into excel format and imported to Stata 15 for analyses. Descriptive statistics such as mean, standard deviations, and percentages were used to describe the study findings.

Findings showed that the primary factors influencing fishing methods were regulatory guidelines (45.6%) and existing fishing practices (30.4%). Awareness of illegal fishing was high (86.1%), with gill nets (59.5%) and longlines (29.1%) cited as having the most negative impact on fish stocks when misused, and the Nile Tilapia (59.5%) identified as the most affected species. Awareness of sustainable fishing practices was also notable (64.6%), with selective fishing gear (56.9%) and catch limits (29.4%) being the most recognized strategies, and 55.7% of participants reporting active use of such methods, mainly selective gear and size limits. These results highlight the critical role of regulations, fishing practices, and knowledge in shaping sustainable fisheries management on Lake Victoria.

## **CHAPTER ONE**

### **1.0 INTRODUCTION**

#### **1.1 Background to the study**

Fisheries biodiversity plays a very important role in ensuring ecological balance of aquatic ecosystems and sustaining the livelihood of many people globally for those whose live depends on fisheries sector. It contributes to ecosystem resilience by providing genetic diversity, which enhances species' adaptability to environmental changes. A diverse fish population also ensures the sustainability of food chains and nutrient cycling in aquatic ecosystems (Duffy et al., 2016). In addition, it supports millions of livelihoods, particularly in developing nations where fishing is a primary source of income and protein intake (FAO, 2020).

Various fishing techniques are used worldwide to target different species and adapt to diverse marine environments. These include trawling, which involves dragging nets through water columns or along the seabed; longline fishing, which uses extended lines with baited hooks; and purse seining, which encircles schools of fish with a large net. Other widely practiced methods are gillnetting, handlining, spearfishing, and fish trapping. While some methods like handlining and trap fishing are considered more environmentally sustainable due to their selectivity, others such as trawling and gillnetting are associated with bycatch and habitat degradation (FAO, 2020; Gilman et al., 2020; Sala et al., 2021; Telesetsky, 2019; Wabnitz et al., 2018).

Fishing techniques in Uganda, while essential for livelihoods and food security, present varying levels of risk to aquatic ecosystems. Common methods such as gillnets, seine nets, hooks and lines, cast nets, traps, lift nets, and even spears are widely used across the country's extensive freshwater bodies. While some of these, like hook-and-line or traps, are considered more sustainable due to their selectivity, others raise ecological concerns. For instance, beach seines often capture juvenile fish and damage sensitive habitats, and lift nets may disrupt nocturnal aquatic behavior. Moreover, illegal practices such as monofilament netting, blast fishing, and cyanide fishing are highly destructive, contributing to overfishing and long-term environmental harm. Despite being banned, these practices persist in some regions, undermining efforts toward sustainable fisheries management (Akoll & Mwanja, 2012; Balirwa, 2017; Baskind &

Birkinshaw, 2021; FAO, 2021; Kayombo & Jorgensen, 2019; Njiru et al., 2019; Nunan, 2014; Ogutu-Ohwayo et al., 2020)

Research has been done citing the effects of the different fishing gears. Studies show that traditional fishing practices can contribute to biodiversity conservation when managed sustainably (Berkström et al., 2019) because it is often characterized by low technology, traditional methods like handlines and traps tend to have lesser ecological impacts. Techniques such as trawling and purse seining are prevalent globally and can lead to overfishing and habitat destruction. For example, in the North Atlantic, trawling has significantly depleted fish stocks, leading to stricter regulations (Pauly et al., 2002).

In Jinja city, especially around the landing sites along the Lake Victoria, local fishers use a mix of traditional and modern fishing techniques. —Many fishers rely on gill nets and fish traps, which are known for being selective and reducing unwanted catch, helping to support sustainable fishing practices (Mugisha et al., 2010). Hooks and lines, including handlines and rod-and-reel techniques, are also popular, especially when targeting specific fish species. These targeted methods are seen as beneficial for maintaining healthy fish populations (Kibera, 2012).

On the other hand, modern techniques are making waves. The use of motorized boats has significantly transformed fishing activities. These boats allow fishers to reach deeper waters and catch more fish, but they also raise concerns about overfishing and resource depletion (Ochieng et al., 2015). Additionally, modern devices used to locate schools of fish are becoming more common. While they boost efficiency, they can lead to unsustainable fishing if not carefully managed (Kibera, 2012). Achieng et al. (2018) also found out that excessive use of destructive fishing gear, such as beach seines, can lead to habitat degradation and reduced fish stocks.

Despite these concerns, limited research has been conducted to systematically assess how fishing techniques impact fisheries biodiversity in specific contexts like the Lake Victoria in Jinja divisions, Jinja city. This study seeks to address this gap by assessing the effects of different fishing techniques on fisheries biodiversity in Jinja divisions, Jinja city. The research will provide insights into the ecological impacts of these practices and offer recommendations for sustainable fisheries management hence contributing to broader efforts of preserving aquatic biodiversity while supporting the livelihoods of communities' dependent on fishing.

## **1.2 Problem statement**

Lake Victoria, one of the largest freshwater lakes in the world, is vital for the livelihoods of millions of people in Uganda, Kenya, and Tanzania. The lake supports a diverse ecosystem and provides a significant source of fish, which is a primary protein source for local communities. However, the region faces increasing pressure from various fishing techniques, including commercial and artisanal methods, that impact fish populations and the overall health of the aquatic ecosystem. Sustainable fisheries management is critical to balancing economic needs and environmental conservation.

The problem lies in the unsustainable fishing practices that have proliferated in Lake Victoria, leading to overfishing, habitat degradation, and a decline in fish stocks. Local communities, particularly fishermen and their families, have been significantly affected by these practices, facing economic difficulties and food insecurity as a result of reduced fish availability. Additionally, the ecological balance of the lake is at risk, threatening biodiversity and the long-term viability of the fishing industry.

Several initiatives have been implemented to address these issues, including government regulations aimed at limiting catch sizes, promoting sustainable fishing practices, and enhancing community awareness of conservation efforts. Non-governmental organizations (NGOs) have also played a role by providing training in sustainable fishing techniques and advocating for the protection of critical habitats. Despite these efforts, challenges persist due to enforcement issues, lack of resources, and the need for more comprehensive management strategies.

Despite existing efforts, there remains a significant gap in understanding the specific implications of various fishing techniques on the sustainability of fisheries in Lake Victoria. Therefore, this study aims to assess the effectiveness of current fishing practices, and evaluate the ecological consequences of these techniques. By filling this gap, this research will provide actionable insights and recommendations for policymakers, stakeholders, and local communities to enhance sustainable fisheries management on Lake Victoria.

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

#### **1.3.1 Main objective of the study**

To assess the implications of fishing techniques on sustainable fisheries on Lake Victoria in Jinja city.

#### **1.3.2 Specific objectives**

1. To identify factors influencing the use of different fishing methods on Lake Victoria in Jinja city.
2. To determine the effects of different fishing methods on the fish population in Lake Victoria in Jinja city.
3. To determine the different strategies put in place to ensure sustainable fishing practices on Lake Victoria in Jinja city.

### **1.4 Research questions**

- i. What are the factors influencing the use of different fishing methods on Lake Victoria in Jinja city?
- ii. What are the effects of the different fishing methods on the fish population in Lake Victoria in Jinja city?
- iii. Which strategies have been put in place to ensure sustainable fishing practices on Lake Victoria in Jinja city?

### **1.5 Scope of the study**

#### **1.5.1 Geographical scope**

The study will be conducted in three landing sites of Masese, Ripon falls and Wairaka in both northern and southern division of Jinja city, Eastern Region of Uganda. Jinja sits along the northern shores of Lake Victoria, near the source of the White Nile.

#### **1.5.2 Content scope**

The study will focus on collecting data on socio-demographics of respondents, finding out the factors influencing the use of different fishing methods, the effects of different fishing methods used towards fish population and establishing the conservation strategies that can ensure effective fishing techniques on Lake Victoria in Jinja City.

#### **1.5.3 Time scope**

The research study will run for 4 months from mid-April to late August 2025 from concept development to report submission.

