



Threats to the Conservation of Wetlands in Ghana: The Case of Songor Ramsar Site

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Authors' contributions

This work was carried out in collaboration among all three authors. Author JAK designed the study and the concept of the paper. Authors JAK and MAK managed initial literature searches, data collections and analyses, and developed the first draft of the manuscript. All authors JAK, MAK and AA reviewed literature, formatted and provided finishing touch to the manuscript, read and approved the final manuscript.

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ABSTRACT

Wetlands are important ecosystems internationally recognized, as exemplified by the Ramsar Convention of 1971. They are diverse in terms of habitat, biota, distribution, functions and uses. Many wetlands have lost their pristine quality and have been transformed to modified ecosystems, but their salient role in the ecosystem function cannot be replaced. Over exploitation due to developmental activities and over dependents on their values for livelihood are threatening their existence. Presently, there are five sites with a surface area 178,410 hectares designated as wetlands of international importance, in Ghana. These sites are located in the strategic area of the country which includes the Densu Delta, Muni Lagoon, Anlo-Keta Lagoon Complex, Sakumo

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Lagoon and the Songor Lagoon. These wetlands are an ecologically valuable resources with diverse fauna including marine turtles, avocets, terns and other migratory or wintering wildlife species.

However, overexploitation and dependency as well as developmental activities on their values for livelihood are threatening their existence. The Songor Lagoon Ramsar site inhabits over 87,000 people in its ecological sensitive area putting enormous pressure on the natural resource and therefore endangering the existence of the species and their habitats.

Therefore a study to investigate the environmental impact of the socio-economic activities on the wetlands has been deemed necessary in order to recommend sustainable measures for the restoration of such sites.

This study used a blend of qualitative and quantitative methodologies to gather both primary and secondary data. Simple random sampling, descriptive and inferential statistics were all employed in data analysis as well as interpretative technique also.

The results indicate that about 92% of the respondents heavily depend on Songor wetland for livelihoods. It was also established that, 52% of the inhabitants are involved in fishing with chemicals while 60% also reclaims the land by using sand for construction in the site. Consequently, wetland resources have been overexploited and degraded, leading to frequent flood and storm attacks.

In conclusion, access to the wetland by the public to undertake activities has made its management on sustainable basis difficult for the management authority. It is therefore recommended that, awareness should be created about the values of the wetland among the community members, also environmental impact assessment should be done before any project is carried out in the site, and the local authorities should formulate a policy or review existing regulations to provide a legal framework for sustainable utilization of the resource and access to critical areas in the Ramsar site.

Keywords: Threats; wetlands; Songor; Ramsar Site; Ghana.

1. BACKGROUND

Wetlands are generally regarded among the world's most productivity environments [1,2]. They provide a wide range of ecological diversities from the provision of water and primary productivity upon which countless lives survive on [2,3] describe wetlands as both "the kidneys of landscape", because of the function they perform in the hydrological and chemical cycles, and as "biological supermarkets" because of the extensive food webs and rich biodiversity they support. They also have attributes which are closely intermeshed with the ethical and aesthetic values that humans attach to them [4].

Despite the benefits most countries derive from wetlands, and despite the effort to establish a sustainable management of wetlands, globally wetlands continue to be destroyed. During the last few decades, tropical wetlands have been destroyed or considerably altered because of the lack of adequate knowledge of their values functions, attributes and resources [5]. Wetland ecosystems help in so many ways by providing livelihood for the people to rejuvenating our environment.

In recent times, wetlands have become easy targets for human over-exploitation due to increasing human populations and the quest for a "better life" through improvements in science and technology [6]. Biodiversity, therefore, is being exploited at much faster rates than ever before with negative implications for sustainable human livelihood [6,7] has stated that biodiversity is facing a decline of crisis proportions which could ultimately lead to mass extinctions in the very near future. According to [8], coastal wetlands will be lost due to sea-level rise in all world futures with 5-20% losses by the 2080 s in the world. However, these losses are relatively small compared to the potential for direct and indirect human destruction.

In Africa, the destruction is the result of man's reckless exploitation of the natural environment in a quest for a better life. In Uganda for example, the underlying cause of wetlands destruction is the insatiable desire of both the rich and the poor to derive livelihood from the wetlands [9]. This is exacerbated by the high annual population growth rate of 3.3% [9], and pressure from industrial construction. The communities that access these wetlands use them for agriculture for the extraction of various raw materials, and for fishing.

