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Attitudes and practices of fishermen towards sustainable fisheries management in Lake Kyoga: A case study of Kagwara Landing site

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ABSTRACT

Lake Kyoga plays a vital role in Uganda's fisheries sector, supporting food security, economic livelihoods, and biodiversity. However, conservation challenges such as overfishing, habitat degradation, and illegal fishing practices threaten its sustainability. Understanding the attitudes of fishing communities towards conservation measures is essential for effective fisheries management. This study assessed the perceptions, compliance behaviors, and influencing factors among fishermen at Kagwara Landing Site, the largest fishing hub on Lake Kyoga in Teso Sub-Region. A mixed-methods approach was used, combining structured questionnaires, focus group discussions, and direct observations. A total of 297 fishermen participated in the survey. Purposive and stratified sampling techniques were applied during the study. Results indicate that while some fishermen recognize the ecological benefits of conservation measures, a significant proportion perceive them as unfairly enforced, restrictive to their livelihoods, or difficult to comply with. Gear regulations (52%) and licensing requirements (24%) were the most disliked measures, primarily due to economic hardships and enforcement inconsistencies. Economic constraints (41%) and corruption (23%) emerged as the leading factors influencing non-compliance. The study findings further evidenced continuous use of illegal fishing gears and fishing of undersize fish (79%) at Kagawara Landing Site on Lake Kyoga. Despite resistance, 60% of respondents acknowledged improvements in fish stocks due to conservation efforts. The study highlights the necessity of integrating community concerns into conservation policies, strengthening enforcement mechanisms, and promoting alternative livelihoods to improve compliance. A participatory approach, involving local stakeholders in policy design and implementation, is crucial for fostering sustainable fisheries management in Lake Kyoga. These findings provide policymakers with data-driven insights to enhance conservation strategies while ensuring the socio-economic well-being of fishing communities.

Keywords: *Fishing, Attitudes, fishermen, Lake Kyoga*

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INTRODUCTION

Freshwater lakes are vital ecosystems that support biodiversity and provide essential resources for human populations worldwide. They play a critical role in food security (Gurung, 2016), particularly through inland fisheries, which supply a primary source of animal protein for an estimated 158 million people globally (Lynch et al., 2022). Beyond their nutritional importance, freshwater lakes sustain livelihoods by fostering economic activities and employment opportunities (Mills et al., 2023). The economic value of ecosystem services provided by lakes is substantial, with global estimates ranging between $1.3 trillion and $5.1 trillion annually. Ensuring their sustainability is therefore crucial for both ecological balance and the well-being of dependent communities.

Africa's freshwater lakes are particularly significant, providing approximately 31,000 cubic kilometers of water, which accounts for nearly 25% of the world's unfrozen surface freshwater reserves (Papa et al., 2022). These lakes are not only critical for biodiversity but also serve as economic engines, especially through fisheries. In sub-Saharan Africa, the inland fishery sector employs about 40.4% of the 12.3 million people working in the broader fisheries and aquaculture industry (Eyayu et al., 2023). National economies also benefit significantly from fisheries; for example, in Uganda, the sector contributes 1.5% to the GDP, while in Tanzania, it accounts for 1.8%. One of Uganda's key freshwater bodies, Lake Kyoga, covers approximately 2,700 square kilometers and serves as an important economic and ecological resource (Obubu et al., 2022; Ongom et al., 2017). It supports fisheries, with Nile perch and tilapia being the most economically significant species. The fishing industry in Uganda sustains over 1.5 million people, many of whom depend on Lake Kyoga for their livelihoods. Additionally, the lake supports agriculture through irrigation, contributing to food security in the surrounding districts.

However, Lake Kyoga is facing multiple environmental threats, including pollution, invasive species, overfishing, the use of illegal fishing gear, and the effects of climate change (Ojara et al., 2020). These challenges endanger not only the lake's biodiversity but also its long-term viability as a source of food and income. Overfishing and destructive fishing practices have disrupted ecological balance, necessitating the implementation of conservation measures (Banaduc et al., 2022). While various regulatory measures—such as restricted fishing zones, seasonal bans, and gear restrictions—have been introduced to mitigate these threats, their success largely depends on the perceptions and compliance of local fishing communities (Nunan et al., 2018).

Despite conservation efforts, compliance among fishermen at Kagwara Landing Site, one of the most active fishing hubs on Lake Kyoga, remains inconsistent (Nunan et al., 2018). Many fishermen perceive these conservation measures as threats to their livelihoods rather than as necessary steps for sustainability. Socioeconomic pressures, limited alternative income sources, and lack of stakeholder involvement often fuel resistance to these policies (Nenadovic & Epstein, 2016). Research suggests that conservation strategies are more likely to succeed when they integrate the knowledge and perspectives of local communities (Lee et al., 2024). However, there remains a gap in understanding the specific concerns, beliefs, and motivations of fishing communities at Kagwara Landing Site.

Studies from other regions indicate that community-led initiatives, economic incentives, and participatory governance can enhance conservation adherence (Boubekri et al., 2022; Dawson et al., 2021; Giareta et al., 2021). However, the effectiveness of such approaches in Lake Kyoga remains underexplored. This study aims to Examine Fishermen's Perceptions and Compliance with Conservation Measures at Kagwara Landing Site, on Lake Kyoga, focusing on their perceptions, compliance behaviors, and the underlying factors influencing their responses.

Kagwara Landing Site, the largest fishing hub on Lake Kyoga in the Teso Sub-region, was selected as the study site due to its significant fishing activity, with over 200 registered boats and approximately 1,250 fishermen. Given its economic and ecological importance, understanding the attitudes of its fishing community is essential for formulating effective and sustainable conservation policies.

By systematically evaluating fishermen's perceptions and compliance with conservation measures, this study will contribute to the development of more sustainable and inclusive conservation strategies. The findings will provide policymakers, conservationists, and local stakeholders with data-driven insights to enhance conservation interventions while safeguarding the livelihoods of fishing communities.

METHODOLOGY

Study area

Kagwara Landing site is one of the largest and most significant fishing centers located on the shores of Lake Kyoga in Serere District, Eastern Uganda (Figure 1). It is situated within Kagwara Town Council, which is part of Teso Sub-region. The site plays a critical role in the livelihoods of fishing communities that depend on Lake Kyoga's resources for economic and food security. Kagwara Landing Site is known for its vibrant fishing activities, commercial fish trade, and the presence of various stakeholders, including fish processors, traders, and regulatory authorities. The site attracts a large population engaged in fishing, fish trading, and other fisheries-related activities, making it a crucial hub for

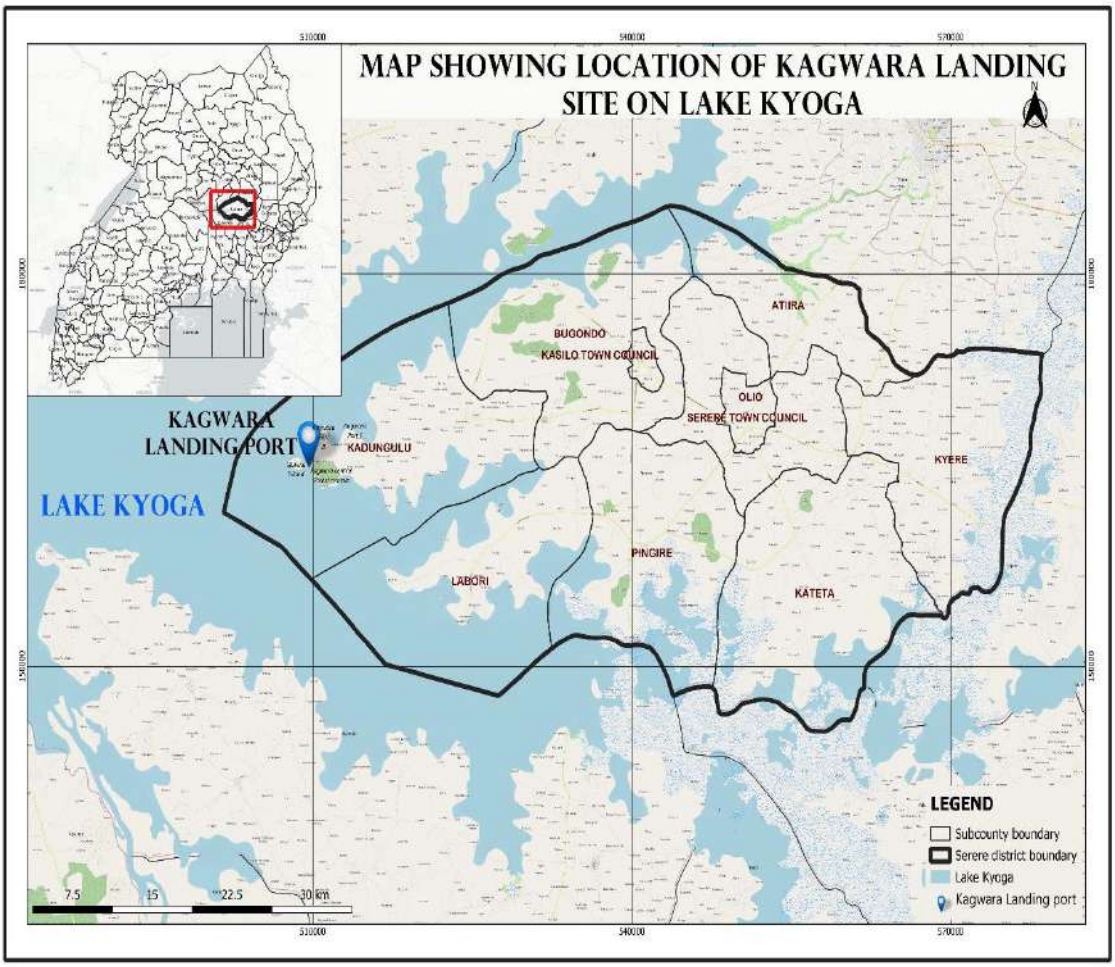


Figure 1: Location of Kagwara Landing Site on Lake Kyoga

understanding the attitudes of fishing communities toward conservation measures.

