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Assessing the Impacts of Fishing Practices on the Ecosystem of Arocha Wetland, Arocha Division, Apac Municipality.

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ABSTRACT

The study was conducted in Arocha wetland, Apac municipal, Apac district, to investigate the various fishing practices of the community, their impact on the wetland ecosystem, and the challenges faced by authorities in controlling degraded practices. Data was collected through interviews, questionnaires, focus group discussions, and descriptive statistical methods. The findings revealed that fishing is a major cause of Arocha wetland destruction, causing vegetation destruction, loss of water quality, habitat degradation, and nutrient flooding. The study also revealed the challenges faced by authorities in regulating fishing and the fish species found in the wetland, including mudfish, tilapia, and lungfish. A high percentage of fishermen are youths and women aged 17-35, who fish for food and income. The study found that overexploitation of fisheries services in the Arocha wetland is a threat, and insufficient fisheries statistics lead to policymakers undervaluing and ignoring the wetland. The data will aid in developing plans and policies for controlling fishing in the wetland.

Keywords: Fishing Practices; Ecosystem; Arocha Wetland; Impact Assessment; Apac Municipality

INTRODUCTION

Fishing is the act of obtaining fish from bodies of water, such as lakes, oceans, and wetlands. It has become a significant global source of food for people and has also generated employment possibilities and economic benefits for the communities who participate in it. The concept is summed up in the definition provided by [1, 2] which state that fishing is the practice of catching wild fish for food, recreation, trade, or their products. Methods used include hooking, trapping, and gathering. In recent years, world fisheries have become a dynamically developing sector of the food industry in response to the growing international demand for fish and fishery products, it has become clear that many fish resources could not sustain future needs due to increasing exploitation that results in habitat loss, disturbance or alteration in habitat quality caused by fishing activities [3]whereas negative effects of fishing on wetlands have been attributed to explosive competition [4]. While traditional fishing methods are frequently regarded as more beneficial for conserving biodiversity in India, their scope and intensity may nevertheless have a detrimental effect on ecosystems and biodiversity because growing populations have a cumulative effect on fisheries resources that cascades into aquatic ecosystems [5, 6]. Poverty is one of the several reasons why local communities exploit fish. According to the pillar of poverty, poverty in relation to fishing is defined by the Eradication Action Plan (PEAP) as the state in which people or communities who depend on fishing as their main source of income or livelihood find it difficult to meet their basic needs because they have limited access to opportunities, resources, and support networks. These people might not have access to the right tools, markets, finances, technology, or training, which makes it harder for them to make a living from their fishing activities. Use of unrecommended fishing gear, such as spears, hooks, baskets, and hand hoes, can indicate overexploitation of fish and its effects on the environment in wetlands. This gear can lead to habitat destruction, alteration, depletion of non-targeted species, pollution, and biodiversity loss. The development of a code of conduct for ethical fisheries management received support during the UNCED summit held in Rio de Janeiro, Brazil in June 1992. The UN World Summit on Sustainable Development

claims that [7], UN Millennium Declaration adopted in [8], FAO World Food Summit in [9, 10] all considered poverty alleviation as a central priority. The 1996 World Food Summit stressed the connection between food security and the need for sustainable management of natural resources like wetlands. It is estimated that over 46% of the population in Kenya who live near Lake Turkan and the Tana River Delta work in jobs related to fishing, such as processing, trading, and catching, making up the majority of those who either directly or indirectly work in small-scale fishing. They employed conventional techniques like traps and locally produced nets, but the degradation of wetland habitats has increased due to the unsustainable use of wetland resources, such as draining for agriculture and building infrastructure [11]. Fisheries operations continue to be a major factor in the decline of biodiversity [12] Small-scale aquaculture is one notable method of using fish resources sustainably that is currently being investigated. There is proof that an ecosystem-based management approach combined with excellent governance can achieve sustainability in fisheries [13]. However, there is a major gap in understanding how traditional fishing practices influence biodiversity [14]. Evaluating gear could aid in choosing gear that has the fewest negative impacts on aquatic species and ecosystems, promoting sustainable biodiversity use and reducing biodiversity loss [15–17].

An understanding of the impacts of traditional fishing practices on wetland ecosystems is limited throughout developing countries yet is an important gap that needs to be addressed to achieve sustainability in fisheries and wetland ecosystem conservation [18–20]. This study set out to find out the impacts of traditional fishing practices on Arocha wetland ecosystems which are located southwest of Apac municipal council area in the Arocha Division. Arocha wetland is increasingly facing degradation due to encroachment by destructive fishing practices introduced by fishermen/women. However, the government and other conservation such as the wetland management department encourage the implementation of CBWMP. These CBWMPs have not been active in most wetlands of Uganda. According to Apac municipal development plan, Poverty in communities surrounding wetlands significantly contributes to unsustainable fishing practices, posing substantial threats to the ecological balance and long-term viability of wetland ecosystems.

