International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 04 Apr. 2024, pp: 802-810 www.ijaem.net ISSN: 2395-5252

Economic Impact of Sustainable Fishing Practices on Lake ItezhiTezhi: Balancing Profitability and Environmental Consideration

Mr Fred Chimiti[1], Dr Sidney Kawimbe[2]
1.(African Parks Network) , P O Box 35423, Lusaka
2. (ZCAS University)

Date of Submission: 18-04-2024 Date of Acceptance: 28-04-2024

ABSTRACT
This article examines the economic impact of sustainable fishing practices on Lake ItezhiTezhi, with a focus on balancing profitability and environmental consideration. The sustainability of fishing practices in the region is crucial for maintaining the ecological balance of the lake while also ensuring the livelihoods of local communities dependent on fishing. Data was collectedfrom communities around the lake through administering questionnaires for individual respondents while other qualitative data was collected through Focus Group Discussions (FGDs). A sample of 150 respondents comprising of members of the community, local traditional leaders, the local government leaders as well as local Non-Governmental Organisations (NGOs). The article explores the potential economic benefits of sustainable fishing practices, including increased fish stocks, improved market access, and long-term viability of the fishing industry. Additionally, it discusses the challenges and trade-offs involved in implementing sustainable practices, such as initial investment costs and potential short-term reduction in catch. From the results, it is evident that it is possible for nature to live side by side with local communities while the community benefits from the endowments.

Keywords: Sustainable fishing, Fisheries management practices, Environmental consideration, Profitability

I. INTRODUCTION AND BACKGROUND

According to the State of World Fisheries and Aquaculture Report (FAO, 2022a), while two-thirds of global commercial fish stocks are exploited sustainably, the remaining one-third is in continued decline due to various factors, such as overfishing, pollution, and poor management. However, total fisheries and aquaculture production reached a record high of 214 million tons in 2020, largely due to the growth of aquaculture, particularly in Asia and Africa. Despite this, biodiversity loss and its impact on human well-being jeopardize progress toward the Sustainable Development Goals (SDGs), particularly SDG14 - Life Under Water. To ensure the achievement of the SDGs, we need sustainable fishing practices that prioritize artisanal and subsistence fishing that feeds people and minimize exploitation of single "stocks" targeted by industrial fisheries to supply global markets (Jacquet and Pauly, 2022). Sustainable fishing practices are crucial for maintaining the ecological balance of aquatic ecosystems and ensuring the long-term viability of fish populations (Pikitch et al, 2004). Lake ItezhiTezhi, located in Zambia, is a significant source of livelihood for local communities and a key contributor to the region's economy. However, the lake's fish stocks have been under increasing pressure due to overfishing and unsustainable practices (Petursson & Kapembwa, 2021). This has raised concerns about the long-term sustainability of the fishing industry and the health of the lake's ecosystem. In this article, we will explore the economic impact of sustainable fishing practices on Lake ItezhiTezhi, with a focus on balancing profitability with environmental considerations.

Lake ItezhiTezhi is a man-made reservoir on the Kafue River, created by the construction of the ItezhiTezhi dam. The lake supports a diverse range of fish species, providing a vital source of protein and income for local communities.

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 04 Apr. 2024, pp: 802-810 www.ijaem.net ISSN: 2395-5252

However, overfishing and the use of unsustainable fishing methods, such as the use of illegal nets and dynamite fishing, have led to a decline in fish stocks and raised concerns about the long-term health of the lake's ecosystem (Petursson & Kapembwa, 2021).Lake ItezhiTezhi presents a unique challenge for sustainable fishing practices, as it is situated partly within a protected area, specifically Kafue national park, and partly within a communal area. The fish populations in the communal area have been significantly depleted, leading fishermen to venture into the national park where fish are more abundant.