Lake Kyoga itself is a large shallow freshwater lake located in central Uganda. It is part of the White Nile basin and receives water from Lake Victoria through the Victoria Nile River. The lake is home to a diverse range of fish species, including Nile perch (Lates niloticus), tilapia (Oreochromis spp.), and catfish (Clarias spp.). However, environmental challenges such as overfishing, habitat degradation, and invasive species have significantly affected fish populations, necessitating conservation efforts. Lake Kyoga supports numerous landing sites, of which Kagwara is the largest in the Teso Sub-region, making it an ideal location for studying fishing communities' perspectives on conservation.

Research design

The study employed a mixed-methods approach, which combined quantitative and qualitative research methods to provide a comprehensive understanding of fishing communities' attitudes toward conservation measures. This methodological interplay was supported by the findings of different researchers in fisheries (Areia et al., 2023; Limuwa et al., 20218; Murray et al., 2016), who underscored the value of mixed methods in capturing complex social phenomena in natural resource contexts.

Quantitative approach

To quantitatively assess attitudes, descriptive statistics were utilized to analyze numerical data collected from fishing communities at Kagwara Landing Site. One set of structured questionnaire was administered to the fishermen, to gather information on their perceptions of conservation regulations, compliance levels, and influencing factors.

The questionnaire incorporated both closed-ended and Likert scale questions, allowing for the quantification of respondents' views. This methodological design was mirrored in the work of Reis-Filho et al. (2024) and Gray et al. (2020), where the use of structured questionnaires

yielded insightful data that facilitated statistical analyses via software for generating percentages, mean scores, and frequency distributions.

Qualitative approach

For qualitative insights, the study employed thematic analysis to delve deeper into participants' experiences. Focus Group Discussions (FGDs) with fishermen, local leaders, and fisheries officers to capture their nuanced experiences, beliefs, and concerns regarding conservation measures. Thematic analysis, which was aligned with practices outlined by Lukambagire et al. (2024), was utilized to categorize and interpret responses into key themes, including awareness, compliance, enforcement challenges, and socio-economic impacts of conservation policies.

Sampling technique

In terms of sampling techniques, the study utilized purposive and stratified random sampling to ensure representation across different groups within the fishing community. Fishermen, were selected based on their levels of engagement with conservation measures. This stratification process guaranteed that variations in age, gender, and fishing experience were adequately represented, echoing the approach described by Franco-Melendez et al. (2021), who emphasized the importance of diverse sampling in community-based research to capture a wide range of perspectives.

Data analysis

Quantitative data

In the study assessing the attitudes of fishing communities towards conservation measures of Lake Kyoga at Kagwara Landing Site, quantitative data were meticulously analyzed using descriptive statistics. Researchers utilized frequencies and percentages to summarize the responses from community members regarding their perceptions of conservation practices. By implementing cross-tabulations, the researchers were able to explore the relationships between different demographic variables—such as age, education level, and fishing experience—and attitudes toward conservation measures. This method enabled a comprehensive understanding of how different segments of the community viewed these measures, thereby illuminating trends that could inform future conservation initiatives. The findings were effectively presented through horizontal bar charts and tables, making it easier for stakeholders to interpret the data visually. The approach aligns with the recommendations of Alabi and Bukola, 2023; Parampreet et al. (2018), who emphasized the importance of employing descriptive statistics for a clear presentation of survey results, allowing for a straightforward interpretation of complex data sets.

Qualitative data

Qualitative data were analyzed using thematic content analysis, a method that facilitated an in-depth exploration of the subjective attitudes and feelings of the fishing communities regarding conservation measures. Through this approach, key themes were identified and coded from the interview transcripts and focus group discussions held with community members. Each theme was meticulously developed to capture the nuances of the community's perspectives, which often encompassed a blend of concern, resistance, and support for conservation efforts. The coding process involved multiple iterations to ensure that the themes accurately reflected the participants' sentiments, adhering to the thematic analysis framework posited by Braun and Clarke (2019).

RESULTS AND DISCUSSION

Demography of the respondents

Table 1 provides a comprehensive overview of the demographic characteristics of respondents who are fishermen and fisherwomen. The analysis reveals various factors, such as age, marital status, gender, and education level that shape the profile of these individuals actively involved in the fishing industry.

The age distribution of the respondents is notably skewed towards the middle-aged demographic, with the largest representation in the age group of 31-40 years, comprising 35% of the total respondents (N=297). The groups aged 41-50 and 51 and above follow, accounting for 24.9% and 19.2%, respectively. In contrast, younger age groups, notably 18-20 and 21-30, represent a smaller portion of the sample, with only 8.7% and 12.1%. This indicates a tendency for fishing to be a profession that attracts individuals in their prime working years, while youth participation appears relatively low.

The gender distribution reveals a stark gender imbalance within the fishing community, with 99.6% of the respondents being male. Only one female respondent (0.34%) was represented in the sample. This significant male predominance is reflective of the traditional perceptions surrounding fishing as a male-dominated industry, warranting attention to gender roles and inclusivity within the fishing sector.

Educational attainment among the respondents shows a concerning trend, as a majority hold only primary education (56.2%) or lack formal education altogether (24.2%). Those with secondary and tertiary education are significantly fewer, at 14.4% and 5.0%, respectively. This educational disparity suggests potential barriers to accessing higher-paying jobs and could indicate the need

Table 1: Demographic characteristics of the population.

Variable	Category	Frequency (N)	Percentage (%)
Age	18-20	**26**	**8.7**
	21-30	**36**	**12.1**
	31-40	**104**	**35.0**
	41-50	**74**	**24.9**
	51 and above	**57**	**19.2**
	Total	**297**	**100**
Marital status	Married	**76**	**25.5**
	Single	**83**	**27.9**
	Divorced	**111**	**37.3**
	Others	**27**	**9.1**
Gender	Female	**1**	**0.34**
	Male	**296**	**99.6**
Education level	No formal education	**72**	**24.2**
	Primary education	**167**	**56.2**
	Secondary education	**43**	**14.4**
	Tertiary education	**15**	**5.0**

for educational initiatives aimed at improving skills within the community.

The age distribution findings indicate a significant challenge and potential opportunity in promoting the fishing profession to younger individuals. The lack of young participants in the fishing sector aligns with trends observed in other regions where youth are gravitating towards urbanized employment opportunities, leaving traditional occupations such as fishing less favored (Danquah et al., 2021; Yeboah and Flynn, 2021). This gap indicates a need for targeted strategies to engage younger generations, potentially through training programs or incentives that underline the benefits and opportunities within fisheries.

In terms of marital status, the notably high divorce rate among fishermen may correlate with the economic pressures and irregular work schedules inherent to the fishing industry (Hagan, 2023, Kwena et al., 2027). The existing literature supports the notion that high work-related stress can lead to strained relationships (Kelemen et al., 2024; Pasini et al., 2020). Thus, future research could explore the psychosocial impacts of fishing on family dynamics and how these dynamics can be positively influenced through community engagement and support systems.

The dramatic gender disparity highlights the urgent need for initiatives aimed at increasing female participation in fishing, a trend noted in studies indicating that women could play pivotal roles in sustainable fishing and coastal community resilience (Macamo, 2023; Aregu et al., 2018). Despite the traditional views that may restrict women's involvement, empowering women through education and support programs could bridge this gap, promoting equity and co-management in fisheries.

Finally, the low levels of educational attainment among the respondents signify a critical area for intervention. The findings parallel those of other studies that suggest low educational levels within fishing communities restrict access to more lucrative employment options, perpetuating cycles of poverty (Ayisi et al., 2023; Bennett et al., 2020). Investments in education and vocational training could enhance the skill set available in the community, potentially leading to better income and employment security in the long term.

The demographic insights derived from (Table 1) not only elucidate the profile of fishermen and fisherwomen but also underline pressing gaps and opportunities for targeted interventions in age engagement, marital support, gender inclusivity, and educational advancement. Future studies may build on these findings to generate more nuanced strategies to empower fishers and their families in evolving economic landscapes.