The Wetlands of Ghana form an ecologically valuable resource providing feeding, roosting and nesting sites for thousands of migratory and resident birds; marine turtles; many species of fish; plant genetic materials for research and a major source of income for especially poor communities from agricultural activities, salt mining and other economic activities [10]. Wetlands, such as mangroves and other forested coastal areas, act as windbreaks and help to mitigate the impact of coastal storm surges. A greater part of the eastern shoreline of Ghana, especially at Keta and Ada, is vulnerable to storm surges due to a lack of such a natural protective system. Hence, the frequent storm surges and serious sea erosion in these areas [5]. As a tourist site, wetlands also generate direct revenue to the government.

The wetlands in Accra are threatened mainly by human and natural factors. Existing literature reveals that in Ghana, urbanization, high population growth, fuel wood gathering, salt and sand winning are among the major factors threatening mangrove and wetland ecosystems along the coast [11]. These threats include rapid conversion of wetlands for housing development, rapid development of slums, mining, land and soil degradation, and sanitation and water pollution [11].

Songor Ramsar site is the second largest in the country amongst the Densu delta, Muni Lagoon, Anlo-Keta Lagoon complex and Sakumo Lagoon which was listed in 1992 although, Ghana ratified the Ramsar Convention on the 22nd June, 1998. A research in the Songor Ramsar site indicates that the human population within the ecologically sensitive areas is over 87,000 people putting enormous pressure on the natural resources [10]. The diverse fauna include marine turtles, avocets, terns and other migratory/wintering wildlife species. The Songor Ramsar site is under the management of the Wildlife Division of the Forestry Commission of Ghana, where human activities are regulated to minimize their adverse effects on the core areas. Allowed activities in the site include sustainable salt production extraction, human settlement, aquaculture, and fisheries production. However, over the years now, these privileges have been abused and wildlife habitats destroyed and survival of species threatened.

The wetland is one of the major sources of livelihood for the community people around the area. The communities do fish and farm on the wetlands especially during the drought season.

By so doing, they use all sort of chemicals, which pollute the wetland. They also cut off the mangrove and other trees found along the fringes/banks and in the wetland for the purpose of fuel wood, farming or for other reasons. These have led to conversion of the wetland into farms, pollution of water bodies, uncontrolled bush burning, unapproved resource extractive methods and persecution of wildlife species [10].

A look around the Songor Ramsar site, will pose a sight of development of housing structures all over. The vegetation in and around the site has been destroyed, and part of the lagoon has been filled with solid waste. This has led to the frequent flood and storm attack over the few years on communities along the site. All these problems are being faced probably because the natural remedy of solving these problems fails to function.

This study aims to determine the socioeconomic factors contributing to the destruction of the wetland in the Songor Ramsar site and their effect on the environment.

2. MATERIALS AND METHODS

2.1 Study Area

The Songor Ramsar site is located in the Dangme East District of the Greater Accra Region of Ghana. It is one of the five constituted coastal Ramsar sites in Ghana. The wetland which is 51.33 hectares includes the west bank of the lower Volta River estuary and the Songor wetlands. In the south of the wetland is the Gulf of Guinea. The landscape is generally flat with the creeks supplying blackish water from the Volta River to the lagoon during high water tides. There are huge expands of reeds and sesuvium. These habitats and resources serve the socio-economic needs of the inhabitants and also provide nesting, feeding and resting areas for wildlife species. There are over 23 inhabited and uninhabited islands associated with the Volta River within the Songor wetlands.

2.2 Data Collection Technique

The study used a blend of qualitative and quantitative methodologies to collect both the primary and secondary data since the research is a descriptive cross-sectional study. The primary data was collected based on a survey, interview and administering of questionnaire to randomly sampled individuals (50 respondents) in and

around the study area and from authorities responsible for management of the site as well as literatures. The sample size was chosen to fit the financial budget of the research. The selection of respondents was by simple random sampling to ensure residents have equal probability of being selected.

2.3 Data Analysis

The data was analysed using both quantitative and qualitative methods. Quantitative data was coded and analysed using Microsoft excel. Descriptive, as well as inferential, statistics were employed to summarize the data gathered. The qualitative data was analysed using the interpretative technique to analyse observation and interviewed information obtain.

3. RESULTS AND DISCUSSIONS

3.1 Age and Gender Distribution

Table 1 shows the age and gender distribution of respondents, which indicates that the majority of them fall under the age group of 31-40 years representing 28% of the studied population. This shows that the majority of the studied population

falls between the youth of working age, who are most active and involved in the socio-economic activities in the wetland. The minority falls between the age group 11-20 years and 61-70 years respectively, representing 4% each of the studied population. These age groups are those that are less active in the socio-economic activities such as teenagers and elderly in the community. The active age groups gave their views on the current situation whiles the elderly provides their experiences from the past. The majority of the respondents were men (56%) while women were 44% of the sample size.