This has resulted in conflicts with wildlife police officers, as the fishermen encroach upon the protected area in search of viable fishing grounds (Matakala et al, 2019). Balancing the profitability of fishing with the environmental considerations of the national park presents a complex issue that requires careful management and collaboration between stakeholders.The economic significance of the fishing industry at Lake ItezhiTezhi cannot be overstated. It provides employment opportunities for local fishermen and women, as well as supporting businesses involved in fish processing and trading. Additionally, the sale of fish contributes to the income of many households in the region. However, the unsustainable exploitation of fish stocks poses a threat to the economic sustainability of the industry and the livelihoods of those dependent on it.In light of these challenges, there is a growing recognition of the need to adopt sustainable fishing practices that can ensure the long-term viability of the fishing industry while also preserving the ecological integrity of Lake ItezhiTezhi. This article aims to explore the potential economic benefits of sustainable fishing practices and the importance of finding a balance between profitability and environmental conservation in the context of Lake ItezhiTezhi.

II. LITERATURE REVIEW

There is a strong assumption that community-based fisheries management promotes Sustainable Fishing Practices(SFP) and has been successful in various countries around the world, leading to both profitability and environmental consideration (Donovan 2006). For example, Iceland has a long history of community-based fisheries management, where local fishing communities have been actively involved in managing their fisheries resources. This has led to sustainable fishing practices, increased profitability for local fishermen, and the preservation of marine ecosystems (Chambers & Carothers, 2017). In New Zealand, the introduction of the Quota Management System (QMS) has allowed for the allocation of fishing quotas to individual fishermen and fishing communities. This has led to improved profitability and environmental sustainability, as fishermen have a vested interest in preserving fish stocks for the long term (Orange, 2013). In Belize, community-based fisheries management has been successful in promoting sustainable fishing practices and protecting marine biodiversity. Local fishing communities have been involved in co-management arrangements with the government, leading to improved profitability and the conservation of marine resources.

Community-based fisheries management has been successful in several African countries, leading to profitability and environmental consideration.

The Namibian government has implemented community-based fisheries management through the establishment of conservancies, where local communities are given rights to manage and benefit from fisheries resources. This approach has led to improved fish stocks, increased profitability for local communities, and better environmental stewardship (Suich, 2010). In Senegal, community-based fisheries management has been successful in several coastal communities, where local fishers have organized into cooperatives to manage their resources sustainably. This has led to increased fish stocks, improved livelihoods, and better environmental conservation (Bene & Belal, 2020). In Madagascar, community-based fisheries management has been implemented in various coastal communities, leading to improved fishery sustainability, increased profitability for local fishers, and better protection of marine ecosystems (Long et al, 2021).

These examples demonstrate how community-based fisheries management can lead to both profitability and environmental consideration when local communities are empowered to manage and benefit from their fisheries resources sustainably.Zambia is blessed with various fisheries with the main water bodies being Lake Tanganyika, Kariba, Bangweulu and Itezhi-Tezhi. These water bodies support a significant fishing industry and provide livelihood for many local communities.

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 04 Apr. 2024, pp: 802-810 www.ijaem.net ISSN: 2395-5252

Figure No 1.1: Location of main fisheries

The fisheries sector in Zambia faces several challenges, including: (a) Overfishing: Overfishing is a significant challenge in many water bodies in Zambia, leading to declining fish stocks and threatening the sustainability of the fisheries sector. (b) Illegal, Unreported, and Unregulated (IUU) Fishing: IUU fishing undermines the sustainability of fisheries by depleting fish stocks, damaging marine ecosystems, and impacting the livelihoods of legitimate fishers. (c) Lack of Infrastructure: Inadequate infrastructure, such as storage facilities and transportation networks, hinders the efficient and sustainable operation of the fisheries sector. (d) Climate Change: Climate change impacts, such as changing water temperatures and extreme weather events, can disrupt fish habitats and migration patterns, affecting fish populations and the livelihoods of fishing communities. (e) Poor Regulatory Enforcement: Weak enforcement of fisheries regulations and inadequate monitoring and control measures contribute to unsustainable fishing practices and illegal activities. (f) Limited Access to Markets: Limited access to markets and value chains hinders the economic potential of the fisheries sector and the livelihoods of fisher folk.

Addressing these challenges requires a multi-faceted approach, including improved governance, sustainable management practices, investment in infrastructure, and capacity building for fisher folk and regulatory authorities.