The indicators of poverty within the communities living around wetlands as reported by (type) include low-income level, low access to resources and opportunities, and limited economic diversification leading to unsustainable fishing practices, methods, and techniques employed by community members such as spear, basket, hooks, and hand hoes. These are all destructive fishing gear usage that threatens ecological balance. Their impacts include depletion of fish populations, vegetation loss, declining bird populations, damage of habitats, disruption of food chains, and loss of biodiversity which poses long-term consequences for both the environment and the communities as they depend on wetlands for livelihoods and resources. However, the municipal environmental office is currently sensitizing the community adjacent to the wetland to essential ecological functions like water filtration, flood control, carbon sequestration, and preservation of species. This study sought to fill the information gap by assessing the impacts of the ecosystem being degraded by poor fishing practices.

METHODOLOGY

Study Area

Apac municipality is situated in the Northern part of Uganda between longitudes 32°west and34°east and latitudes1.59° North and 3°South. It is approximately 280 kilometers from Kampala via Masindi port. Apac municipal is boarded by Apac Sub County to the east south and west, Chegere Sub County to the North, and Ibuje Sub County to the North West. The municipality covers a total area of approximately 231.41km square of which 7% is under permanent Arocha wetland. It generally stands at 3.54oft above sea level. The surrounding is in the northern Ugandan plateau consisting mainly of undulating flatland surfaces separated by wide permanent and seasonal swamps. The whole of the municipal is drained by the Arocha swamp flowing westward into the river Nile.

Soil

The soils are variable and are generally sandy clay and sandy loamy with low organic matter and low to medium nutrient availability. The gley soil with very poor drainage and significant peat development on surface always often referred to as peaty gley. These soils are found in areas of high rainfall where the water does not drain away readily. Peaty gley soil is waterlogged for all or most of the year. This waterlogging denies the soil the oxygen that the soil organisms need to survive. The organism left in the soil extract the oxygen they need to survive from the iron compounds and the soil gradually turns grey, blue or green as the oxygen is depleted.

Vegetation

The natural vegetation of Apac municipal and its immediate surroundings is moist cumbersome savanna mainly with scattered shrubs in the grassland, although some woodland also exists. Among the plant species that are found in the Arocha wetland include Cyperus papyrus, Echinochola pyramidalis, Theiypteris acuminate, Paspalum scrobiculatum, Persicaria cordata.

The Social-Economic Aspect of the People

The majority of people surrounding this wetland are farmers who live a peasant life. They practice agriculture as a source of living since they obtain their food through carrying out agricultural activities alongside fishing. Among the food crops they grow include cassava, maize, beans, simsim, and cash crops like sunflower, and sorghum. They also rear livestock such as cattle, goats, sheep, and poultry for domestic consumption.

Study Population.

According to the 2014 population and housing census of Uganda, Apac municipal council had a population of 50962 with 26014 females and 24678 males. The population as per the divisions stands as below.

Table 1. Demographic composition of Apac municipal council

Divisions	No of households	Male	female	Total
Agulu	2609	6757	7132	13889
Akere	2428	7060	7582	14642
Arocha	2134	5257	5489	10746
Atik	2006	5604	5811	11415
Total	9177	24678	26014	50692

Source: Apac municipal website.

Sample Size

The researcher conducted his studies and a total of 52 respondents were chosen and they all gave the researcher information based on the topic and objectives of the studies.

Table 2. Shows the sample size

Respondents	Numbers of respondents
fishermen	13
fishmongers	10
Fish processors	9
The community surrounding the wetland	20

Sampling Techniques

(a) Simple Random Sampling

In this sampling method, the researcher randomly selected a subset of participants from the population. Data was then collected from as large a percentage as possible of this random sample. Each member of the population had an equal chance of being selected by the researcher.

(b) Cluster Sampling

It is a probability sampling method in which you divide a population into clusters and then randomly select some of these clusters as the samples. Using this method, the researcher divided the fishermen into four groups and then he randomly picked thirteen respondents from each group to be interviewed and represent the whole fishermen.

Data Collection Tools

The study used different data collection instruments to obtain relevant data on fishing activities and their impact on the wetland ecosystem and these included.