3.2 Community and Educational Background of Respondents

Table 2 shows the educational level of the respondents in the six communities selected along the wetland. About 24% of the respondents in Otokpe, Lolonyakope and Ayibo completed secondary level of education. All communities except Azizanya and Totimekope had no person who completed tertiary institutions. This shows that the two communities are more active. The community with the minority population is Totimekope representing 12% of the studied population.

Table 1. Age and gender distribution of respondents

Age of respondents	Gender of respondents		Total	Percentage of total population
	Male	Female		
11-20	2	2	4	8
21-30	10	0	10	20
31-40	6	8	14	28
41-50	6	6	12	24
51-60	4	2	6	12
61-70	0	4	4	8
Total Percentage	28	22	50	100
	56	44	100	100

Table 2. Educational background of respondents

Respondents communities	Educational background of respondents					Total	Percentage
	Primary	Elementary	Secondary	Tertiary	None		
Otokpe	2	2	4	0	2	10	20
Totimekope	0	2	0	2	2	6	12
Ocansekope	2	2	2	0	2	8	16
Azizanya	0	4	2	2	2	10	20
Lolonyakope	0	0	4	0	4	8	16
Ayigbo	2	2	4	0	0	8	16
Total	6	12	16	4	12	50	100
Percentage	12	24	32	8	24	100	

With their educational background, majority are mid-level (secondary) school graduates, which is 34% of the study population, showing that most of the people engaged are educated and may have some knowledge about the study. The minority are those with higher education representing 8% of the studied population. Although people with high education level do not reside in the study area, they are responsible for recreational activities and development ventures in the wetland.

3.3 Marital Status

Table 3 indicates that, 48% of the respondents are married whereas, 28% is single in the studied population. The divorce and the widows are in the minority.

Table 3. Marital status of respondents

Marital status	Frequency	Percentage of total population
Single	14	28.0
Married	24	48.0
Divorced	6	12.0
Widow	6	12.0
Total	50	100.0

3.4 Religion and Ethnic Background of Respondents

Table 4 shows the respondents' religion and ethnic background. The majority of the people are natives of Ada making 76% with the minorities being Northerners which takes 4% of the responding population. The data indicates that majority are Christians, representing about 60% of the population while the minority is Muslim, which is about 4% of the total population. Their religious beliefs can have some effect on the activities they undertake in the

wetland. In fact, some religions believe the existence of the natural resources are renewed by itself and therefore any activity of humans may not render it depleted whereas others from ethical backgrounds also believe they have the sole rights to the resources and therefore refuse to adhere to the regulations and policies governing the resources. The acts therefore make it difficult to regulate the activities on and in the site leading to overexploitation and misuse of the resource.

According to previous studies, such as [12] and [9], the use of traditional management helps in the sustainable management of wetlands. The generally low human populations' practice of sustainable traditional agriculture, fishing, and animal husbandry, as well as limitation of land use to a relatively smaller segment of the population using simple tools on smaller land areas, however, ensured the sustenance of soil fertility without the use of agro-chemicals. Biodiversity conservation was thus, achieved through environmentally-friendly traditional human cultural practices and beliefs [12,13]. The advent of Christianity, formal "western" education and technological advancement has rendered some of these norms and taboos obsolete, because they were considered largely fetish [12]. Also, the custodians themselves, invariably illiterate fetish priests and traditional rulers, often tended to concentrate on sanctions imposed on offenders, rather than education of their subjects on the need to maintain such taboos.

3.5 Dependency on Wetland

The result of the research indicates that the Songor wetland is not a restricted site which bound people from undertaking activities around the area.

Table 4. Religions ethnic background of respondents

Religion of respondents	Ethnic background			Total	Percentage of total population
	Ada	Ewe	Northern		
Christian	20	10	0	30	60
Moslem	0	0	2	2	4
Traditional	15	0	0	16	32
None	2	0	0	2	4
Total	38	10	2	50	100
Percentage	76	20	4	100	

In Table 5, ninety two percent (92%) of the respondents admitted that their livelihood depend solely on the wetland values, and only 8% of the respondents said they don't depends solely on the wetland value. They also undertake activities such as crop production, fishing, salt production, housing construction and other activities in the wetland as well. The non-restriction of the wetland has made it difficult for the authorities in charge of the wetland to protect the resource from activities that could cause its degradation. Researchers like [10,11,14] have revealed that degradation of wetland are due to human economic activities in the wetland.