## **1.6 Justification of the study**

The study assesses various fishing techniques on sustainable fisheries of Lake Victoria within Jinja City, this study will help to understand the impact of fishing techniques on the fish biodiversity for conservation purposes and identifying methods which can lead to the decline of specific fish species and overall biodiversity on the modern fisheries. The results of this research will help provide critical data for District fisheries officers of Jinja City and district at large, fisheries protection units, NON-governmental organizations that can be used to inform conservation strategies aimed at protecting vulnerable species and maintaining ecological balance within the river ecosystem. The study will also help in promoting sustainable fishing practices among local communities through identification of fishing techniques that minimize ecological disruption and promote biodiversity. The study will also guide fishermen in adopting practices that ensure long-term sustainability of fish stocks particularly important in regions like Eastern part of the country, where overfishing and habitat degradation can threaten local fisheries. This research will provide empirical evidence needed to inform policymakers and regulatory bodies about the current state of fish biodiversity in Lake Victoria. The study's outcomes can be instrumental in developing regulations that govern fishing practices, aiming to balance economic benefits with ecological sustainability. Additionally, it can support the establishment of protected areas or seasonal fishing bans to allow for fish population recovery.

## 1.7 Conceptual Framework

This research is guided by a conceptual framework that illustrates the relationship between fishing techniques and conservation outcomes as shown below.

### Independent variables

### Dependent variables

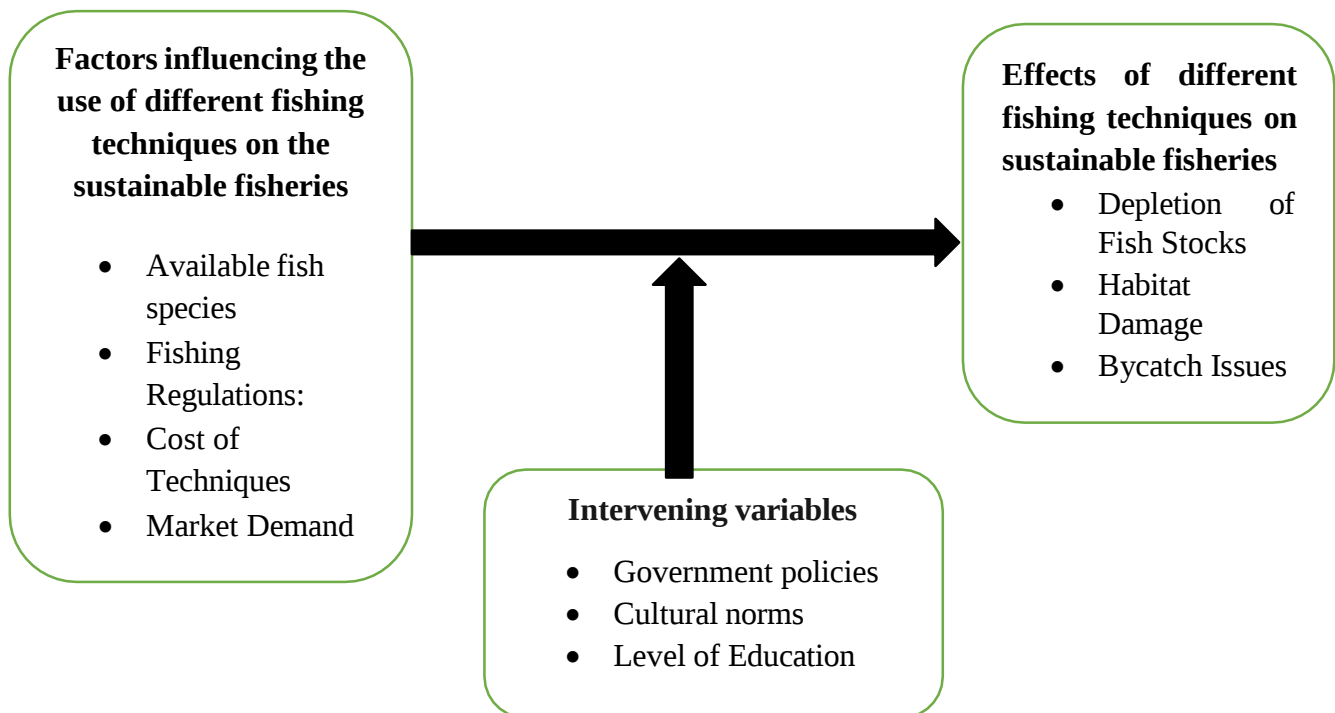


Figure 1.1: A conceptual framework

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1. Introduction**

This chapter presents literature on assessing the implications of fishing techniques on fishery biodiversity for conservation from global through continental, regional and national points of view. The review aims at to determine the factors influencing the use of different fishing methods on the sustainable fishery, finding out the effects of fishing methods used towards fish population and identifying conservation strategies for effective sustainable fishery that meet the need of both the current and future generation.

### **2.2. Factors influencing the use of different fishing methods**

Sustainable fisheries are essential for maintaining marine biodiversity, ensuring food security, and supporting coastal economies. Overfishing, habitat destruction, and bycatch have highlighted the need for environmentally responsible fishing methods (FAO, 2018). The adoption of different fishing methods is influenced by a range of factors, including ecological concerns, economic viability, social structures, technological capabilities, and governance frameworks. This literature review explores these factors, drawing on recent research conducted over the past decade.

Climate change is altering ocean temperatures, currents, and species distributions, compelling fishers to adapt their methods. A study highlighted that shifting species ranges are affecting catch composition and gear effectiveness, leading to increased use of mobile and adaptable gear such as jigging and pelagic longlines (Free et al, 2019) . Cost of gear and Operational efficiency are other factors influencing the different fishing methods used in different areas. Economic considerations heavily influence gear selection. High-capital gear like trawlers or purse seiners offer greater catch volumes but require significant investment and fuel costs. Small-scale fishers often rely on less costly and fuel-efficient techniques such as nets, traps, or handlines (Béné et al , 2015) .

In regions with limited infrastructure or capital, the affordability of gear becomes a primary determinant of method choice. Moreover, economic pressures can lead to the continued use of unsustainable methods when short-term gains outweigh long-term conservation (Sumaila et al, 2016) . Market Demand and Eco-Certification as growing consumer awareness and demand for sustainably harvested seafood have encouraged a shift toward environmentally friendly practices. Certifications such as those offered by the Marine Stewardship Council (MSC) and Fair-Trade USA incentivize the use of selective gear and adherence to sustainability criteria (MSC, 2023). A study suggest that certified fisheries often gain better market access and price

premiums, motivating fishers to adopt methods that are compliant with sustainability standards (Roheim et al, 2017).

**Traditional Knowledge and Cultural Practices.** In many artisanal and indigenous fishing communities, traditional knowledge guides fishing practices. These practices are often adapted to local ecosystems and are inherently sustainable (Santos & Costa, 2017). For instance, the use of non-destructive gear such as spears, traps, and handlines reflect generations of ecological understanding. Integrating this knowledge into modern fisheries management can foster sustainable outcomes while preserving cultural heritage. **Community-Based Management of fisheries** is another factor. Community-based and co-management approaches empower local stakeholders to regulate resource use, including the selection of gear types. A similar study found that fisheries governed under co-management systems are more likely to implement sustainable practices, including restrictions on destructive gear and the promotion of selective methods (Gutiérrez et al, 2016) . The success of such models depends on local capacity, enforcement mechanisms, and the existence of social capital and leadership.

**Gear Innovations.** Technological improvements in fishing gear have led to more selective and sustainable methods. Modifications such as bycatch reduction devices (BRDs), turtle excluder devices (TEDs), and escape panels have been integrated into trawls and nets to reduce the capture of non-target species (Eayrs et al, 2020) .

**Digital Tools and Monitoring Systems.** The use of GPS, sonar, satellite tracking, and electronic monitoring systems is transforming fisheries into more data-driven enterprises. These tools help fishers locate target species efficiently and avoid sensitive habitats or restricted zones (Perez et al, 2022). Moreover, digital traceability systems enhance transparency and compliance with sustainability regulations.

### **2.1.1. Fishing methods and gears used in relation to relative fish abundance**

Globally different fishing techniques have been used in the world including trawling which involves dragging a large net through the water, either along the seafloor (bottom trawling) or in mid-water (Trawling, 2017). This method is widely used in commercial fishing but has been criticized for its impact on marine ecosystems due to its over exploitation of the marine fishery while on the other hands Longline Fishing (Amoroso, 2018). This technique uses a long central fishing line with multiple baited hooks attached at intervals. It is commonly used for catching tuna, swordfish, and other large pelagic species. However, it poses a threat to non-target species such as seabirds and turtles.