Questionnaire

The questionnaires were given to different stakeholders in the districts i.e. district environmental officer, district fisheries officer and other stakeholders in order to gather information based on the topic and objectives of the study. The questionnaires were in form of open ended and closed ended in nature and the respondents filled in the answers of their choice in line with the study questions in the questionnaire's guide. Researcher analyzed the respondent's information basing on the study objectives. This method was preferred because it gives an opportunity to respondents to freely express themselves without fear of the outcome. And also, data collected are original from different respondents. Such question includes what are the different fishing gears used in Arocha wetland and their impacts, fish species.

Observation

This method allows me to observe with my eyes the land use change, wetland courage, ecosystem destruction, water turbidity and the impacts of destructive fishing gear like habitat degradation, overfishing and habitat alteration moreover the

impacts of biodiversity and the challenges faced by fishermen at large. Observation was important because it provided the background information about the environment where the research was done.

Interview Guide

The researcher was able to conduct personal interviews with the key informants to get information on the challenges faced by authorities in controlling fishing. The key informants involved were local leaders, an environment officer, and an elder of the area.

Focus Group Discussion

Discussion was held in groups of 15 people among whom an interview guide was used and questions like what are the impacts of destructive fishing in this area were asked to reach the right conclusion.

Secondary Data

These data were collected from different sources such as journals, scholarly articles, and publications for example information concerning the study area.

Ethical Issues

The researcher obtained an official letter from the head of the department to introduce the researcher to the study area. The researcher assured the respondents that the findings would help them on how best they can improve their catches without destroying wetlands. I explained to the respondents that I was a politician and needed their participation for only academic purposes. Upon acceptance participants in question was then interviewed.

Limitation of the Study

Some inhabitants of the wetland more so fishermen and some farmers were not willing to participate in the study since most of them thought that we were planning for their eviction. On the other hand, some key informants such as local leaders had no idea of what we were talking about since their involvement in the draft process was overseen. In addition, the availability of limited funds to run the field activities limited the scope of the study and the number of the participants to be involved this was because most participants require money as refreshment and fuel to give out a view about the study.

RESULTS

Fishing practices in Arocha wetland

Methods of Fishing

The communities surrounding the Arocha wetland used traditional fishing methods that involved the use of local fishing gear such as spears, hooks, and baskets that are locally made by the people in the area. Among the fish species that are extracted using this method include mudfish (lut), lungfish (twang), and tilapia (apok).

The Traditional Fishing practices employed by the people in the Arocha wetland

From these findings, the researcher found that the biggest percentage of the respondents agreed with the statements that most of the communities within Arocha Wetland used traditional fishing practices. The common is gill netting, the use of hooks, spears, hand hoes, and baskets. The majority of the fishermen use hooks and spears while few of them use gill netting but during the dry season, most of the fishermen use hand hoes to dig fish, especially mud and lungfish.

Table 3 shows the fishing gear that is used in Arocha wetland.

Fishing gears	No of people	Percentage
Spears	13	25
Hooks	11	21.154
Baskets	7	13.461
Hand hoes	18	34.615
Net	3	5.769
Total	52	100

People Involved in Fishing Activities

The results revealed that the biggest percentages of the people involved in fishing were male (54%) who were involved majorly in the use of traditional fishing gear. Most of the fishermen that are engaged in fishing are between 20-30 years and most of them stopped in primary and secondary levels. The males are involved in catching, and marketing, and the females in processing and smoking. The study also revealed that fishing was daily and involved the use of spears, hooks baskets, and hand hoes for sale.

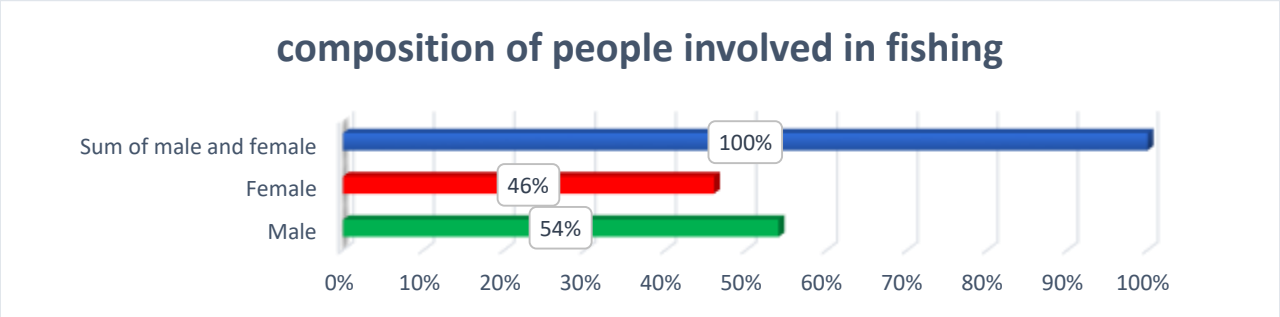

Fig. 1: The chart shows the gender composition of people involved in fishing activities.