Lake ItezhiTezhi has not been spared by the above challenges. Available literature suggests that immigration of fishers from other parts of Zambia, coupled with wrong fishing methods contributes to reduction in fish catches, which negatively impacts the fishermen's ability to earn more income for further investment to meet household needs (Kapembwa et al, 2021). At Lake ItezhiTezhi fisheries, there is a lack of core management and instead, a dual governance approach is utilized, involving both the fishing community and central government control. However, both approaches are ineffective due to non-compliance with legislation for local community participation in fisheries governance

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 04 Apr. 2024, pp: 802-810 www.ijaem.net ISSN: 2395-5252

and a lack of adequate policy framework to guide the governance process. Additionally, the governance approach lacks legitimacy with stakeholders, leading to the continuation of unsustainable fishing practices (Gardner & Kapembwa, 2020).

III. METHODOLOGY

The study was primarily a qualitative study which relied predominantly on views expressed by the respondents through the FGDs, views from the traditional leaders, government officials and Non-Governmental Organisations. Focus group discussions played a critical role as this data collection mode creates open lines of communication between individuals and rely on the dynamic interaction between participants to produce data that would be impossible to gather via other approaches, such as one-on-one interviewing (Jarvis & Barberena, 2008). Due to the relatively small size of the population, the target population of 150 also the sample. As stated above, the purposely selected sample was within reach and hence the researcher attained a 100 percent response rate. Further, the sample is broken down as shown in table 4.1 below:

IV. DATA PRESENTATION AND ANALYSIS

4.1 Sampling Frame

The sample was carefully selected to reflect critical the views of the communities living around the Itezhi-Tezhi lake considering the risk of biasness and subjectivity that may have crept in the study. Table 4.1 shows the breakdown of the respondents.

4.1 Key Informants

SN	Category of Respondents	Sample
1	Community Members	116
2	Government Officials	14
3	Non-Governmental Organisation	12
4	Traditional leaders	8
	Total	150

The sample was carefully and purposely selected to consider key informants in such a way that the community through the focus group discussion were not influenced by either the traditional leadership, local government leadership or any Non-Governmental Organisations.

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 04 Apr. 2024, pp: 802-810 www.ijaem.net ISSN: 2395-5252

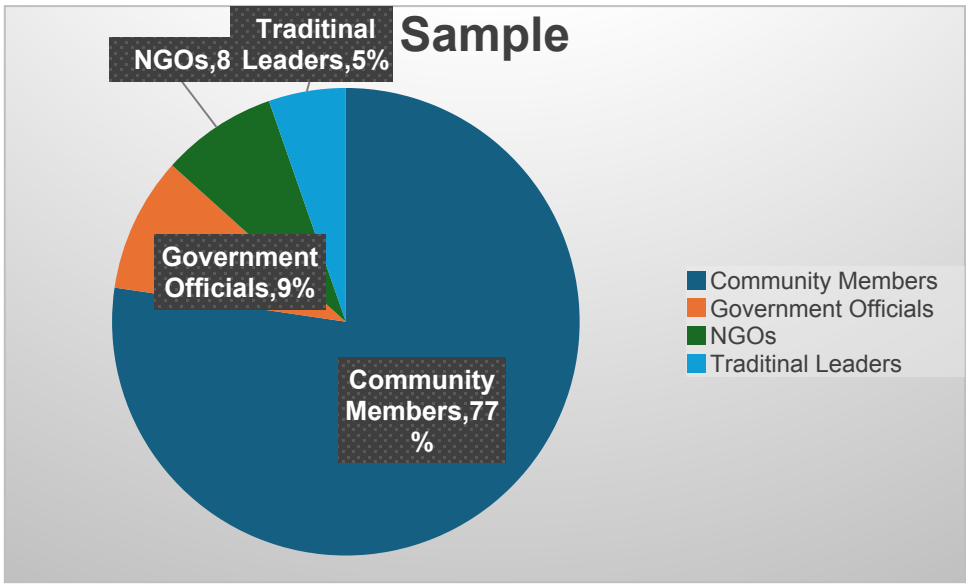


Figure 4.1 Sample for Key Informants

4.2 Categorisation of Responses

Using a 5-point likerty scale viewed of the respondents were profiled to indicate the intensity of the responses. The respondents expressed views on whether sustainable fishing practices have a positive economic impact and environmental sustainability on the communities residing around lake LakeItezhiTezhi. The views were organised on a 5-point likerty scale as shown in table No 4.2 below:

Table 4.2 Categories of Responses

SN	View	Point
1	Strongly Agree	5.0
2	Agree	2.5
3	Not Sure	0
4	Disagree	Negative 2.5
5	Strongly Disagree	Negative 5.0

4.3 Focus Group Discussions Responses

From the focus group discussion, the themes on whether sustainable fishing has positive economic implication on the welfare of the people living in surrounding areas of Itezhi-Tezhi lake emerged as shown in figure 4.3 below:

Table No 4.3 Focus Group Discussions Views

SN	Theme	Sample
1	Strongly agree	84
2	Agree	15
3	Not Sure	5
4	Disagree	8

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 04 Apr. 2024, pp: 802-810 www.ijaem.net ISSN: 2395-5252

5	Strongly Disagree	12
	Total	116

Out of a total number in the FGDs of 116, 68 percent or 84 strongly agreed that sustainable fishing methods were economically impacting the communities around lake Itezhi-Tezhi positively and that this kind of managing the water resources were helping in sustaining the biodiversity around the lake. 12 percent of a total of 15 out of 116 respondents agreed that sustainable way of fishing helped the local communities economically while at the same time keeping environment safe, while 5 out of 114 respondents or 4% reported that they were not sure on whether sustainable fish farming benefited locals while maintaining the environment. 5 out of 114 respondents in the FDGs or 4% indicated that they were not sure since they were not connected to the fishing activities in the area. The remaining 12 out of 114 or 10 percent reported that they strongly disagreed with the view that sustainable fish farming improved the economic wellbeing of the communities living around lake Itezhi-Tezhi.

The results appear to show that most members of the community around lake Itezhi-Tezhi appreciate the rolling out of sustainable methods of fishing with 68% in strong agreement. This is in line with other questions posed on the impact of sustainable fishing on the Itezhi-Tezhi lake with 15 out of 116 respondents or 12 percent of respondents in agreement. 5 out of 116 of the respondents or 4 percent were not sure while 12 percent strongly disagreed that sustainable fishing methods helped communities around lake Itezhi-Tezhi. It appears that the 12 percent that were in strong disagreement were in avoiding the fish ban and wished that fishing could be continuous as the that was the only income generating activity in the area.

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 04 Apr. 2024, pp: 802-810 www.ijaem.net ISSN: 2395-5252

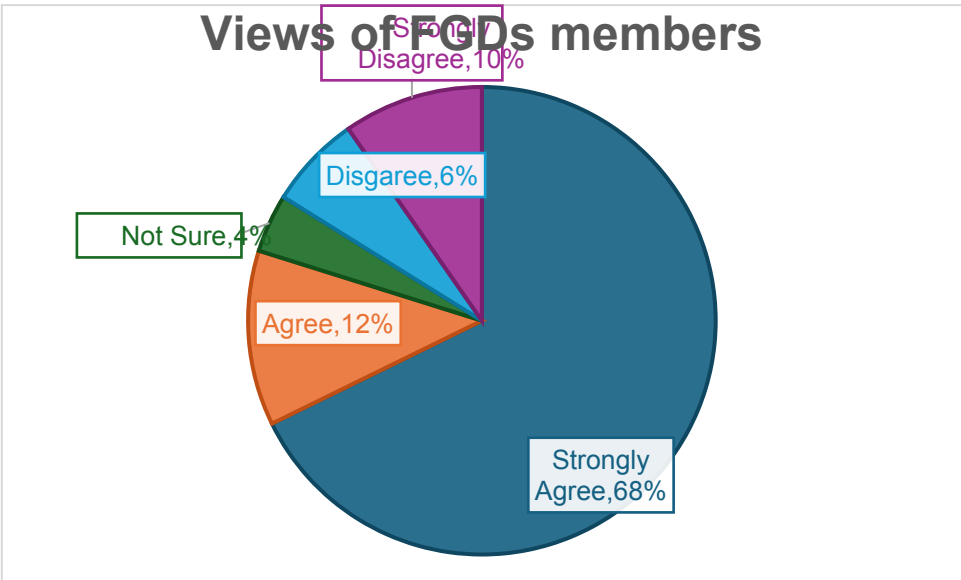


Figure 4. 3Views of FGDs

This line of designing a questionnaire was arrived at taking into account literacy levels of the respondents in this remote part of the country and also the fact that most fishermen and fish monger possess modest to low levels of education.