Conservation measures at Kagwara Landing Site

Figure 2 below presents a pie chart illustrating the distribution of conservation measures implemented at Kagwara Landing Site on Lake Kyoga. The conservation measures include Gear Regulations, Licensing Requirements, Seasonal Bans, Restricted Fishing Zones, and Fish Breeding Sanctuaries, each represented as a percentage of the total conservation efforts. Gear Regulations account for the largest portion, comprising 52% of the total conservation measures, followed by Licensing Requirements at 24%. Seasonal Bans contribute 11%, while Restricted Fishing Zones and Fish Breeding Sanctuaries represent 8% and 5%, respectively. The chart visually emphasizes the dominance of Gear Regulations in conservation efforts at the site, with a distinct separation from other measures through an exploded segment.

The results highlight Gear Regulations (52%) as the most dominant conservation measure at Kagwara

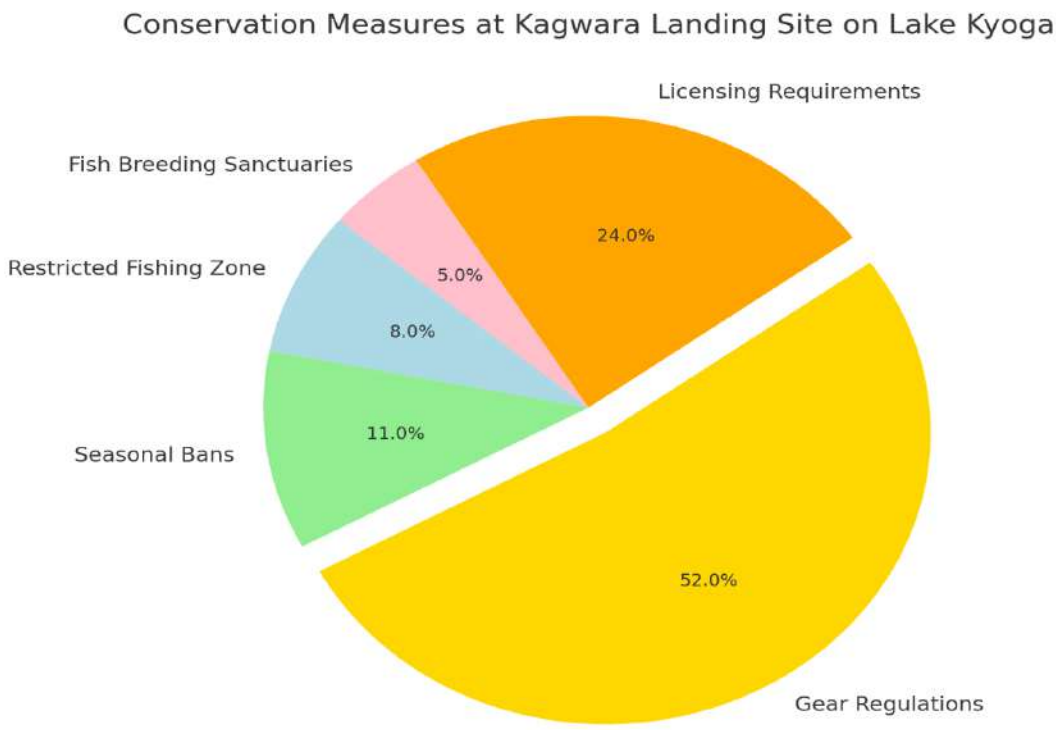


Figure 2: Conservation measures at Kagwara Landing Site on Lake Kyoga

Landing Site. This suggests that regulatory authorities prioritize controlling the type and size of fishing gear to prevent overfishing and ensure sustainable fish stocks. The significance of this measure can be attributed to its direct impact on reducing illegal fishing practices, maintaining fish populations, and promoting responsible fishing (Condy et al., 2015). The large proportion allocated to Gear Regulations indicates that policymakers and conservationists regard it as an effective tool for managing fishery resources in Lake Kyoga. These results are in agreement with many studies in different fishing communities globally where fishing gear restriction is used as the most effective approach in sustainable fishery management (Hardesty et al., 2020; Bates et al., 2017).

The second most significant conservation measure, Licensing Requirements, represents 24% of the total conservation efforts. This measure ensures that only registered and authorized fishers operate within the landing site, thus controlling fishing pressure and preventing unregulated exploitation. Licensing also helps in monitoring compliance with sustainable fishing practices and enables authorities to track fishing activities more effectively. The prominence of this measure underscores its role in promoting accountability and sustainability within the fishery sector as re.Seasonal Bans, constituting 11% of the conservation efforts, indicate a strategy focused on protecting fish during critical breeding and spawning periods. By temporarily restricting fishing activities, authorities aim to enhance fish reproduction and replenish stocks. Although this measure is less emphasized compared to Gear Regulations and Licensing Requirements, its presence suggests a recognition of ecological cycles and the need to balance conservation with fishing livelihoods. Seasonal bans have been widely used in lakes conservation as reported by Jiang et al. (2022) and Linke et al., (2019). However, seasonal bans alone may not bring about total recovery of fish population. Wang et al. (2023) reported a failure of recovery of fish population after a ten year seasonal ban in the Yangtze River basin on Liangze Lake.

Perception of the conservation measures by the fishermen at Kagwara Landing Site on Lake Kyoga

Figure 3 presents a bar chart illustrating the perceptions of fishermen regarding conservation measures implemented at Kagwara Landing Site on Lake Kyoga. The data is categorized into five distinct perception categories, each accompanied by its corresponding percentage. The largest segment of respondents, comprising 44%, felt that the conservation measures are "unfairly enforced." This is followed by a notable 33% of

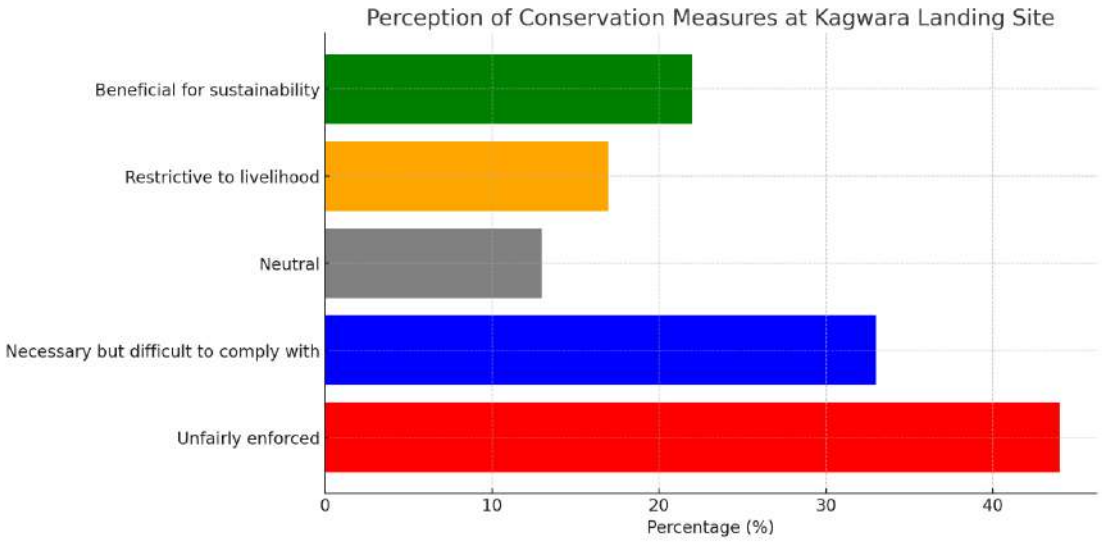


Figure 3: Perception of fishermen on conservation Measures implemented at Kagwara Landing Site

fishermen who perceived the measures as “necessary but difficult to comply with.” A smaller proportion believes these measures are “beneficial for sustainability” (22%), while 17% view them as “restrictive to livelihood.” Lastly, 13% of respondents categorized their perception as “neutral.” The results suggest a predominant skepticism about the enforcement and feasibility of the conservation measures, indicating significant discontent among the fishing community at Kagwara Landing Site. However, a minority acknowledges the potential benefits of these measures for ecological sustainability.

The findings from Kagwara Landing Site reveal a complex relationship between conservation measures and the livelihoods of local fishermen. The perception that these measures are "unfairly enforced" (44%) may reflect a broader challenge in conservation management where local communities feel alienated from the decision-making processes that directly affect their livelihoods. Previous studies have highlighted the necessity for inclusive governance in conservation efforts. For instance, Mupepi et al. (2024), emphasize that successful conservation measures require the trust and cooperation of local communities; otherwise, they may lead to non-compliance and resentment. This gap in community engagement could explain the high percentage of fishermen perceiving the regulations as unfair, indicating that any successful conservation strategy must adequately consider local perspectives and involve communities in the design and enforcement of measures. Worth noting is that community participation in fisheries management is affected by number of factors such as education level and clear demarcation of roles of each team (Nunan, 2020).

Furthermore, the perception that conservation measures are "necessary but difficult to comply with" (33%) points to another critical issue: the practicality and execution of these measures. In many instances, conservation regulations are well-intentioned but fail to account for the socio-economic realities of local livelihoods, leading to resistance (Cavanagh and Brehony, 2024). This underscores the importance of adaptive management that aligns conservation goals with the needs of local fishers. The recognition by 22% of respondents that the conservation measures are "beneficial for sustainability" shows an acknowledgment of the ecological necessity, yet this unified perception seems to be overshadowed by concerns about fairness and enforceability. Kagwara Landing Site Management Team and other and sustainable fisheries enforcers can use this perception of fishermen to improve conservation as per the findings of Bennet (2016).