Impact of Fishing on Wetland Ecosystems.

To assess the impacts of fishing on the Arocha wetland, respondents were interviewed to assess their perception of fishing. 70% of respondents reported that traditional fishing is more negative towards wetland ecosystems. The major types of destruction that were identified in the field are habitat destruction, it was high, water turbidity, floods, siltation, loss of vegetation, declining fish stocks, and nutrient loading. This was attributed to the use of destructive fishing gear.

Table 4 below shows the major impacts of traditional fishing practices on the Arocha wetland

Observed impacts of fishing on wetland	Status		
	Low	Medium	High
Habitat destruction			
Water turbidity			
Floods			
Siltation			
Loss of vegetation (papyrus)			
Declining fish stocks			
Nutrient loading(eutrophication)			

Source: primary data 2023

Status	Low	Medium	High
Color			

Arocha wetland is mostly threatened in the dry season compared to the wet season. This is mostly through destructive fishing gears like hand hoes to dig mudfish that always hide under the mud soil especially when water levels drop. These mostly intensify in the dry season. However, other methods like baskets, hooks, and spears also cause significant threats during the dry season in the area.

DISCUSSION

This fishing method that involves dragging a net can cause significant damage to underwater vegetation. Trawling can uproot or destroy papyrus grasses and other benthic vegetation, disrupting the habitat for various marine organisms Use of a hand hoe to dig the lungfish can result in the clearance of wetland plants, water, and reeds leading to the drying up of wetland vegetation. Alteration of aquatic vegetation; handheld gear can result in the disturbance of aquatic vegetation. This can impact the health of plant communities and the associated aquatic ecosystem affecting water quality parameters [21]. The findings show that traditional fishing practices leads to Sedimentation; fishing activities that involve dredging of baskets, nets can stir up sediment under the water bodies. The increased sedimentation can result in reduced water clarity, turbidity negatively impacting water quality and aquatic vegetation by limiting light penetration and hindering photosynthesis. Improper disposal of fishing gears and fish feeds, such as baits, nets and lines, can contribute to marine pollution. Lost gear, can entangle marine life and remain in the water for extended periods resulting in to water pollution. Additionally, the release of chemicals such as oils for fishing or the disposal of unwanted catch can introduce pollutants into the water lowering water quality for human consumptions; the discharge of fish processing waste and baits into wetland can introduce excess nutrients such as nitrogen and phosphorus [22, 23]. This nutrient loading can lead to eutrophication, promoting the growth of algae and potentially causing harmful algal blooms that have detrimental effects on the water quality like the turbidity, color of water and the aquatic life. The study revealed that both the fishing and environmental department faced the problem of underfunding. Insufficient funds to facilitate the movement of the environmental and

fisheries officers to carry out sensitization program about the vital roles of wetland ecosystem and how the community can carry out sustainable fishing. Capital is also needed to set demonstration farm where by fishermen and farmers can be trained to carry out aquaculture. This limitation can impede their ability to implement and enforce effectively. Secondly, weak enforcement of law by wetland and fisheries institutions because there are few staff that cannot cover up all Apac municipal has resulted in more use of unrecommended fishing equipment which is more harmful to both aquatic life and the ecosystems[24]. Inadequate regulation and monitoring; fishing is a common challenge in many wetland areas due to inadequate monitoring and enforcement capacity by the NEMA, environmental department, and fisheries institutions, authorities may struggle to establish and enforce sustainable catch limits and fishing season but still there is overfishing due in adequate monitoring[13, 25]. Limited community engagement. Effective wetland management requires collaboration with the local communities, fishers, and other stakeholders however authorities may face challenges in engaging these groups leading to difficulties in implementing and gaining support for sustainable fishing practices. Data limitation; insufficient data on fish population, habitat conditions, and socio-economic factors can hinder effective management. Authorities may struggle to make informed decisions without comprehensive data making it challenging to implement science-based management practices.

CONCLUSION

This research study found out that the Arocha wetland is facing unsustainable fishing practices such as the use of a hand hoe to dig mud fish during the dry season which results in vegetation destruction especially papyrus, habitat destruction, siltation, flooding, nutrient loading, and others. Lastly, the study also found out the challenges faced by different authorities in managing wetland fisheries and they include insufficient funds, few staff to carry out sensitization and training the communities about the value of wetland and other income-generating activities such as poultry, piggery, agroforestry and cattle rearing.

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