Other methods include purse Seining (Gilman et al., 2020) which involves encircling a school of fish with a large net and then pulling the bottom closed, like a drawstring bag. It is highly effective for catching species like sardines, mackerel, and tuna (FAO, 2018); Gillnetting which are vertical panels of netting that trap fish by their gills as they try to swim through. While effective, they can lead to bycatch of unintended species, including marine mammals and turtles (Hall et al, 2022). Trap Fishing involves using of fish traps or pots which are stationary structures used to catch fish or crustaceans such as crabs and lobsters. This method is considered more sustainable as it allows for the release of undersized or non-target species (Bjordal & Løkkeborg, 2017).

Another oldest fishing technique is spearfishing which involves using a spear or spear gun to capture fish and is still practiced in many coastal communities, particularly for subsistence fishing... Handlining and Pole-and-Line Fishing are also other traditional methods which involve using a single fishing line with baited hooks. They are considered environmentally friendly because they result in minimal bycatch (Ward & Hindmarsh, 2016). Lastly, drift Netting is another used to capture fish. This involves using of driftnets which are large nets left to drift with ocean currents, capturing fish that swim into them. However, due to high bycatch rates, the use of large-scale drift nets has been banned in many regions (Northridge, 2021)

### **2.3. Effects of different fishing methods on fish population**

Fishing method can have both positive and negative impacts on fish diversity and population in lakes. . Sustainable trawling techniques, such as using modified nets and avoiding sensitive habitats, can help maintain fish populations. Research indicates that when trawling is managed effectively, it can support the recovery of overabundant species and enhance biodiversity in fish communities (Parker et al, 2018). .

Selective Longlining is a method that can target specific species while minimizing bycatch through the use of selective gear. Innovations in longlining, such as the use of circle hooks and specific bait types, have shown to reduce bycatch significantly. Furthermore, a study found that these practices not only preserve non-target species but also contribute to the stability of fish populations, allowing for more balanced ecosystems.

Sustainable Gillnetting. A study suggest that gillnets can be designed to target specific sizes and species, thereby allowing juvenile fish to escape (Börner et al, 2022) . This selectivity helps maintain population dynamics and supports the resilience of fish communities. Sustainable gillnetting practices can enhance local fish biodiversity.

**Responsible Purse.** It is an effective method for targeting schooling species, but its impact can be mitigated through responsible practices. When purse seining is managed with measures such as closed seasons and protected areas, it can lead to the recovery of fish stocks and increased biodiversity. Another study documented that purse seine fisheries, when well-regulated, can allow for the release of non-target species unharmed, thereby contributing to ecosystem stability (Hoffmann et al, 2017) . Artisanal fishing methods, often conducted by local communities, can have profound positive effects on biodiversity. Artisanal fisheries often prioritize sustainability and local management. Additionally, it was noted that these fisheries can enhance biodiversity by employing traditional knowledge and practices that promote the conservation of fish habitats Cohen et al. (2018). Furthermore, artisanal fishing supports local economies and food security, fostering community stewardship of marine resources. Fishing is a critical economic activity that provides sustenance and livelihoods for millions globally. However, various fishing methods pose significant threats to marine biodiversity.

**Impact on Habitat.** Trawling causes extensive damage to benthic habitats, including coral reefs and seagrass beds. It was also reported that trawling can lead to a reduction in species richness by up to 50% in heavily fished areas, resulting in the loss of critical habitats essential for various fish species (Diana et al., 2017).

**Bycatch Issues.** Trawlers often catch non-target species, leading to significant bycatch. Research shows that bycatch can account for up to 40% of total catches, exacerbating declines in vulnerable populations (Kaiser et al, 2019). Longlining also poses significant bycatch challenges. Gilman et al. (2016) found that non-target species, including sharks and sea turtles, are frequently caught, leading to population declines and disruptions in marine ecosystems.

**Target Species Impact.** Overfishing through longlining can deplete target species, which can alter community dynamics and lead to long-term ecological consequences (Holland et al., 2020).

**High Bycatch Rates.** Gillnets can capture a wide range of non-target species, including juvenile fish and vulnerable species. Additionally, bycatch in gillnets can lead to substantial reductions in fish populations, affecting overall biodiversity (Klein et al, 2020) . **Population Imbalances.** The capture of juvenile and non-target species can disrupt population dynamics within ecosystems, leading to imbalances that affect predator-prey relationships (Börner et al, 2021) .

**Purse seining involves encircling schools of fish with a net. While effective for certain species, it poses its own set of challenges. The impacts on Juvenile Fish.** Purse seining can result in the

capture of juvenile fish, which can hinder population recovery and sustainability. Another study indicated that excessive juvenile capture leads to long-term declines in fish stocks (Hoffmann et al, 2020). Studies have shown that purse seine operations can lead to significant bycatch, threatening vulnerable populations (Pérez-Ruzafa et al, 2022) .

**Overfishing Risks.** In regions where artisanal fishing practices are unregulated, overfishing can occur, leading to depletion of local fish stocks. Another study found that unsustainable practices in artisanal fisheries can threaten biodiversity, particularly in sensitive coastal areas (Cohen et al, 2022) . **Habitat Destruction** where Some artisanal methods can also cause habitat damage, particularly when using destructive gear or practices that disturb the seabed (Béné et al, 2019).

**Loss of Benthic Species** where Trawling has been shown to reduce the abundance of benthic organisms, which play a crucial role in marine ecosystems. Moreover, another study emphasizes the importance of these species in maintaining ecological balance (Diana et al, 2017) . Then another impact is that of **Species Extinction Risk** where Prolonged overfishing can lead to the collapse of fish stocks, resulting in potential extinction of vulnerable species (Pauly et al, 2018) . It was noted that many commercially important species are now at risk due to unsustainable fishing practice then finally there is an impact of **Loss of Biodiversity** where the declined of key species due to overfishing and bycatch can result in reduced biodiversity and altered community structures, as noted by (Klein et al, 2019).

**Ecosystem Health and Habitat Impact.** Fishing methods vary significantly in their effects on marine habitats. Bottom trawling, for example, has been widely criticized for its destructive impact on seabed ecosystems and non-target species (Kaiser et al, 2019) . According to another similar study , bottom trawling can reduce benthic biomass by up to 41%, with long-term consequences for habitat recover (Sciberras et al, 2018). In contrast, passive gear types such as traps and hook-and-line are considered more selective and less damaging, making them preferable from a sustainability perspective (Froehlich et al, 2019) . These techniques reduce bycatch and avoid physical damage to benthic habitats.

#### **2.4. Conservation Strategies for Sustainable Eco systems and Fishing Practices.**

Conservation strategies are essential in ensuring sustainable fishing practices in any fish catchment area. Ecosystem-Based Fisheries Management (EBFM) is an integrated approach that considers the entire ecosystem, including species interactions and environmental factors. EBFM aims to maintain the health of marine ecosystems while ensuring sustainable fishery

yields. It is argued that EBFM enhances resilience to environmental changes and supports biodiversity conservation by managing fish stocks in the context of their ecosystems (Link et al, 2016). This holistic approach allows for more adaptive management in the face of climate change. Then Community-Based Fisheries Management (CBFM).

Research indicates that CBFM can lead to improved management outcomes (Béné et al, 2019). Local knowledge helps tailor strategies to specific ecological contexts, fostering a sense of ownership and responsibility among community members. This approach not only enhances sustainability but also improves the socio-economic conditions of local fishers. Marine Protected Areas (MPAs). Marine Protected Areas (MPAs) are designated regions where fishing activities are restricted or prohibited to protect marine ecosystems. MPAs can significantly enhance biodiversity by providing safe havens for overfished and vulnerable species.

Another study found that well-designed MPAs lead to increased fish biomass and diversity, contributing to the overall health of marine ecosystems (Edgar et al, 2014). MPAs also help in restoring habitats that have been damaged by fishing and other human activities. Selective Fishing Gear.

The development of selective fishing gear aims to reduce bycatch and minimize the impact on non-target species. Innovations such as circle hooks and bycatch reduction devices (BRDs) have shown significant potential in decreasing bycatch rates. It was also reported that using selective gear not only enhances fish population health but also improves ecosystem dynamics by allowing non-target species to thrive (Gilman et al, 2016).