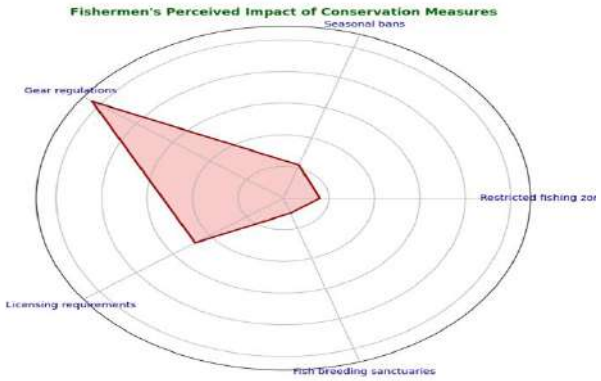
The relatively low percentage of fishermen viewing the measures as "restrictive to livelihood" (17%) indicates that while the conservation measures present challenges, the community does not altogether reject the premise of conservation, but rather critiques the means by which it is enforced. This contrasts with findings from other fisheries’ regions, where similar measures have been met with outright opposition due to economic impacts (Castrejon and Defeo, 2024).

By identifying this gap between local perceptions and the realities of conservation enforcement, the current study contributes valuable insights into how conservation measures can be re-evaluated and redesigned to enhance compliance and community support. Future research should focus on developing frameworks that integrate economic and environmental objectives, ultimately leading to a more sustainable fishing practice

that respects both ecological and community needs. This approach aligns with findings from recent studies indicating that integrated co-management strategies can lead to improved outcomes in both conservation and livelihood sustainability (Eranga et al., 2022; Whitehouse and Fowler, 2018). Understanding and addressing the perceptions of fishermen at Kagwara Landing Site is crucial for achieving effective conservation outcomes. The results highlight the need for a collaborative approach that respects local knowledge and livelihoods, laying a framework for future conservation policies that seek not only ecological success but also community well-being.

Conservation measures which mostly disliked by the fishermen

Figure 4 illustrates the perceptions of fishermen concerning various conservation measures implemented at Kagwara Landing Site on Lake Kyoga. The data is represented in percentage form, indicating the proportion of fishermen who feel that specific conservation measures have a significant impact on their practices. Notably, gear regulations are highlighted as the most disliked conservation measure, with 52% of respondents indicating that these regulations affect them the most. Following this, 24% of the fishermen cited licensing requirements as a major concern. Seasonal bans were noted by 11% of the participants, while restricted fishing zones and fish breeding sanctuaries were the least controversial measures, attracting attention from only 8% and 5% of the fishermen, respectively.



Figures 4: Conservation measures which fishermen feel affect them most

The findings from (Figure 4) reveals a pronounced aversion to gear regulations among fishermen at Kagwara Landing Site. This result resonates with broader studies that suggest that gear restrictions often pose a challenge to local fishers' livelihoods, which can lead to increased resistance against conservation efforts (Burbano and Meredith, 2020). Fishermen frequently invest considerable resources in their fishing gear, and changing these regulations can be seen not only as an infringement on their economic activities but also as an erosion of traditional practices. The particularly high percentage (52%) at Kagwara Landing indicates a significant gap in the acceptance of necessary conservation strategies, suggesting that more engagement and communication with local communities are critical to foster understanding and compliance.

Licenses often come with fees and bureaucratic hurdles, which can disproportionately affect smaller, subsistence fishers who may lack the means to navigate these systems (Silver and Stoll, 2022; Azhar et al., 2018). This highlights an important gap in how conservation policies are developed and implemented, as they may overlook the economic realities faced by local fishermen, thereby exacerbating tensions between sustainability goals and local livelihoods (Okafor-Yarwood et al., 2020).

Seasonal bans, although less contentious than gear regulations, still elicited concern from 11% of fishermen. This hesitance reflects a common plight among fishers who rely on continuous access to fishing resources for income and sustenance. Research supports that while such bans are intended to promote ecological recovery; without adequate support or alternative income opportunities, they can severely impact the livelihoods of dependent communities (Islam et al., 2021). The sentiments expressed by the fishermen at Kagwara exemplify the need for a more integrated approach to fisheries management that balances conservation with the socio-economic frameworks of local communities.

Interestingly, restricted fishing zones and breeding sanctuaries received the least concern, with only 8% and 5% respectively. This could suggest that these measures are not perceived as direct threats to their livelihoods, possibly because they are seen as temporary restrictions aimed at long-term benefits, or fishing communities may have begun to adapt to them as part of their practices. However, this also highlights a potential gap; there is a need for ongoing education to communicate the benefits of such measures effectively and ensure that local communities are actively involved in the management and policymaking processes surrounding these conservation strategies (Sun et al., 2024).

While the results from (Figure 4) showcase a significant level of discontent regarding gear regulations and licensing requirements among the fishermen at Kagwara Landing Site, they also underline the necessity for a transformative approach in conservation policy formulation. This should ensure that local fishing communities are not merely subjects of regulatory measures but are partners in the development of sustainable practices that accommodate their socio-economic realities. The research contributes to existing literature by pinpointing specific areas—like gear

regulation and licensing—that warrant more thorough consideration and dialogue in conservation-oriented fisheries management.

Impact of gear regulations as a conservation measure on fish stocks at Kagwara Landing Site

Table 2 presents the responses of fishermen regarding their perceptions of the impact of conservation measures, specifically gear regulations, on fish stocks at Kagwara Landing Site on Lake Kyoga.

This response distribution suggests a general perception among the fishermen that the implemented gear regulations have been beneficial for the fish populations in Lake Kyoga. The data reflect a strong belief in the positive impacts of conservation initiatives, with almost 90% of respondents either affirming a noticeable improvement or a slight enhancement of fish stocks, as a Nile Perch catch shown in (fFgure 4).

Table 2: Effect of gear regulations on fish stocks.

QUESTION	RESPONSE	N	%
Do you believe that gear regulations have improved fish stocks in Lake Kyoga?	Fish stocks improved	178	60
	Slightly improved	80	27
	Not sure	12	4
	No improvement	27	9

The results presented in (Table 2) underscore the critical role that local perceptions play in the evaluation of conservation measures within artisanal fishing communities. The high percentage of fishermen who believe that fish stocks have improved (60%) indicates a positive reception of gear regulations, which are often designed to sustain fish populations and promote biodiversity (Huang et al., 2019). This alignment is crucial, as local buy-in to conservation strategies is fundamental for their success (Bennett, 2016). The fact that only 9% of fishermen reported seeing no improvement suggests that the majority are likely witnessing tangible benefits, which might encourage further compliance and support for ongoing and future conservation efforts.

However, these results also highlight a potential gap in underlying knowledge or awareness about the mechanisms of conservation measures. While a strong majority perceives improved fish stocks, the lingering 4% who are unsure and 9% who see no improvement may point to a need for enhanced education and communication about the benefits of conservation measures. Similar studies in different contexts have shown that misconceptions about conservation can lead to resistance (Foyet and Louis, 2023). This suggests that interventions should not only focus on enforcing regulations but also engage local communities in understanding the long-term benefits of sustainable practices.

Moreover, the perceived success of conservation measures in this study mirrors trends observed in other fisheries research, where local populations often report improved yield and biodiversity after the implementation of strict gear regulations (Feekings et al., 2019). However, it is essential to consider that perception does not always align with scientific assessments of fish stock recovery. For instance, while fishermen may report improved stocks, ecological assessments might present a different narrative, revealing issues such as overfishing or habitat degradation that the fishermen may not immediately perceive.

In bringing this study into focus within the broader context of fishery management literature, it serves to confirm that fishermen's perceptions can provide valuable insights and should inform policy-making. The study's findings indicate the necessity for ongoing dialogue between conservation practitioners and local fishers as the cornerstone of effective management approaches. Bridging the gap between perceived improvements and scientifically validated changes can help ensure that conservation measures evolve in ways that are responsive to both ecological realities and fisher interests. Future studies should employ longitudinal methodologies to assess whether these perceptions hold true over time and how they correlate with actual metrics of fish population health (Figure 5).

Figure 5: Pictures of Nile perch fish at Kagwara Landing Site

Factors which influence compliance with fishing regulations among fishermen at Kagwara Landing Site

Figure 6 presents the results of a survey conducted among fishermen at Kagwara Landing Site on Lake Kyoga, highlighting the factors that influence their compliance with conservation measures.