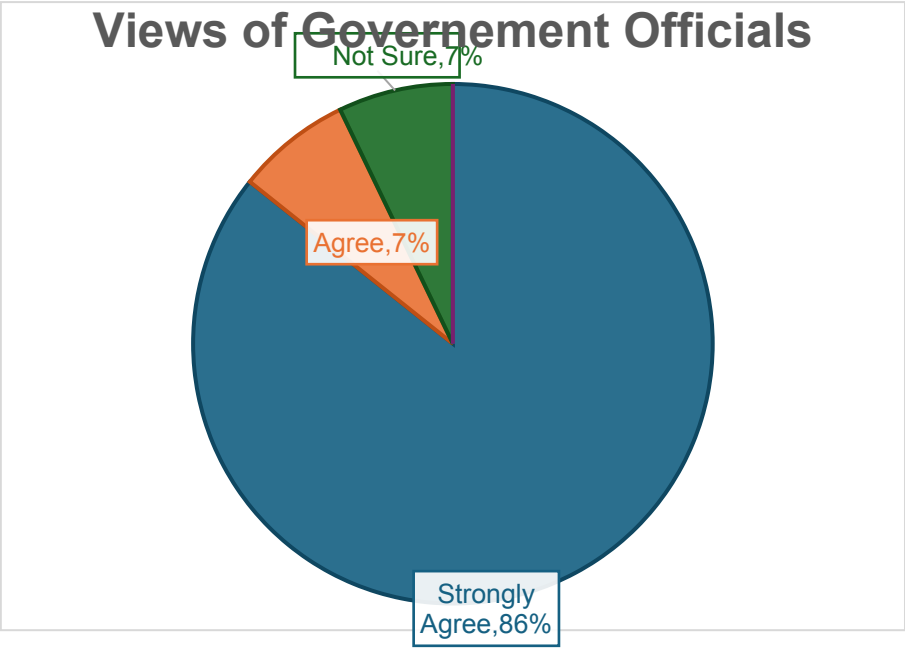
4.4 Responses from Government Officials

Table No 4.4 shows responses from the key government informants one weather sustainable fishing methods were benefitting locals who live around lake Itezhi-Tezhi.

4.4 Responses from Government Officials

SN	Theme	Sample
1	Strongly agree	12
2	Agree	1
3	Not Sure	1
4	Disagree	0
5	Strongly Disagree	0
	Total	14

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 04 Apr. 2024, pp: 802-810 www.ijaem.net ISSN: 2395-5252



12 out of 14 or 86% reported that they strongly agreed that sustainable fishing methods play a key role in improving economic well-being of the people as well as the need to keep biodiversity in check.

1 or a paltry 7 percent reported that they agreed with the position that sustainable fishing methods as key to improving the economic welfare as well as keeping the environment safe. This is expected considering that it is the role of the government to push the green agenda and any other activities that support citizen empowerment.