Electronic Monitoring and Reporting. The implementation of electronic monitoring systems enhances data collection and compliance in fisheries. Electronic monitoring provides accurate data on catch and bycatch, enabling better management decisions. Research by Hinton and Nakamura (2018) indicates that electronic monitoring can improve accountability and reduce illegal fishing activities, supporting sustainable practices. This technology allows for real-time data analysis, facilitating adaptive management. Sustainable Aquaculture.

Sustainable aquaculture practices can provide a reliable seafood source without depleting wild populations. Moreover well-managed aquaculture can contribute to food security and environmental sustainability, especially when employing practices that minimize pollution and habitat destruction (FAO, 2020). Innovations in aquaculture, such as integrated multi-trophic aquaculture (IMTA), can further enhance sustainability by recycling nutrients. Policy and

Regulatory Frameworks. Effective policy and regulatory frameworks are essential for promoting sustainable fishing practices.

Fisheries Management Plans (FMPs) that incorporate scientific assessments and stakeholder input can enhance the sustainability of fisheries. Hilborn et al. (2020) emphasize that effective FMPs lead to the recovery of overfished stocks and promote long-term ecological health. These plans help in setting quotas, establishing closed seasons, and protecting critical habitats.

International Agreements and Cooperation. such as the United Nations Convention on the Law of the Sea (UNCLOS), facilitate cooperation in fisheries management. Research by Davis and Fuchs (2019) highlights the importance of collaborative efforts in achieving sustainable fishing practices on a global scale. Such agreements help in setting common standards and practices that enhance sustainability.

Enforcement and Compliance Mechanisms which has Strengthen enforcement can significantly reduce illegal, unreported, and unregulated (IUU) fishing, which poses major threats to sustainability. According to Agnew et al. (2019), effective enforcement strategies, including surveillance and penalties for non-compliance, are essential for maintaining the integrity of fisheries management.

Stakeholder Involvement Which Involves stakeholders in decision-making processes enhances the effectiveness of fisheries management. Collaborative approaches that include fishers, scientists, and policymakers lead to more informed and accepted management strategies. Béné et al. (2018) note that stakeholder engagement fosters a sense of ownership over resources, promoting sustainable practices and compliance with regulations. Education and Outreach Programs. Education and outreach initiatives can raise awareness about the importance of sustainable fishing.

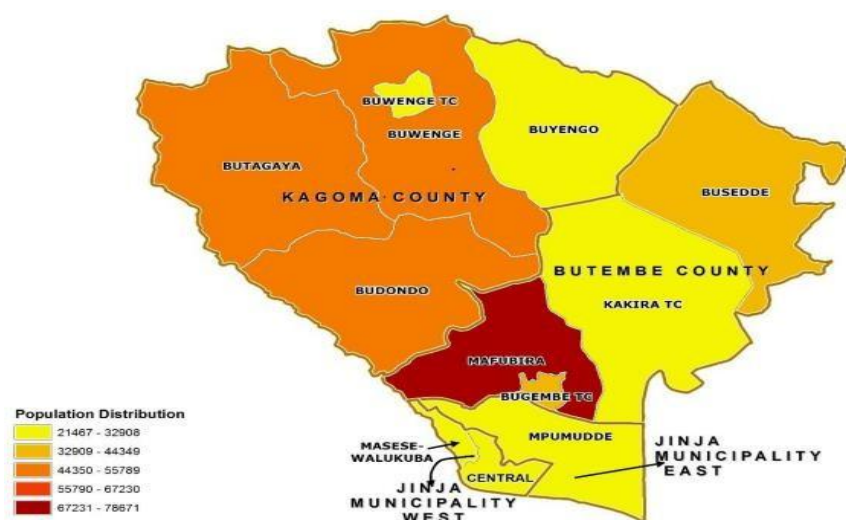
Programs aimed at educating fishers and consumers about sustainable practices can drive behavioural changes that support conservation efforts. Research by Lewis et al. (2024) highlights the role of education in promoting sustainable seafood choices and responsible fishing practices. Engaging the public through campaigns can enhance the demand for sustainably sourced seafood.

## CHAPTER THREE: METHODOLOGY

### 3.1. Study area

### 3.2. Location

Jinja District encompasses Jinja City and its surrounding areas, Jinja is located in the eastern part of Uganda, approximately 81 kilometers (50 miles) east of Kampala, the capital city. It lies along the northern shores of Lake Victoria, which is one of the largest freshwater lakes in the world. The city is positioned at the confluence of the Nile River and Lake Victoria, making it strategically significant. It is bordered by Iganga District to the north, Mayuge District to the south, and Kamuli District to the east. The district covers an area of approximately 1,271 square kilometers (491 square miles).



**Figure 1. A map showing the location of study area.**

### 3.3. Research design

This was a descriptive cross-sectional study design with quantitative method of data collection. The design was chosen to assess the effects of fishing techniques on fish diversity at a particular period when the study was conducted.

### 3.4. Study population

The study was conducted among fishers in the three landing sites of Lake Victoria in Jinja city Uganda

### 3.5. Sampling size determination

The sample size was calculated using Slovin's formula of sample size determination when the total population of the target participants is known, 100 (URN, 2024) . The calculation used a margin error of 5% to be confident at 95% level.

$$n = N / (1 + Ne^2)$$

Where,

N is 100, the estimated total numbers of fishers in the selected three landing sites in Jinja city (URN, 2024),

e is the allowable/ margin error, 5% and

n is the required sample size.

$$n = 100 / (1 + 100 * 0.0025),$$

$$n = 80$$

### 3.6. Sampling procedures

The three landing sites from Jinja city was considered to represent other landing sites in Jinja city. The landing sites were selected purposively because they have larger number of fishers and have started many years ago that will allow for more informative finding. In addition, the fishers were selected systematically from each landing sites after appropriate interval was established by dividing the total population by the required sample size. Interval ( $K^{th}$ ) =  $N/n$ , where N is the total population and n is the sample size. At the landing site, participants were selected following the established interval ie.

### 3.7. Data collection

In this study, only quantitative data was collected from the study participant data collection methods. A pretested Interviewer-administered questionnaire developed on kobo-collect toolbox on a mobile tablet was used for collecting quantitative data from the study participants. The pretesting was done among fishermen in Kayei landing site in Apac District in northern Uganda. The data collected during pretesting was not included in the final analysis. The designs of the questionnaire were guided by the specific objective and the conceptual framework.

### 3.8. Data analysis

The data collected and submitted to the kobo-collect toolbox server was downloaded to Microsoft Excel version 2013 where it was sorted and cleaned. The cleaned data was then imported into Stata version 14 for analysis. Here, descriptive statistics such as means, standard deviation, and percentages were used to describe the data basing on the stated study specific objectives. The results were presented using frequency tables.

### **3.9. Ethical considerations**

The ethical approval was sought from the University and official permissions were obtained from the relevant local leaders including the Jinja resident city commissioner, Jinja fisheries production officer and Jinja city Clark. All participants participated following informed consent where they were informed of the study objectives, procedure, voluntary participation, benefits, privacy, and confidentiality of the data collected

## CHAPTER FOUR: RESULTS

### 4.1. Introduction

The response rate in this study was 98.8% (n=79)

### 4.2. Sociodemographic characteristics of the study participants

In this study, the majority of respondents were male (95.0%), married (65.8%), had attained a primary level of education (53.2%), and relied on fishing as their primary source of livelihood (93.7%) (Table 1).