The results presented in (Figure 6) suggest that economic hardship is the primary reason for non-compliance among fishermen at Kagwara Landing Site. This finding is consistent with previous studies that have highlighted the impact of poverty on fishing practices (Justin, 2019). Fishermen may perceive that the costs associated with complying with conservation measures, such as purchasing licenses or adhering to catch limits, outweigh the benefits, leading them to prioritize their

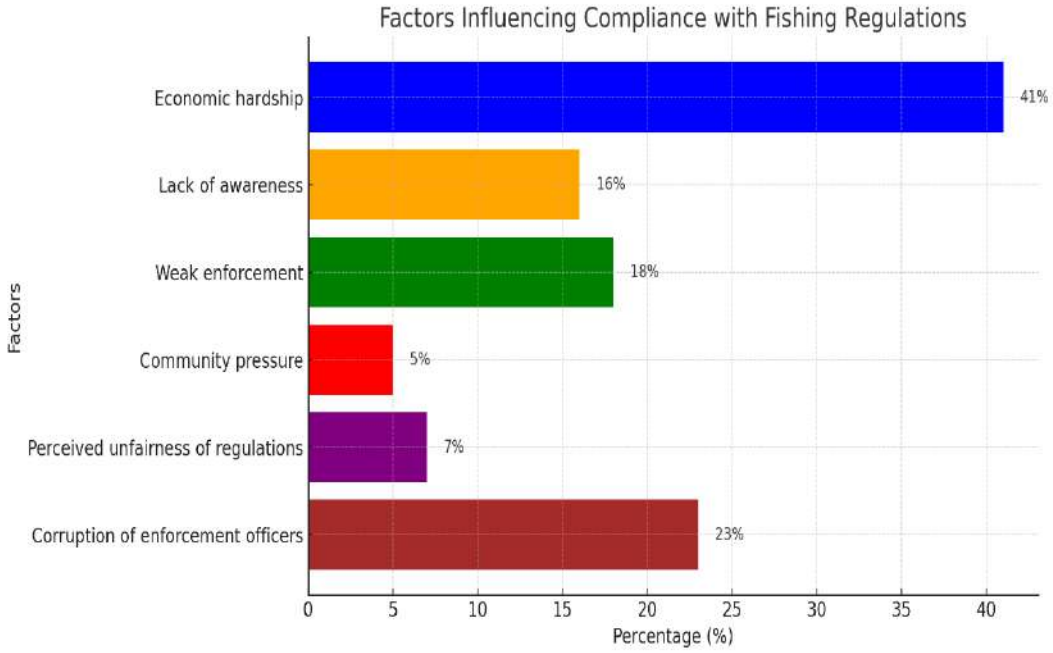


Figure 6: Factors which influence compliance with fishing regulations.

economic interests over conservation goals. This highlights the need for alternative livelihoods and economic support for fishermen to ensure that they can participate in sustainable fishing practices.

The high percentage of respondents citing lack of awareness as a factor (16%) suggests that education and outreach programs aimed at raising awareness about the importance of conservation measures may be effective in increasing compliance. This is consistent with research that has shown that education and awareness-raising initiatives can lead to positive behavioral change among fishermen (Ashley et al., 2019). However, it also highlights the need for more effective communication channels and targeted outreach efforts to reach fishermen and ensure that they have access to accurate information about conservation measures.

The relatively high percentage of respondents citing weak enforcement (18%) as a factor may indicate that the current enforcement mechanisms in place are inadequate or ineffective. This finding is consistent with previous studies that have highlighted the importance of robust enforcement mechanisms in promoting compliance with conservation regulations (Castillo et al., 2024). The fact that corruption of enforcement officers is also cited as a significant factor (23%) suggests that there may be a need for reforms to ensure that enforcement officers are held accountable for their actions and that they prioritize conservation goals over personal interests (Nunan et al., 2018).

Finally, the relatively low percentage of respondents citing community pressure and perceived unfairness of regulations as factors may indicate that these issues are not as significant in this context. However, it is essential to recognize that these factors can still have a significant impact on compliance, particularly if they are not addressed through targeted interventions and community engagement. Many studies have reported community pressure on fishery resources to undermine conservation efforts (Warren and Steenbergen, 2021; Sowman and Sunde, 2018).

The results presented in (Figure 6) highlight the complex interplay of factors influencing compliance among fishermen at Kagwara Landing Site on Lake Kyoga. While economic hardship and lack of awareness are significant contributors to non-compliance, weak enforcement and corruption of enforcement officers are also major concerns. Addressing these issues through targeted interventions, education and outreach programs, and reforms to enforcement mechanisms is essential to promoting sustainable fishing practices and conserving Lake Kyoga's resources.

Prevalence of illegal fishing gears and fishing of undersize fish at Kagwara Landing Site

Figure 7 presents the perceptions of fishermen regarding conservation measures at Kagwara Landing Site on Lake Kyoga, specifically focusing on the prevalence of illegal fishing gear and the practice of fishing undersize fish.

The high percentage of fishermen (79%) as in fig. 5, who either strongly agree or agree that illegal fishing gear is prevalent suggests a strong acknowledgment of the

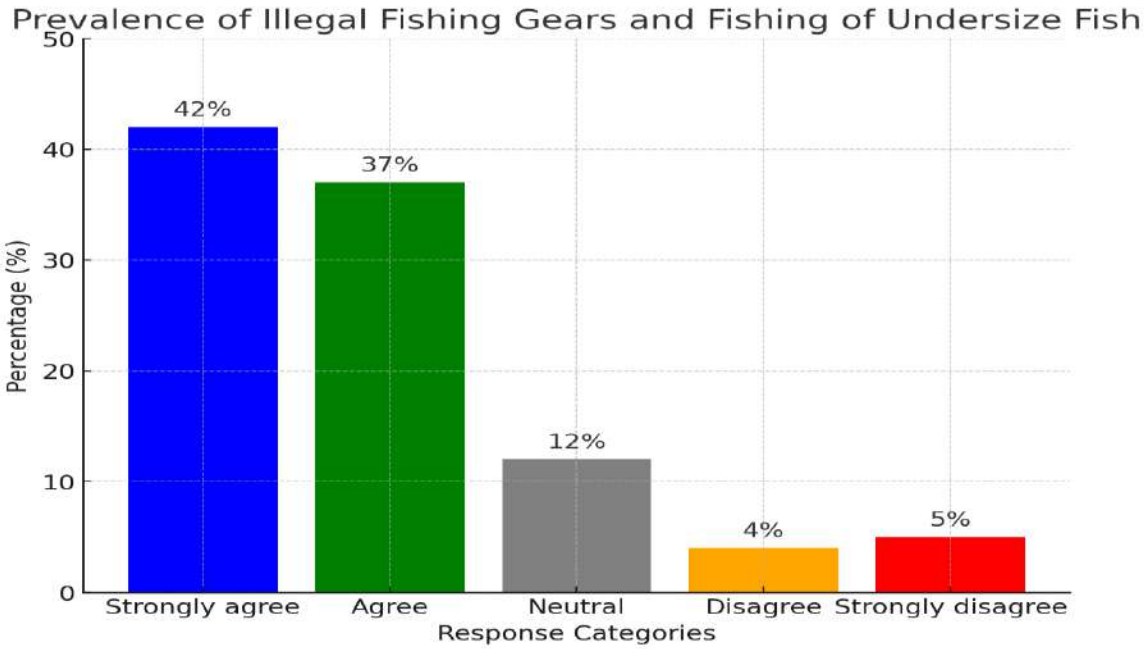


Figure 7: Prevalence of illegal fishing gears and fishing of undersize fish.

challenges confronting conservation efforts in the region. This finding resonates with previous studies that document the pervasive use of illegal fishing methods in many aquatic environments, which have been shown to undermine sustainable fisheries management (Widjaja et al., 2023; Doherty et al., 2021). The acknowledgment of illegal fishing activities by a majority indicates a common understanding among fishermen of the scale of the issue and its implications for both the sustainability of the fishery and their livelihoods. Despite ongoing efforts to enforce gear regulations and monitoring on Lake Kyoga, findings reveal persistent use of illegal fishing gears and fishing of undersize fish which threatens the sustainability of Lake Kyoga.

Moreover, the reported prevalence of fishing undersize fish emerges as a critical concern linked to these illegal practices. Fishermen's recognition of the issue may stem from the ecological knowledge gained through firsthand experiences, suggesting that local populations are not only aware of fishing regulations but are also witnessing the detriments of overexploitation. This aligns with findings from similar studies, where local fishers demonstrated a deep understanding of the adverse consequences of overfishing on fish stocks and the ecosystem's balance (Donlan et al., 2020).

Nevertheless, the relatively small percentage of neutral (12%) and dissenting responses (9%) indicates a potential disconnect among some fishermen regarding the severity of the issue or perhaps an underestimation of the impact of these unsustainable practices. This observation points to a knowledge gap that may require targeted educational interventions aimed at highlighting the long-term consequences of illegal fishing (Bulengela et al., 2020) Further investigations could explore whether these individuals lack access to information, are engaged in illegal practices themselves, or perceive the problem differently based on their unique experiences.

In comparison to findings from other regions, such as those documented in Lake Victoria (Njiri et al., 2018; Mgale and Nikusekele, 2017), where illegal fishing has led to significant declines in fish populations, the situation at Kagwara Landing Site underscores the urgency of implementing effective management strategies. Many fishers on Lake Victoria have reported a shift in species composition and diminishing catches attributed to the same illegal practices reported by fishermen at Lake Kyoga. This comparison underlines the necessity for collaborative efforts between local fishers and regulatory bodies to develop and enforce conservation measures that resonate with the community's needs and realities.