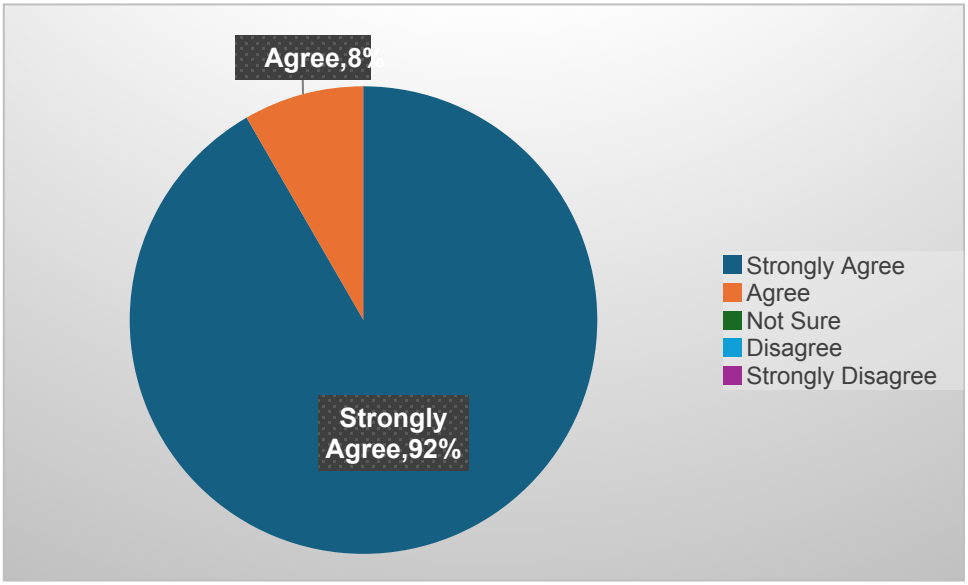
4.5Non-Governmental Organisations

Out of a total of 12 NGOs that participated in the survey, 11 or 92 percent strongly felt that sustainable fishing methods were a catalyst to economic well-being of the communities around lake Itezhi-Tezhi as well as the care for nature. 1 or 8% reported that the agreed with the notion that sustainable fishing helps communities around lake Itezhi-Tezhi in economic well-being and the care for nature. This was expected since almost all the NGOs in the area carry a mission of protecting the environment and support sustainable fishing in the area.

SN	Theme	Sample
1	Strongly agree	11
2	Agree	1
3	Not Sure	0
4	Disagree	0
5	Strongly Disagree	0

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 04 Apr. 2024, pp: 802-810 www.ijaem.net ISSN: 2395-5252

	Total	12

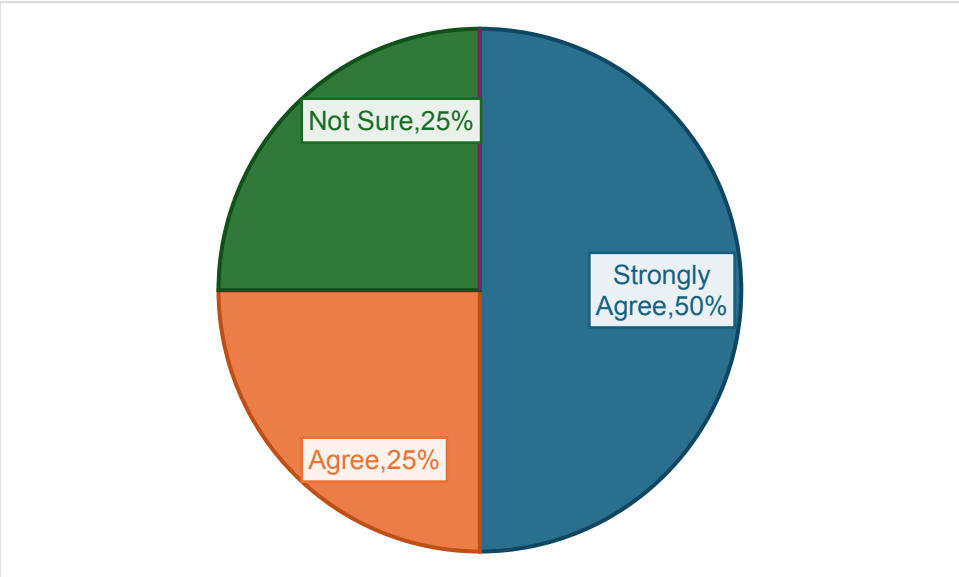


4.6 Traditional Leaders

8 traditional leaders were interviewed on how they felt was the impact on sustainable fishing and care for the environment in communities around lake Itezhi-tezhi. Half of the respondents or 50 percent strongly felt that sustainable fishing had a positive economic impact on communities aound the lake as well as care for the environment. 2 out of 8 or 25 percent agreed while the other 2 or 25 percent were not sure. The 25 percent that were not sure could mean that they were against regulating the fishing and non-care of the environment for reasons best known to them.