*Table 1. Sociodemographic characteristics of the study participants*

| Variable                  | Frequency (n=79) | Proportion (%) |
|---------------------------|------------------|----------------|
| <b>Location</b>           |                  |                |
| Masese landing site       | 28               | 35.4           |
| Rippon falls landing site | 31               | 39.2           |
| Wairaka Landing Site      | 20               | 25.4           |
| <b>Gender</b>             |                  |                |
| Female                    | 4                | 5.0            |
| Male                      | 76               | 95.0           |
| <b>Marital status</b>     |                  |                |
| Divorced                  | 8                | 10.1           |
| Married                   | 52               | 65.8           |
| Single                    | 19               | 24.1           |
| <b>Level of education</b> |                  |                |
| No education              | 1                | 1.2            |
| Primary                   | 42               | 53.2           |
| Secondary                 | 33               | 41.8           |
| Tertiary                  | 3                | 3.8            |
| <b>Religion</b>           |                  |                |
| Born again                | 12               | 14.1           |
| Moslem                    | 19               | 24.4           |
| Catholic                  | 31               | 39.7           |
| Protestant                | 17               | 21.8           |
| <b>Tribe</b>              |                  |                |
| Munyankole/Mukiga         | 1                | 1.3            |
| Muganda                   | 12               | 15.2           |

|                                               |                |      |
|-----------------------------------------------|----------------|------|
| Musoga                                        | 16             | 20.3 |
| Others                                        | 50             | 63.3 |
| <b>Major source of livelihood</b>             |                |      |
| Farming                                       | 1              | 1.3  |
| Formal/Professional employment                | 1              | 1.3  |
| Other                                         | 3              | 3.8  |
| fishing                                       | 74             | 93.7 |
| <b>Household size (average)</b>               | <b>4 ± 2.4</b> |      |
| <b>Distance to landing sites (average km)</b> | <b>2 ± 1.2</b> |      |

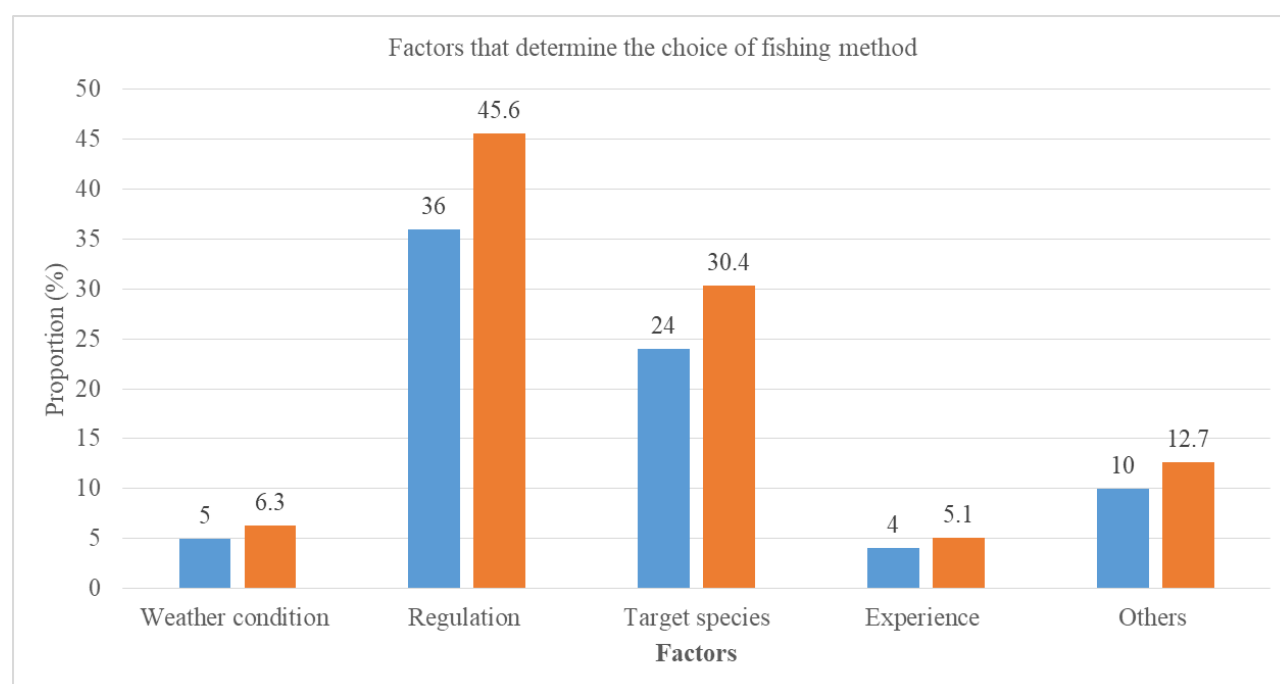
#### 4.3. Factors that determine the choice of fishing method used

Most participants (89.7%) reported engaging in fishing on a daily basis, with net fishing being the predominant method used (64.6%). Nearly half (46.8%) indicated that they adopted their fishing methods from family members (Table 2). However, the primary factors influencing their choice of fishing techniques were regulatory guidelines (45.6%) and existing fishing practices (30.4%) (Figure 1)

**Table 2. Fishing method employed by study participants**

| Variable                              | Frequency (n=79) | Proportion (%) |
|---------------------------------------|------------------|----------------|
| <b>How often do you fish?</b>         |                  |                |
| Daily                                 | 70               | 89.7           |
| Monthly                               | 2                | 2.5            |
| Rarely                                | 2                | 2.5            |
| weekly                                | 5                | 6.3            |
| <b>Fishing method used</b>            |                  |                |
| Angling                               | 8                | 10.1           |
| Net fishing                           | 51               | 64.6           |
| Longlining fishing                    | 16               | 20.3           |
| Other                                 | 2                | 2.5            |
| Trap fishing                          | 2                | 2.5            |
| <b>How did you learn that method?</b> |                  |                |
| Family tradition                      | 37               | 46.8           |
| Formal training                       | 4                | 5.1            |

|             |    |      |
|-------------|----|------|
| Self-taught | 2  | 2.5  |
| other       | 36 | 45.6 |



**Figure 2. Factors that determine the choice of fishing method used**

#### **4.4. Effects of the different fishing methods on the fish population in Lake Victoria in Jinja city**

The majority of respondents (86.1%) were aware of illegal fishing practices, including the use of unauthorized fishing gear (82.4%). When asked about the fishing methods with the greatest negative impact on fish stocks if misused, most participants identified gill nets (59.5%), followed by longlines (29.1%). Notably, a significant number of respondents (86.1%) reported having observed changes in fish stock over the years, with 57.4% indicating a decline. The Nile Tilapia was identified as the most affected species, cited by 59.5% of participants (Table 3).

**Table 3. Effects of the different fishing methods on the fish population in Lake Victoria in Jinja city**

| Variable                                 | Frequency (n=79) | Proportion (%) |
|------------------------------------------|------------------|----------------|
| Are you aware of illegal fishing method? |                  |                |

|                                                                            |    |      |
|----------------------------------------------------------------------------|----|------|
| No                                                                         | 9  | 11.4 |
| Not sure                                                                   | 2  | 2.5  |
| yes                                                                        | 68 | 86.1 |
| <b>If yes, what are those Illegal fishing methods?</b>                     |    |      |
| Fish poisoning                                                             | 10 | 14.7 |
| Illegal gears                                                              | 56 | 82.4 |
| Dynamite fishing                                                           | 2  | 2.9  |
| <b>In your opinion, which method has the biggest impact on fish stock?</b> |    |      |
| Gill nets                                                                  | 47 | 59.5 |
| Fish traps                                                                 | 2  | 2.5  |
| Long lines                                                                 | 23 | 29.1 |
| Hooks                                                                      | 7  | 8.9  |
| <b>Have you noticed change in fish stock over years?</b>                   |    |      |
| No                                                                         | 11 | 13.9 |
| yes                                                                        | 68 | 86.1 |
| <b>What changes have you noticed?</b>                                      |    |      |
| Changes in average fish size                                               | 7  | 10.3 |
| Changes in species diversity                                               | 16 | 23.5 |
| Decrease in fish numbers                                                   | 39 | 57.4 |
| Increase in fish numbers                                                   | 2  | 2.9  |
| Other                                                                      | 4  | 5.9  |
| <b>Which fish species are most affected by the change?</b>                 |    |      |
| Nile Tilapia                                                               | 47 | 59.5 |
| Nile perch                                                                 | 31 | 39.2 |
| Silver Cyprinids                                                           | 1  | 1.3  |

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#### **4.5. Strategies that have been put in place to ensure sustainable fishing practices**

The majority of participants (64.6%) reported being aware of sustainable fishing practices, with selective fishing gear (56.9%) and catch limits (29.4%) being the most commonly cited examples. Over half (55.7%) indicated that they currently use sustainable fishing methods, particularly selective gear (43.2%) and size limits (31.8%). More than half (57.0%) were aware of training programs on sustainable fishing, and almost all (98.7%) expressed interest in learning more. A large proportion (77.2%) acknowledged the existence of measures to support

adoption of sustainable practices, including education and training (47.5%), regulatory frameworks (13.1%), and community involvement (13.1%). Just over half (55.7%) had received training, primarily from government agencies (84.1%) (Table 4).