Challenges facing implementation of sustainable fishing methods at Kagwara Landing Site on Lake Kyoga

Table 3 provides a comprehensive overview of the various challenges that hinder the effective implementation of conservation measures at the Kagwara Landing Site on Lake Kyoga, as perceived by local fishermen. The results from (Table 3) highlight a series of

Table 3: Challenges of implementing conservation measures.

CHALLENGES	RESPONSES	
	N	%
Corruption	83	28
Inadequacy of personnel	65	22
Community resistance	15	05
Poor communication	9	03
Political interference	21	07
Inadequate resources	62	21
Lack of community training	42	14

systemic challenges that undermine conservation measures at the Kagwara Landing Site. The overwhelming response regarding corruption aligns with findings from previous studies, which indicate that corruption is a prevalent issue that hampers conservation efforts globally (Garcia, 2024). For instance, according to Nunan et al. (2018), corruption in the management of natural resources can lead not only to the misappropriation of funds but also to mistrust among community members towards conservation authorities. This mistrust can inhibit collaboration and diminish community buy-in, further complicating efforts to implement effective conservation strategies.

The second-most cited challenge, inadequacy of personnel, emphasizes a gap found in many rural conservation contexts discussed by Mozumder et al. (2023), the human resource deficit in environmental management sectors often leads to poor implementation of conservation policies. This shortage suggests that even well-intentioned policies are ineffective without a sufficient workforce to drive them. The study at Kagwara highlights the urgent need for enhanced staffing, training, and capacity-building initiatives that can empower local personnel to effectively manage conservation measures.
Inadequate resources and lack of community training can be viewed as interconnected challenges. The insufficient allocation of resources makes it difficult for communities to see the benefits of conservation (Zhang et al., 2023; Bennett et al., 2017). When local fishermen perceive that conservation efforts do not correspond with tangible economic benefits, community support wanes, fostering a self-reinforcing cycle of non-compliance. This underscores the importance of integrating socioeconomic incentives in conservation strategies to enhance community engagement.

Interestingly, challenges such as community resistance (5%) and poor communication (3%) received relatively low scores, suggesting that while they are acknowledged issues, they may not be the primary obstacles compared to corruption and resource inadequacy. Nevertheless, these findings are critical; they suggest that building trust through clear communication and community engagement is essential. Related studies carried out by Fortnam (2019) and Silva et al. (2021) underscored the role of clear communication in community management. Community resistance cab be overcome by multi-education and sensitization to the fishing community at Kagwara Landing Site on Lake Kyoga. Furthermore, political interference (7%) also indicates that governance issues will need to be addressed to align local needs with broader conservation policies.

The study underscores a notable gap between the current state of conservation at Kagwara Landing Site and effective resource management practices. It calls for a model of conservation that not only addresses the barriers identified but also actively involves local communities in a manner that builds trust and enhances cooperation. Furthermore, to bridge the gap between policy intentions and grassroots realities, future interventions should look to couple conservation measures with economic benefits, thus creating a win-win situation for both conservation objectives and the communities that depend on these ecosystems. Addressing these challenges will require a holistic approach that brings together various stakeholders, including the local community, government agencies, and NGOs, to collaboratively resolve these urgent issues while embedding conservation within the local socio-economic context.

Conclusion

The findings of this study highlight the complex and multifaceted nature of fishing communities' attitudes toward conservation measures at Kagwara Landing Site. The results indicate that while some fishermen recognize the importance of conservation efforts in maintaining fish stocks and sustaining the lake's ecosystem (22%), others perceive these measures as direct threats to their livelihoods (17%). Economic hardship (41%), corruption of enforcement officers (23%), lack of alternative income sources (7%), and limited awareness about long-term environmental benefits (16%) contribute to resistance against compliance. These attitudes align with broader trends observed in similar studies, where socio-economic pressures often shape environmental perceptions. Therefore, effective conservation policies must integrate community concerns by addressing economic insecurities through alternative livelihood programs and education initiatives. Despite a number of challenges encountered in enforcing sustainable fisheries' regulations at Kagwara landing site on Lake Kyoga, many respondents acknowledged the role of gear regulations in improving fish stocks (87%).

Furthermore, the study underscores the role of enforcement mechanisms, stakeholder engagement, and participatory governance in shaping compliance with conservation regulations. Fishermen's compliance is significantly influenced by their trust in regulatory authorities and the perceived fairness of enforcement strategies. Weak enforcement (18%), corruption (23%), and inadequate community involvement in decision-

making processes (7%) foster skepticism and resistance, undermining conservation efforts. These findings emphasize the need for a collaborative approach where fishermen, local leaders, and conservation agencies co-develop policies that balance sustainability with socio-economic needs. Successful conservation models in other regions suggest that inclusive decision-making and community-led initiatives improve adherence to conservation measures.

Besides, the study findings evidenced the continuous existence of illegal fishing gears and fishing of under-size fish (79%) which remains a threat to achieving sustainable management of fishery resources on Lake Kyoga. This further acknowledges similar global studies which pinpoint the use of illegal fishing gears by fishermen as a major threat to sustaining fish populations in natural water bodies.

In conclusion, promoting sustainable fisheries management in Lake Kyoga requires an integrated approach that aligns conservation goals with the realities of fishing communities. Addressing socio-economic challenges, enhancing awareness, and strengthening enforcement structures are crucial to improving compliance. Conservation efforts should not be perceived as external impositions but as mutually beneficial strategies developed in consultation with local stakeholders. The insights from this study provide valuable guidance for policymakers and conservation practitioners in refining strategies that ensure both ecological sustainability and the well-being of the fishing communities. Future research should explore the long-term impact of participatory conservation models and assess their effectiveness in fostering greater compliance and positive attitudes toward conservation in Lake Kyoga.

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Conflict of interest

The author of this study declares no conflict of interest whatsoever in the production and publication of this study. Kumi University as a funder had no any role in the design, data collection, data analysis, results discussion, manuscript writing and choice of the journal for the publication.

REFERENCES

Alabi, O. and Bukola, T. (2023). Introduction to descriptive statistics. Recent Advances in Biostatistics. https://doi.org/10.5772/intechopen.1002475

Andrew, L.V., van Wynsberge, S., Chinain, M., Gatti, C.M.I., Dempsey, A. and Andrewfouet, S. (2021). A framework for mapping local knowledge on ciguatera and artisanal fisheries to inform systematic conservation planning. ICES Journal of Marine Science 78(4):1371. https://doi.org/10.1093/icesjms/fsab016

Aregu, L., Choudhury, A., Rajaratnum, S., Locke, C. and McDougall, C. (2018). Gender norms and agricultural innovation: Insights from six villages in Bangladesh. Journal of Sustainable Development 11(4):270-285. https://doi.org/10.5539/jsd.v11n4p270

Areia, N.P., Tavares, A.O. and Costa, P.J.M. (2023). Public perception and preferences for coastal risk management: Evidence from a convergent parallel mixed-methods study. Science of the Total Environment 882:163440. https://doi.org/10.1016/j.scitotenv.2023.163440

Ashley, M., Pahl, S., Glegg, G. and Fletcher, S. (2019). A change of mind: Applying Social and Behavioural Research Methods to the Assessment of the Effectiveness of Ocean Literacy Initiatives. Frontiers in Marine Science 6:288. https://doi.org/10.3389/fmars.2019.00288

Ayisi, C.L., Sienso, G., Mensah, G.D., N' Souvi, K., Baidoo, K., Alhassan, E.H. and Osei, S.A. (2023). Examining the socio-economic characteristics, fishing patterns and challenges of fishermen at James Town in Ghana. Social Sciences and Humanities Open 8(1):100591. https://doi.org/10.1016/j.ssaho.2023.100591

Azhar, M., Suhartoyo, S., Alw, L.T., Suharso, P. and Herawati, V.E. (2018). Protection of Traditional Fishermen in the Granting of Fishery Licenses in Indonesia: In the 2nd Scientific Communication in Fisheries and Marine Sciences (SCiFiMaS208). E3S Web of Conferences 47:07003. https://doi.org/10.1051/e3sconf/20184707003

Banaduc, D., Simic, V., Cianfaglione, K., Barinova, S., Afanasyev., V., Okutener, A., McCall, G., Simic, S. and Curtean-Banaduc, A. (2022). Freshwater as a sustainable resource and generator of secondary resources in the 21st Century: Stressors, Threats Management and Protection Strategies, and Conservation Approaches. International Journal of Environmental Research and Public Health 19(24):16570. https://doi.org/10.3390/ijerph1924/6570

Bates, A.E., Soler, G., Stuart-Smith, R.D., Edgar, G.J. and Campbell, S.J. (2017). Fishing gear restrictions and biomass gains for coral reef fishes in marine protected areas. Conservation Biology 32(2):401-410. https://doi.org/10.1111/cobi.12996.