SN	Theme	Sample
1	Strongly agree	4
2	Agree	2
3	Not Sure	2
4	Disagree	0
5	Strongly Disagree	0
	Total	8

International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 04 Apr. 2024, pp: 802-810 www.ijaem.net ISSN: 2395-5252



V.

VI. CONCLUSIONS AND RECOMMENDATIONS

As the aquaculture sector is developing and expanding, it has an increasing effect on the surrounding environment. These effects include nutrient pollution from uneaten feed and metabolic waste, chemical pollution from various substances used in the production process (such as medical treatments, including antibiotics and antiparasitic) as well as the spread of farmed fish genes, parasites, and diseases to wild populations. It is imperative that safe and sustainable fishing methods are adopted to enhance economic well-being of people around lake Itezhi-Tezhi as this is the only sure way of maintaining continuity. Further with the effects of global warming, sustainable fishing will help fish regeneration as a protein for future generations and hence the great need to protect the eco system around the lake Itezhi-Tezhi and other surrounding areas. It is highly recommended that the government and key stake holders such as Non-Governmental Organisations and the traditional leadership at all levels work together to protect the environment through practicing safe and sustainable fishing habits as this is the sure way of enhancing economic development at local level and protecting the environment.

VII. LIMITATIONS

The study faced a myriad of limitations starting with the reluctance by some government workers to respond to some questions which they deemed too sensitive. They could not give their opinions freely due to the fact that they are not allowed to speak to any third party without express authorisation from the permanent secretary. They therefore gave a position which supported the government. Further, some group members could not give their full opinions on certain aspects of the interview because they could not be given space by dorminant and vocal members of the FGDs. The other limitation also was the distances that the researcher had to carry to meet all the proposed FGDs, hence the reliance on the views of a few that were easily accessible.

REFERENCES

[1]. Bene, C., & Belal, E. (2020). Mainstreaming Small Scale Fisheries Policy and Governance Into National Development Strategies : A comperative review of Senegal and Egypt. Marine Policy.
[2]. Chambers , C., & Carothers, C. (2017). Fishing Rights and Small Communities : The case of Iceland Fisheries. Marine Policy.
[3]. Gardner, A., & Kapembwa, S. (2020). Governance Assessment of Small Scale Inland Fishing : The Case of Lake Itezhi Tezhi,Zambia. Natural Resources Forum.
[4]. Kapembwa et al, S. (2021). Small Scare Fishing : Income Vulnerability and Livelihood Strategies at Lake Itezhi Tezhi, Zambia. Development Southern Africa.
[5]. Long et al, S. (2021). Governance Analysis of a Community Managed Small Scale Crab Fishery in Madagascar : Novel USe of An Empirical Framework. Marine Policy.

[6]. Matakala et al, P. (2019). Human Wildlife Conflict In Lake Itezhi Tezhi, Zambia : Causes, Impacs, and Mitigation Strategies. Journal of Wildlife Management.
[7]. Orange, R. (2013). Management of Fisheries in New Zealand. Marine Policy.
[8]. Petursson, J. G., & Kapembwa, S. (2021). Small Scale Fishing : Income vulnerability and Livilihood Strategies at Lake Itezhi-Tezhi, Zambia.
[9]. Pikitch et al, E. K. (2004). Ecosystem Based Fishery Management. Science Journal.
[10]. Suich, S. (2010). The Livelihood Impacts of the Namibian Community BAsed Natural Resoruces Management Program : a meta-synthesis. Environmental Conservation.
[11]. FAO. 2022. The State of World Fisheries and Aquaculture. Rome. https://www.fao.org/documents/card/en?details=cc0461en.
[12]. Jacquet and Pauly (2022). Jennifer Jacquet, Daniel Pauly. Reimagining sustainable fisheries. PLoS Biol., 20 (10) (2022), Article e3001829, 10.1371/journal.pbio.3001829