**Table 4. Strategies have been put in place to ensure sustainable fishing practices**

| <b>Variable</b>                                                        | <b>Frequency (n=79)</b> | <b>Proportion (%)</b> |
|------------------------------------------------------------------------|-------------------------|-----------------------|
| <b>Are you aware of sustainable fishing practices?</b>                 |                         |                       |
| No                                                                     | 23                      | 29.1                  |
| Not sure                                                               | 5                       | 6.3                   |
| yes                                                                    | 51                      | 64.6                  |
| <b>If yes, what are the examples of sustainable practices?</b>         |                         |                       |
| selective fishing gear                                                 | 29                      | 56.9                  |
| Aquaculture                                                            | 5                       | 9.8                   |
| seasonal closure                                                       | 2                       | 3.9                   |
| catch limit                                                            | 15                      | 29.4                  |
| <b>Are you currently using sustainable fishing method?</b>             |                         |                       |
| No                                                                     | 35                      | 44.3                  |
| yes                                                                    | 44                      | 55.7                  |
| <b>If yes, which of the following you are using?</b>                   |                         |                       |
| Other                                                                  | 4                       | 2.3                   |
| Size limits                                                            | 15                      | 31.8                  |
| Seasonal closures                                                      | 3                       | 2.3                   |
| use of selective gear                                                  | 22                      | 43.2                  |
| <b>Are you aware training program in sustainable fishing practice?</b> |                         |                       |
| No                                                                     | 34                      | 43.0                  |
| yes                                                                    | 45                      | 57.0                  |
| <b>Are you interested in learning sustainable fishing practices?</b>   |                         |                       |
| No                                                                     | 1                       | 1.3                   |
| yes                                                                    | 78                      | 98.7                  |

**Are there available measures to enable farmers adopt sustainable fishing practices?**

|          |    |      |
|----------|----|------|
| No       | 13 | 16.5 |
| Not sure | 5  | 6.3  |
| yes      | 61 | 77.2 |

**What are some of the available measures?**

|                          |    |      |
|--------------------------|----|------|
| community involvement    | 8  | 13.1 |
| Education and training   | 29 | 47.5 |
| Monitoring and reporting | 6  | 9.8  |
| Regulatory Framework     | 8  | 13.1 |

**Have you ever been trained in sustainable fishing practices?**

|     |    |      |
|-----|----|------|
| No  | 35 | 44.3 |
| yes | 44 | 55.7 |

**If yes, who trained you?**

|                     |    |      |
|---------------------|----|------|
| Friends/Relatives   | 2  | 4.6  |
| Government agencies | 37 | 84.1 |
| NGOs                | 4  | 9.1  |
| TV/Radio program    | 1  | 2.3  |

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## CHAPTER FIVE: DISCUSSION

### 5.1. Introduction

This chapter focuses on discussing the results of the analysis where the relationship of these finding with other studies are discussed, its implication on sustainable fishing practices, and brief recommendations for the relevant stakeholders. The discussion starts with highlighting key finding of the study followed by discussion basing on each specific objective as followed. This study was to assess the implications of fishing techniques on sustainable fisheries on Lake Victoria in Jinja city.

In this study, the majority of respondents were male (95.0%), married (65.8%), had attained a primary level of education (53.2%), and relied on fishing as their primary source of livelihood (93.7%) (Table 1). Most participants (89.7%) reported engaging in fishing on a daily basis, with net fishing being the predominant method used (64.6%). Nearly half (46.8%) indicated that they adopted their fishing methods from family members (Table 2). However, the primary factors influencing their choice of fishing techniques were regulatory guidelines (45.6%) and existing fishing practices (30.4%) (Figure 1).

Furthermore, the majority of respondents (86.1%) were aware of illegal fishing practices, including the use of unauthorized fishing gear (82.4%). When asked about the fishing methods with the greatest negative impact on fish stocks if misused, most participants identified gill nets (59.5%), followed by longlines (29.1%). Notably, a significant number of respondents (86.1%) reported having observed changes in fish stock over the years, with 57.4% indicating a decline. The Nile Tilapia was identified as the most affected species, cited by 59.5% of participants (Table 3).

The majority of participants (64.6%) reported being aware of sustainable fishing practices, with selective fishing gear (56.9%) and catch limits (29.4%) being the most commonly cited examples. Over half (55.7%) indicated that they currently use sustainable fishing methods, particularly selective gear (43.2%) and size limits (31.8%). More than half (57.0%) were aware of training programs on sustainable fishing, and almost all (98.7%) expressed interest in learning more. A large proportion (77.2%) acknowledged the existence of measures to support adoption of sustainable practices, including education and training (47.5%), regulatory frameworks (13.1%), and community involvement (13.1%). Just over half (55.7%) had received training, primarily from government agencies (84.1%) (Table 4).

## **5.2. Sociodemographic characteristics of the study participants**

The majority of respondents were males. This finding reiterates with the norms in many African societies where male gender dominates fishing activities on lakes. Fishing is regarded as one of the works that requires physical strength and skills such as swimming which limit women participation (Britwum, 2009; Thorpe et al., 2014). Additionally, men are long been regarded as food providers, hence making most of them to be hunters and fishers (Thorpe et al., 2014). The finding underscores the need for male-inclined intervention to promote sustainable fishing practices. Additionally, most participants were married. Marriage comes with responsibilities which demands for sources of livelihood including fishing activities. By fishing, the fishers can find food for their families, raise money for school fees and other domestic expenditures (Belhabib et al., 2015; Porter Retired & Mbezi, 2010) . Therefore, promoting sustainable fishing practices is important in promoting sustainable sources of livelihood for the fishing communities in Uganda. This is consistent with this study's finding that 93.7% of the respondent relied on fishing as their primary source of livelihood (Table 1).

## **5.3. Factors determining the choice of fishing methods**

The primary factors influencing fishers' choice of fishing techniques were regulatory guidelines and the existing fish species. This finding shows the combined effects of external regulation efforts and ecological conditions on the selection of fishing methods among fishers in Jinja City, Lake Victoria. Additionally, the prominent influence of regulatory guidelines suggests that many fishers are becoming more aware of national and local laws governing fishing practices, such as gear restrictions, mesh size requirements, and seasonal closures. This is in line with previous studies such as Nunan et al. (2015) and Ogwang et al. (2021), which show that the effectiveness of fisheries co-management structures like Beach Management Units (BMUs) has improved compliance with fishing regulations in parts of Lake Victoria.

Secondly, the present finding indicates that fishers adapt their techniques based on the type of species available in their local fishing grounds. Different species require different fishing methods; for instance, Nile Perch may require longlines or hooks, while Nile Tilapia is often caught using gillnets or traps. This ecological awareness reflects a form of traditional ecological knowledge (TEK), as previously discussed by Jansen et al. (2000) where local fishers adjust their strategies based on species behavior, abundance, and habitat. The ability of fishers to align their method with the available species aligns with sustainable fishing principles. This can reduce bycatch and minimize environmental impacts. However, in the absence of effective regulation enforcement, inappropriate gears can be used leading to

exploitation of high-demand species like tilapia. The current finding implies a positive signal to stakeholders in law enforcement and awareness creation such as the Uganda People's Defense Forces (UPDF) and others, given that nearly half of fishers consider regulations in their decision-making. Moreover, the finding implies that interventions targeting strengthening species-specific management strategies can be effective when incorporated with the local knowledge. The findings also call for a need for continuous sensitization coupled with enforcement to promote sustainable fishing practices.

#### **5.4. Effects of the different fishing methods on the fish population in Lake Victoria in Jinja city**

The study found that a large majority of respondents were aware of illegal fishing practices, particularly the use of unauthorized fishing gear. Additionally, respondents identified gill nets and longlines as the fishing methods that, if misused, pose the greatest threat to fish stocks. A significant proportion also observed a decline in fish stock over the years, with Nile Tilapia being the most affected species. These findings demonstrate a relatively high level of awareness among fishers about both unsustainable practices and their consequences. The widespread acknowledgment of gill nets as highly impactful supports concerns raised by previous studies, such as those conducted by Njiru et al. (2007) and Matsuishi et al. (2006), which found that the inappropriate use of small-mesh gill nets has contributed to the decline of key species like Nile Tilapia in Lake Victoria. Misuse of longlines, though less common, can also harm juvenile fish and non-target species, adding to stock depletion.