Bennett, N.J. (2016). Using perceptions as evidence to improve conservation and environmental management. https://doi.org/10.1111/cobi.12681

Bennett, N.J., Roth, R., Klain, S.C., Chan, K.M.A., Clark, D.A., Cullman, G., Epstein, G., Nelson, M.P., Stedman, R., Teel, T.L., Thomas, R.E.W., Wyborn, C., Curran, D., Greenberg, A., Sandlos, J. and Verissimo, D. (2016). Mainstreaming the social sciences in conservation. Conservation Biology 31(1):56-66. https://doi.org/10.1111/cobi.12788

Boubekri, I., Mazurek, H. and Djebar, A.B. (2022). Social-ecological dimensions of Marine Protected Areas and coastal fishing: How fishermen's local knowledge can inform fisheries management at the future "Taza" MPA (Algeria, SW Mediterranean). https://doi.org/10.1016/j.ocecoaman.2022.10621

Braun, V. and Clark, V. (2019). Reflecting on reflexive thematic analysis. Qualitative Research in Sport, Exercise and Health 11(4):589-597. https://doi.org/10.1080/2159676X.2019.1628806

Bulengela, G., Onyango, P., Brehm, J., Staehr, P.A. and Sweke, E. (2020). "Bring fishermen at the Centre ". The value of local knowledge for understanding fisheries resources and climate-related changes in Lake Tanganyika. Environment, Development and Sustainability 22:5621-56-49. https://doi.org/10.1007/s10668-019-00443-z

Burbano, D.V. and Meredith, T.C. (2020). Conservation Strategies through the Lens of Small-Scale Fishers in the Galapagos Islands,

Ecuador: Perceptions underlying local resistance to marine planning. Society and Natural Resources 33(10):1194-1212. https://doi.org/10.1080/08941920.2020.1765058

Castillo, S., Wilson, J.R., Eceves-Bueno, E., Quintana, A.C.E. and Gaines, S. (2024).Enforcement, deterrence and compliance in co-managed small-scale fisheries. Ecology and Society 29(4):10. https://doi.org/10.5751/ES-1536-290410

Castrejon, M. and Defeo, O. (2024). Addressing illegal longlining and ghost fishing in the Galapagos marine reserve: an overview of challenges and potential challenges. Frontiers in Marine Science 11:1400737. https://doi.org/10.3389/fmars.2024.1400737

Cavanagh, C. and Brehony, P. (2024). First, do not harm? Dark logic models, Social injustice, and the prevention of iatrogenic conservation outcomes. Biological Conservation 289:110380. https://doi.org/10.1016/j.biocon.2023.110380

Condy, M., Cinner, J.E, McClanahan, T.R. and Bellwood, D.R. (2015). Projections of the impacts of gear-modification on the recovery fish catches and ecosystem function in an impoverished fishery. Aquatic conservation: Marine and Freshwater Ecosystems 25(3):396-410. https://doi.org/10.1002/aqc.2482.

Danquah, J.A., Roberts, C.O. and Appiah, M. (2021). Effects of decline in fish landings on the livelihoods of coastal communities in Central Region of Ghana. Coastal Management 49(6):617-635. https://doi.org/10.1080/08920753.2021.1967562

Dawson, N.M., Coolsaet, B., Sterling, E.J., Lovebridge, R., Gross-Camp, N.D., Wongbusarakum, S., Sangha, K.K., Scher, L.M., Phan, H.P., Idrobo, C.J., Chenet, A., Bennett, N.J., Mansourian, S. and Rosado,-May, F.J. (2021). Indigenous peoples and local communities in effective and equitable conservation. Ecology and Society 26(3):19. https://doi.org/10.5751/ES-12625-260319

Doherty, P.D., Atsango, B.C., Ngassiki, G., Ngouembe, A., Breheret, N., Chauvet, E., Godly, B.J., Machin, L., Moundzoho, B.D. and Meticlafe, K. (2021). Threats of Illegal, unregulated, and unreported fishing to biodiversity and food security in the Republic of the Congo. Conservation Biology (35):1463:1472. https://doi.org/10.1111/cobi:13723

Donlan, C.J., Wilcox, C., Luque, G.M. and Gelcich, S. (2020). Estimating illegal fishing from enforcement officers. Scientifica Reports 10:12478. https://doi.org/10.1038/s41598-020

Eranga, K.G., Falardeau, M., Harris, L.N., Rocha, J.C., Moore, J. and Berkes, F. (2022). Resilience-based steps for adaptive co-management of Arctic small-scale fisheries. Environmental Research Letters 17:083004. https://doi.org/10.1088/1748-9326/ac7b37

Eyayu, A., Getahun, A. and Keyombe, J.L. (2023). A review of the production status, connstraints and opportunities in East African freshwater cpture and culture fisheries. Aquaculture International 31:2057-2078. https://doi.org/10.1007/s10499-023-01071-1

Feekings, J., O'Neil, F.G., Krag, L., Ulrich, C. and Malta, T.V. (2019). An evaluation of European initiative established to encourage industry-led development of selective gears. Fishery Management and Ecology 26(6):650-660. https://doi.org/10.1111/fme.12379

Fortnam, M.P. (2019). Forces opposing sustainability transformations: Institutionalization of ecosystem-based approaches to fisheries management. Ecology and Society 24(4):240433. https://doi.org/10.5751/ES-10996-240433

Foyet, M. and Louis, M.P. (2023). Enhancing Conservation Communication: Using Digital Literacy to address the Misunderstanding of Southern Africa's Sustainable Use Approach in Western Settings. Journal of Policy and Governance 3(2):17-58. https://doi.org/10.33002/jpg030202

Franco-Melendez, M., Tam, J., van Puttern, I., and Cubillos, L.A. (2021). Integrating human and ecological dimensions: The importance of stakeholders' perceptions and participation on the performance of fisheries co-management in Chile. PLoS ONE 16(8):e0254727. https://doi.org/10.1371/journal.pone.0254727

Garcia, E.L. (2024). Fisheries observers: An overlooked vulnerability for crime and corruption within the global fishing industry. Marine Policy 161:106029. https://doi.org/10.1016/j.marpol.2024.106029

Giareta, E.P., Prado, A.C., Leite, R.D., Padilha, E., Santos, I.H., Wosiak, C.C.L. and Wosnick, N. (2021). Fishermen's participation in research and conservation of coastal elasmobranchs. Ocean and Coastal Management 199:105421. https://doi.org/10.1016/j.ocecoaman.2020.105421

Gray, S., Aminpour, P., Reza, C., Sayphers, S., Grabowski, Murphy, R., Singer, A., Baltaxe, D., Jordan, R., Jetter, A. and Introne, J. (2020). Harnessing the collective intelligence of stakeholders for conservation. Frontiers in Ecology and the Environment 18(8):465-472. https://doi.org/10.1002/fee.2252

Gurung, T.B. (2016). Role of inland fishery and aquaculture for food and nutrition security in Nepal. Agriculure and Food Security 5(18):0063. https://doi.org/10.1186/s40066-016-0063-7

Hagan, G.P. (2023). Marriage, Divorce and Polygamy in Winneba. In. Female and Male in West Africa, Routledge, pge 15, 9781003402749.

Hardesty, B.D., Wilcox, C. and Vince, J. (2020). Progress and challenges in eliminating illegal fishing. Fish and Fisheries 22(3):518-531. https://doi.org/10.1111/faf/12532

Huang, H., Liao, C. and Lu, H. (2019). Fishermen's perceptions of coastal fisheries management regulations: Key factors to rebuilding coastal fishery resources in Taiwan. Ocean and Coastal Management 172:1-13. https://doi.org/10.1016/j.ocecoaman.2019.01.015

Islam, M.M., Begum, A., Rahman, S.M.A. and Ullah, H. (2021). Seasonal Fishery Closure in the Northern Bay of Bengal Causes Immediate but Contrasting Ecological and Socioeconomic Impacts. Frontiers in Marine Science. https://doi.org/10.3389/femars.2021.704056

Jiang, Z., Liu, Y., Wu, J., Dai, B. and Xie, C. (2022). Initial recovery of fish faunas following the implementation of pen-culture and fishing bans in flood-plain lakes along the Yangtze River. Journal of Environmental Management 319:115743. https://doi.org/10.1016/j.jenvman.2022.115743

Justin, R. (2019). Conserving Poverty destructive fishing gear use in a Tanzanian marine protected area. Conservation and Society 17(3):297-309. https://doi.org/10.4103/cs.cs_18_53

Kwena, Z.A., Shisanya, C.A., Bukusi, E.A, Turan, J.M., Dworkin, S.L., Rota, A.G. and Mwanzo, I.J. (2017). Joboya ("Sex for Fish"): A qualitative Anlysis of Contectural Risk Factors for Extramarital Partnerships in the fishing communities in Western Kenya 46:1877-1890. https://doi.org/10.1177/01492063241281467

Ledebef, E.A. and Chambers, C. (2023). Youth and newcomers in Icelandic fisheries: Opportunities and obstacles. Maritime Studies 22(34). https://doi.org/10.1007/s40152-023-00326-0

Limuwa, M.M., Sitaula, B.K., Njaya, F. and Storebakken, T. (2018). Evaluation of small-scale fishers' perceptions on climate change and their coping strategies: Insights from Lake Malawi. Climate 6(2):34. https://doi.org/10.3390/cli6020034

Linke, S., Hermoso, V. and Januchowski-Hartley, S. (2019). Toward process-based conservation prioritization:Marine and Freshwater Ecosystems 29(7):1149-1160. https://doi.org/10.1002/aqc.3162

Lukambagire, I., Agrah, T., Von Lieres, J.S., Matovu, B. and Bhavani, R.R. (2024). Fishermen's attitudes towards drone use for sustainable fishing community in Kerala, India: An exploratory qualitative study. Sustainable Futures 7:100225. https://doi.org/10.1016/j.sftr.2024.100225

Lynch, A.J., Arthur, R.I., Baigun, C., Claussen, J.E., Kangur, K., Koning, A.A., Murchie, K.J., Myers, B.J.E., and Stokes, G.L. (2022). Societal Values of Inland Fishes. Encylopedia of Inland Waters, 2nd Edition, Elsevier, pp, 475-490. https://doi.org/10.1016/B978-0-12-819166-8.

Macamo, C. (2023). Governance and Community Participation in Marine and Coastal EBA in SADC. South African Institute of International Affairs. https://www.jstor.org/stable/resrep67103. Accessed, 01-03-2025 14:15 EAT/Nairobi Time.

Mgale, Y.J. and Nikusekela, N.E. (2017). Decline in fish stock and livelihood of small-scale fisheries in shores of Lake Victoria, Tanzania. International Journal of Applied Agricultural Sciences 3(4):87-91. https://doi.org/10.11648/j.ijaas.20170304.11

Mills, D., Simmance, F., Byrd, K., Robinson, J., Garrido-Gamarro, E., Pincus, L., Ahern, M., Cohen, P., Hicks, C., Fiorella, K., Kjelled, M., Roscher, M., Thilsted, S., Tilley, A., Nico, G., Gondwe, E., Kaunda, E., Kolding, J., Nankwenya, B., O'Meara, L., Marinda, P., Teoh, S.J.

and Nagoli, J. (2023). Illuminating Hiden Harvests- The contributions of small-scale fisheries to food security and nutrition, In "Illuminating Hiden Harvests The contribution of small-scale fisheries to sustainable development". Italy:FAO. https://doi.org/10.5281/zenodo.8035842

Mozumder, M.M.H., Uddin, M.M., Schneides, P., Deb, D., Hasan, M., Saif, S.B. and Nur, A.A.U. (2023). Governance of illegal, unreported and underregulated (IUU) fishing in Bangladesh: status, challenges, and potentials. Frontiers in Marine Sciences 10:1150213. https://doi.org/10.3389/fmars.2023.1150213

Mupepi, O., Matsa, M.M., Hove, J. and Dzawunda, B. (2024). Binga's VaTonga communities involvement in Zambezi river fishery resource harvesting and management. Scientific African 23:e02041. https://doi.org/10.1016/j.sciaf.2023.e02041

Murray, G., D'Anna, L. and MacDonad, P. (2016). Measuring what we value. The utility of mixed methods approaches for incorporating values into marine social-ecological system management, Marine Policy 73:61-68. https://doi.org/10.1016/j.marpol.2016.07.008

Nenadovic, M. and Epstein, G. (2016). The relationship of social capital and fishers' participation in mult-level governance arrangements. Environmental Science and Policy 61:77-86. https://doi.org/10.1016/j.envsci.2016.03.023

Njiri, J., Knaap, M., Kundu, R. and Nyamweya, C. (2018). Lake Victoria fisheries: Outlook and Management. Lakes and Reservoirs 23(2):10-162. https://doi.org/10.1111/lre.12220.

Nunan, F. (2020). The political economy of fisheries co-management: challenging the potential for success on Lake Victoria. Global Environmental Change 63:102101. https://doi.org/j.gloenvcha.2020.102101

Nunan, F., Drazen, C., Yongo, E., Salehe, M., Mbilingi, B., Odongkara, K., Onyango, P., Mlahagwa, E. and Owili, M. (2018). Compliance, corruption and co-management: how corruption fuels illegalities and undermines the legitimacy of fisheries co-management. International Journal of the Commons 12(2):58-79. https://doi.org/10.18352/ijc.827

Obubu, J.P., Mengistou, S., Odong, R., Fetahi, T. and Alamirew, T. (2022). Determination of the Connectedness of Land Use, Land Cover Change to Water Quality Status of a Shallow Lake: A case of Laka Kyoga Basin, Uganda. Sustainability 14:372. https://doi.org/10.3390/su14010372

Ojara, M.A., Lou, Y., Aribo, L., Nmumbya, S. and Uddin, J. (2020). Dry spells and probability of rainfall occurrence for Lake Kyoga Basin in Uganda East Africa. Natural Hazards 100:493-514. https://doi.org/10.1007/s11069-019-03822-X

Okafor-Yarwood, I., Kadagi, N.I., Miranda, N.A.F., Uku, J., Elegbede, I.O. and Adewumi, I.J. (2020). The Blue Economy-Cultural Livelihood-Ecosystem Conservation Triangle: The African Experience. Frontiers in Marine Science 7:586. https://doi.org/10.3389/fmars.2020.00586

Olowoyeye, O.S. and Kanwar, R.S. (2023). Water and food sustainability in the riparian countries of Lake Chad in African Sustainability 15 (13): 10009. https://doi.org/10.3390/su/5/3/0009

Papa, F., Cretaux, J., Grippa, M., Robert, E., Trigg, M., Tshimanga, R.M., Kitambo,B., Paris, A., Carr, A., Fleischmann, A.S., De Fleury, M., Gbetkom, P.G., Calmettes, B. and Calmant, S. (2022). Water resources in Africa under global change: Monitoring surface waters from space. Survey in Geophysics 44:43-93. https://doi.org/10.1007/s10712-022-09700-9

Parampreet, K., Jill, S. and Vikas, Y. (2018). Descriptive statistics. International Journal of Academic Medicine 4(1):60-63. https://doi.org/10.4103/IJAM.IJAM_7_18

Pasini, G., Fiore, S. and Cavapozzi, D. (2020). Divorce and Well-being. Disentangling the role of stress and socio economic status. The Journal of the Economics of Aging 16:100212. https://doi.org/10.1016/j.jeoa.2019.100212

Reis-Filho, J., Hatje, V. and Barros, F. (2024). Navigating blue justice: Policy gaps and conflicts in Coastal development from small-scale fisher perspectives. One Earth 7(10):1786-1802.

Silva, M.R.O., Pennino, M.G. and Lopes, P.F.M. (2021). Predicting potential compliance of small-scale fishers in Brazil: The need to increase trust to achieve the goals of sustainable fisheries management. Journal of Environmental Management 288:112372. https://doi.org/10.1016/j.jenvman.2021.112372

Silver, J.J. and Stoll, J.S. (2022). A framework for investigating commercial license and quota holdings in an era of fisheries consolidation, concentration and financialization. Marine Policy 143:105179. https://doi.org/j.marpol.2022.105179

Sowman, M. and Sunde, J. (2018). Social impacts of marine protected areas in South Africa on coastal fishing communities. Ocean and Coastal Management 157:168-179. https://doi.org/10.1016/j.ocecoaman.2018.02.013

Sun, Z., Sun, Y., Zhang, Y. and Qiao, Q. (2024). How can governments and fishermen collaborate to participate in a fishing ban for ecological restoration? Journal of Environmental Management 360:120958. https://doi.org/10.1016/j.envman.2024.120958

Wang, Q., Feng, K., Deng, W., Li, H., Guo, Q., Tao, K., Yuan, J., Li, Z., Lek, S. and Hugueny, B. (2023). Direct and indirect effects of a fishing ban on lacustrine fish community do not result in a full recovery. Journal of Applied Ecology 60(10): 2210-2222. https://doi.org/10.1111/1365-2664.14491

Warren, C. and Steenbergen, D.J. (2021). Fisheries decline, local livelihoods and conflicted governance: An Indonesian Case. Ocean and Coastal Management 202:105498. https://doi.org/10.1016/j.ocecoaman.2020.105498

Whitehouse, L.M. and Fowler, M.S. (2018). Meta-analysis reveals that fisheries co-management alters socio-economic outcomes and resource well-being. Marine Ecology Progress Series 600:127-140. https://doi.org/10.3354/meps12681

Widjaja, S., Long, T., Wirajuda, H., van As, H., Bergh, P.E., Brett, A., Copeland, D., Fernandez, M., Gusman, A., Juwana, S., Ruchimat, T., Trent, S. and Wilcox, C. (2023). Illegal, unreported and unregulated fishing and associated drivers. The Blue Compendium. Springer, Cham. In Lubchencho, J., Haugan, P.M. (eds). https://doi.org/10.1007/978-3-031-16277-0_15

Yeboah, T. and Flynn, J. (2021). Rural Youth Empowerment in Africa: An Evidence Review, Evidence Synthesis Paper 10/2021, Ledien: INCLUDE Knowledge Platform. https://includeplatform.net/wp-content/uploads/2021/05/Rural-youth-empowerment-in-Africa-evidence-review.pdf

Zhanga, W., Eididi, H., Masuda, Y.J., Meinzen-Dick, R.S., Swallow, K.A., Ringer, C., DeMello, N. and Aldous, A. (2023). A community-Based Conservation of Freshwater Resources: Learning from a Critical Review of the Literature and Case Studies. Society and Natural Resources 36(6):733-754. https://doi.org/10.1080/08941920.2023.2191228.