The perceived decline in fish stocks, especially of Nile Tilapia, corresponds with ecological assessments previously conducted by the Lake Victoria Fisheries Organization, which has consistently reported declining catch rates due to overfishing and illegal gear use (LVFO, 2025). The ability of the participants to observe these long-term changes suggests that local fishers possess valuable ecological knowledge, which can be harnessed for sustainable management if properly supported (Farr et al., 2018). However, despite this awareness, the continued use of harmful gear such as gill nets implies a gap between knowledge and practice, which can be attributed, to economic pressures, weak enforcement, or lack of access to alternative gear. This agrees with findings by Nunan (2010), who argued that knowledge alone is insufficient to change behavior unless institutional and economic barriers are addressed. Awareness alone is not enough: Although fishers recognize the dangers of illegal methods, enforcement and incentives are needed to drive behavior change. The present findings imply species-specific vulnerability of Nile tilapia, requiring species target regulation and recovery

efforts. Another implication is that local knowledge can be utilized in participatory monitoring and community-oriental management of fishing activities. Additionally, despite most fishers recognizing illegal fishing method, this may not enough, hence be calling for a need for incentives coupled with law enforcement to realize sustainable fishing practices.

#### **5.5. Strategies have been put in place to ensure sustainable fishing practices**

The study revealed that most respondents were aware of sustainable fishing practices, and more than half reported actively using such methods. Among these, selective fishing gear and catch limits were the most commonly cited strategies, with size limits and gear selectivity being widely practiced. Additionally, most of participants were aware of training programs, and almost all participants expressed interest in learning more about sustainable fishing techniques. These findings revealed a positive shift in attitudes and behavior toward sustainable fisheries in Jinja City. The adoption of sustainable fishing practices and interest shown by most fishers in this study could suggest that fishers are not only aware of sustainability issues but are willing to adopt appropriate methods when supported. This is correspondence to the finding of study implemented by Nunan et al. (2015) who emphasized the important role played by effective community engagement, education, and awareness in promoting sustainable fishing practices around Lake Victoria. In addition, this study highlights the role played by government institution in shaping fishing behaviors given more than half reported receiving training form relevant government agencies. This is in accordance with the study conducted by Ogwang et al. (2021) which suggested that government-sponsored training and aware creation as well as enforcement increase adoption of sustainable fishing practices.

Despite the high awareness and interest in sustainable fishing practices shown by most fishers, relatively big proportion (44.3%) are not currently in sustainable practices. This gap could be attributed to lack of access to recommended fishing gears, inadequate capital, or limited followed after training. As previously observed by Béné (2009), pressure to meet daily household needs such as food, money for school fees, etc. can for fishers to resort to unsustainable practices despite knowing the sustainable practices. Furthermore, the participants recognizing the exiting supportive measures implies an existence of a favorable environment for sustainable fisheries to exist. However, this may require scale up and effective coordination. Additionally, the study found community involvement as one of the measures. This reveals the emergence of locally driven initiatives such as fishery groups, beach management, etc. which are very important if long-term sustainability is to be realized. The findings have serious implication on sustainable fishing practices. Firstly, it implies that

government can play a central role in providing necessary training to the fishers regarding sustainable fishing practices but collaboration with local NGO and fishing communities could be more effective. Secondly, the elevated level of awareness and interest among fishers provide a great opportunity for adoption of sustainable fishing practices when exploited effectively.

#### **5.6. Study limitation**

The study provides an important insight to how different fishing techniques can influence sustainable fishing practices on lake victoria. However, this study may be limited by social desirability where some respondents may have responded to meet societal expectations. This limitation was minimized by acknowledging ensuring confidentiality to study participants during consenting process and pretesting of data collection questionnaire.

## **CHAPTER SIX: CONCLUSION AND RECOMMENDATION**

### **6.1 Conclusion**

This study revealed that regulation and the targeted fish species are the major factors that influence choice for a fishing method among fisher in Lake Victoria, Jinja city. It is also revealed that there was observed change in fish stock attributed to unsustainable fishing practices, with Nile Tilapia as the most affected fish species

### **6.2 Recommendation**

- The government, through district fisheries department should carry out more sensitization to increase knowledge and adaptation of sustainable fishing practices since this study revealed that significant numbers were not using sustainable methods.
- The government and other relevant stakeholders should leverage on the local knowledge to strengthen monitoring and evaluation effort regarding sustainable fishing practices and water protection.
- The government of Uganda, through collaboration with the private sector should offer fishers with incentives and subsidy for them to access legal fishing gears, hence promoting sustainable fishing practices among them.
- There should be continuous law enforcement by the UPDF coupled with community involvement to reduce use of illegal fishing gears in Lake Victoria.
- The government of Uganda, through collaboration with the private sector should offer fishers with incentives and subsidy for them to access legal fishing gears, hence promoting sustainable fishing practices among them.

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## Appendix I: HOUSEHOLD QUESTIONNAIRE

Dear respondent,

I am OBOTE AMOS a student of Busitema University Namasagali Campus pursuing bachelor's degree of science in fisheries and water resources management. I am conducting my research on "Assessing the implications of fishing techniques on the sustainable fisheries a case study of Lake Victoria, Jinja City".

You have been identified as one of the respondents in this study and I would like to ask you questions concerning this research. This will take about 30min. The information you provide will be used only for academic purposes of the study and will be kept for confidential. You are therefore requested to honestly answer as many questions as possible that apply to your situations.

Thank you.

### Instruction:

Please tick ☐ in the appropriate box and where necessary fill in the blank spaces provided. **Section A: Background Information**

### SECTION A. PRELIMINARY INFORMATION

A1. 1 Masese Landing Site ☐ 2. Wairaka Landing Site ☐

3. Rippon falls landing site ☐

A2. Coordinates .....

### SECTION B. SOCIO-DEMOGRAPHIC INFORMATION

B1. Sex of respondent.

1. Male ☐ 2. Female ☐

B2. Age of respondent.....

B3 Are you the head of the family?

Yes ☐

No ☐

B4. If no, what is the sex of the head of the household?

Male ☐

Female ☐

B5. Marital status of respondent

1. Married ☐      2. Single ☐      3. Divorced ☐      4. Widowed ☐

B6. Highest level of education

1. No education ☐      2. Primary ☐      3. Secondary ☐  
4. Tertiary ☐

B7. What is your religious affiliation?

1. Catholic ☐      2. Protestants ☐      3. Moslem ☐      4. Born again ☐  
5. Others (Specify).....

B8. What is your tribe?

1. Musoga ☐      2. Muganda ☐      3. Munyoro/Mutoro ☐  
4. Munyankole/Mukiga ☐ Others (please specify)  
.....

B9. What is your major source of livelihood?

1. Farming ☐      2. Business enterprise      3. fishing      4. Formal/Professional employment  
5. Other (Specify) .....

B10. How many adults (18 and above) and children live in your household (including yourself)?

1. Adults.....      2. Children.....

B11. Have you had access to credit in the last 12 months from a formal financial institution?

1. Yes .....      2. No .....

B12. What is the distance of your household from your nearest landing site (kms)?

.....  
.....

**SECTION C: FACTORS INFLUENCING THE USE OF DIFFERENT FISHING METHODS ON THE SUSTAINABLE FISHERIES OF LAKE VICTORIA.**

**C 1. Do you do fishing**

**1. Yes.....**      **2. No .....**

**C2. If yes, how often do fishing?**

☐ Daily

☐ Weekly

☐ Monthly

☐ Rarely

**C3. What fishing Methods do you primarily use?**

☐ Net fishing

☐ Trap fishing

☐ Longlining

☐ Angling

☐ Spearfishing

☐ Other (please specify)

.....

**C4. How did you learn these fishing methods?**

☐ Family tradition

☐ Formal training

☐ Self-taught

☐ Other (please specify) .....

**C5. What factors influences the choice of your fishing method?**

☐ Target Species

☐ Regulations

☐ Weather Conditions

☐ Experience Level

☐ Finances

Others specify.....

**C6. Have you faced any challenges when using the above fishing method?**

1. ☐ Yes

2. ☐ No

**C7. If yes, what challenges have you faced?**

1. ☐ Storms and wind

2. ☐ Breakdown of fishing gears

3. ☐ Competition with other fishermen i.e. commercial producers

4. ☐ Unintended capture of non-target fish species.

5. Others specify.....

**C8. Have you adopted any new fishing techniques in the past five years?**

☐ Yes

☐ No

☐ Not sure

**C9. If yes, what new fishing techniques have you adopted?**

1. ☐ Light fishing using LED lights to attract fish especially at night.
2. ☐ Catch and Release Techniques to promote sustainable practices
3. ☐ Advanced sonar systems; to identifying fish locations and underwater structures
4. ☐ Drone Fishing; Utilizing drones equipped with cameras to locate fish more effectively
5. others specify.....

**SECTION D. EFFECTS OF DIFFERENT FISHING METHODS ON FISH POPULATION OF LAKE VICTORIA.**

**D1. Are you aware of any fishing methods that are illegal or harmful to fish populations?**

1. ☐ Yes                      2. ☐ No                      3. ☐ Not sure

**D2. If yes, which fishing methods are illegal or harmful to fish populations in your area? (Provide option)**

1. ☐ Fish poisoning methods: Applying toxic substances to water bodies to kill fish
2. ☐ Dynamite fishing: This method destroys habitats and kills non target species
3. ☐ Illegal Gears: Employing prohibited nets such as seines that harms fish populations
4. ☐ Electric fishing methods

**D3. In your opinion, which fishing method has the most impact on fish stocks in Lake Victoria? (provide options).**

1. ☐ Gillnets
2. ☐ Longlines
3. ☐ Sein nets

4. ☐ Fish traps

5. ☐ Hooks

**D4. Have you noticed changes in fish stocks over the years?**

1. ☐ Yes

2. ☐ No

3. ☐ Not sure

**D5. If yes, what changes have you observed? (Select one that apply)**

1. ☐ Increase in fish numbers

2. ☐ Decrease in fish numbers

3. ☐ Changes in species diversity

4. ☐ Changes in average fish size

5. ☐ Other (please specify)

.....  
.....

**D6. Which species do you notice most affected by your fishing methods?**

**Provide the options**

☐ Nile perch (Latest niloticus)

☐ Nile tilapia (Oreochromis niloticus)

☐ Catfish (Clarias)

☐ Silver cyprinids (Rastrineobola argentea)

☐ Lung fish (Protopterus)

**SECTION E. STRATEGIES PUT IN PLACE TO ENSURE SUSTAINABLE FISHING PRACTICES ON LAKE VICTORIA.**

**E1. Are you aware of any sustainable fishing practices implemented in your landing site?**

- ☐ Yes
- ☐ No
- ☐ Not sure

**E2. If yes, which sustainable fishing practices do you know?**

1. ☐ Catch limits: setting maximum allowable catches to prevent over fishing
2. ☐ Seasonal closures: Implementing closed seasons during breeding times to allow fish population recover.
3. ☐ Selective fishing gear: Using gear that reduces bycatch and minimises damage to marine habitats
4. ☐ Aquaculture practices: promoting sustainable fish farming to reduce pressure on wild stocks

**E3. Are you currently using any sustainable fishing practices?**

- ☐ Yes
- ☐ No

**E2. If yes, which of the following sustainable practices do you implement? (Select one that apply)**

- ☐ Size limits ☐ Seasonal closures
- ☐ Use of selective gear
- ☐ Other (please specify) .....

**E5. Are you aware of any training programs for sustainable fishing methods?**

☐ Yes

☐ No

**E6. Would you be interested in learning new fishing methods?**

☐ Yes

☐ No

**E7. Are there any barriers or challenges that affect your adoption of sustainable fishing methods?**

1. Yes ☐

2. No ☐

**E8. If yes, please describe these barriers**

1. Lack of financial resources ☐

2. Lack of awareness and education ☐

3. Limited participation in decision making ☐

4. Social and Cultural constraints ☐

5. Others (Specify).....

**E9. Are you aware of any strategies or measures put in place to ensure you adopt the sustainable fishing practices in your area?**

1. Yes ☐

2. No ☐

3. Not sure ☐

**E10. If yes, what are those measures? (Select the option)**

1. ☐ **Education and Training**

2. ☐ **Regulatory Framework**

3. ☐ **Community Involvement**

4. ☐ **Monitoring and Reporting**

**E11. Have you received information/ training on sustainable fishing methods in your area?**

1. Yes ☐

2. No ☐

**E.12. If yes, what was the primary source of information?**

1. Government agencies ☐      2. NGOs ☐      3. TV/Radio program ☐  
4. Neighbors ☐      5. Friends/Relatives ☐ Others (specify).....

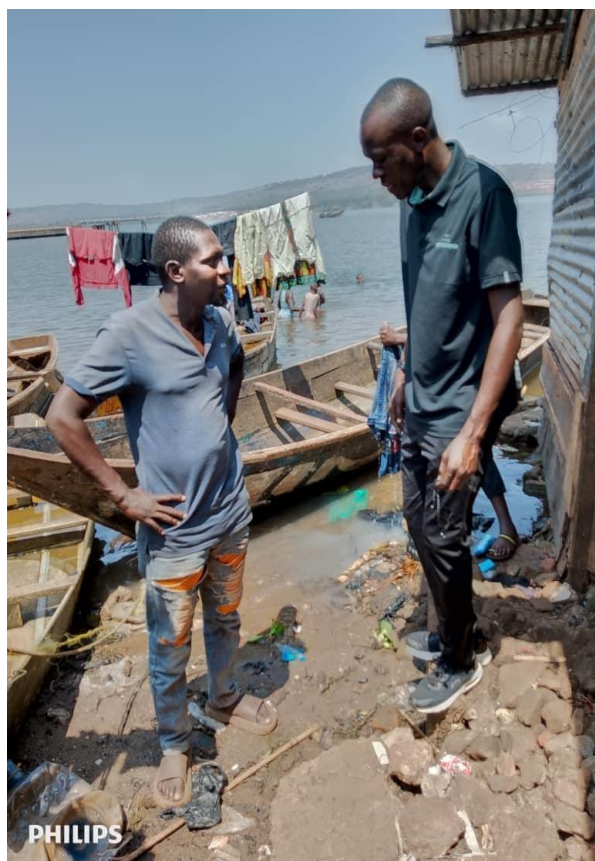
**E13. Are there existing laws, rules and regulations regarding sustainable fishing in your area?**

1. Yes ☐      2. No ☐      3. ☐ Not sure

**E14. In your view, do you think the above laws, rules and regulations regarding fishing have contributed towards ensuring sustainable fishing practices in this area?**

1. Yes ☐      2. No ☐      3. Not sure ☐

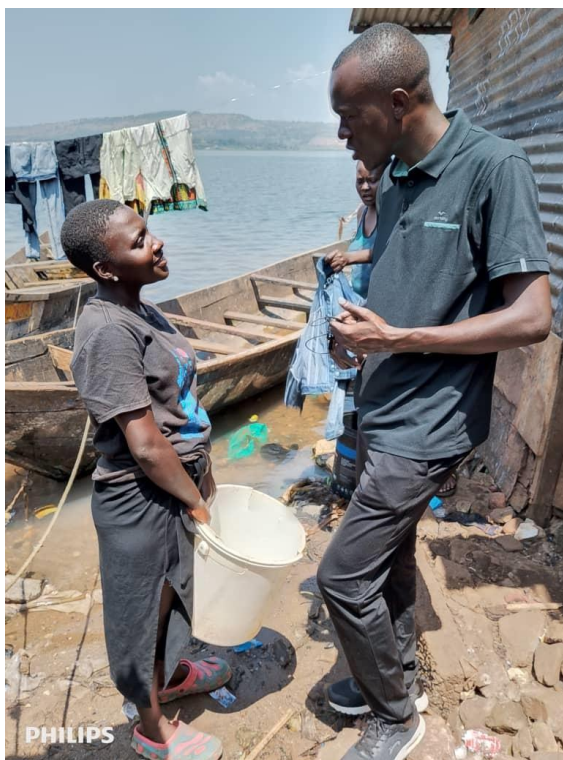
## Appendix II: ACTIVITY PHOTOS



**Data Collection from Respondent at Rippon Falls Landing Site**



**Data Collection from Respondent at Rippon Falls Landing Site**



**Data Collection from Respondent at Rippon Falls Landing Site**



**Data Collection from Respondents at Masese Landing Site**