The majority of the people in the community agreed that if they should have alternative sources to live on, they would prefer to leave the wetland resource. The over dependency on the wetland is the cause of its degradation; thus if there would be an alternative source of livelihood it would reduce the over dependency on the wetland resources as suggested by [10].

3.6 Waste Disposal Method

It was observed that solid waste disposal in the community was not the best as refuse was seen disposed of into the waters in the wetland and at the outskirts of the community near the waters and around their buildings. About 16% of the respondents said they burn their refuse in the

house to keep the environment clean, even though the observation shows that majority of the people dump their refuse into the wetland. Only 8% admitted that they dumped their solid waste into the wetland. It was also observed that the dumping of waste into the wetland is causing its degradation and other associated adverse effect like the loss of aquatic life and blockage of water pathway.

Table 5. Respondents' dependency on wetland

Response	Frequency	Percentage of the total population
Yes	46	92.0
No	4	8.0
Total	50	100.0

For the reasons given regarding the Waste Disposal method chosen (Fig. 1), the majority of the respondents said they look to prevent flooding around their building, and others referred to it depends by the unavailability of central waste containers in the community and so dump their waste around their houses to check flooding around the buildings normally is carried by the water and later choke the wetland in addition to those who dump it into the wetland. This activity affects the biochemical oxygen demand of the water body as indicated by [11].

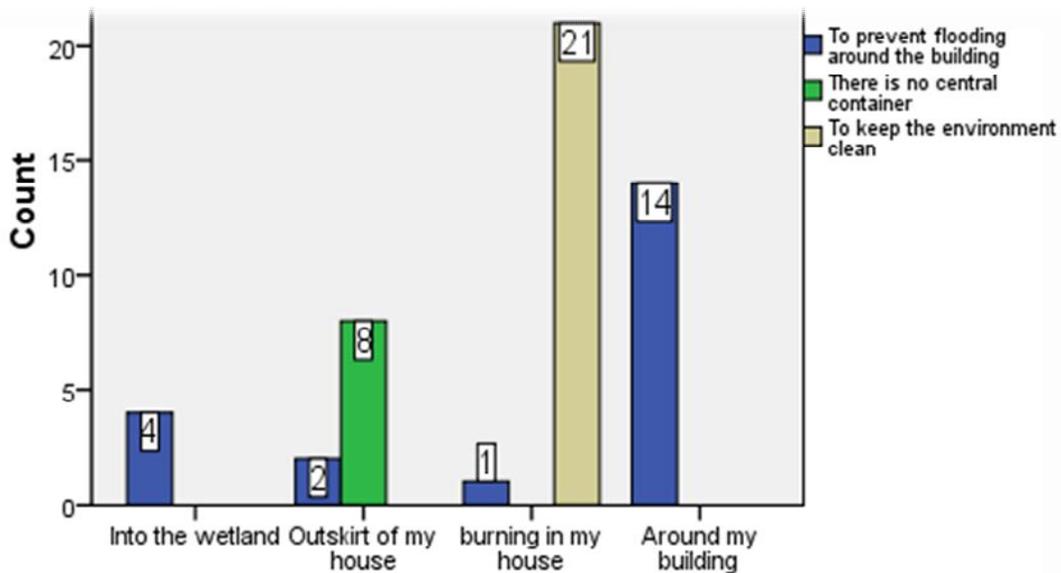


Fig. 1. Method of waste disposal

3.7 Socio Economic Activities in the Wetland

The study revealed the types of socio-economic activities that were going on in the wetland. In Fig. 2, the majority of the people (52%) were engaged in fishing activities, and minority of the people involved in crop production (28%), recreational activities (8%) and salt production (12%) in the wetland. It was noticed that, the activities in the wetland include construction of houses, cultivation of agricultural products, fishing and other activities. These various activities that are carried out is causing disturbances to the ecosystem function of the wetland.

3.8 Contribution of Wetland to Livelihood

Majority of the respondents (72%), in Fig. 3, said that Songor Wetland offers financial income to them and 28% said it is a source of food in their home. This shows that the communities around the wetland solely depend on the wetland as their financial income and also as a source of their food in their household. This finding shows there could be pressure on the wetland resource since it does not only serve as a food source to the communities around the wetlands, but most also as their financial income.

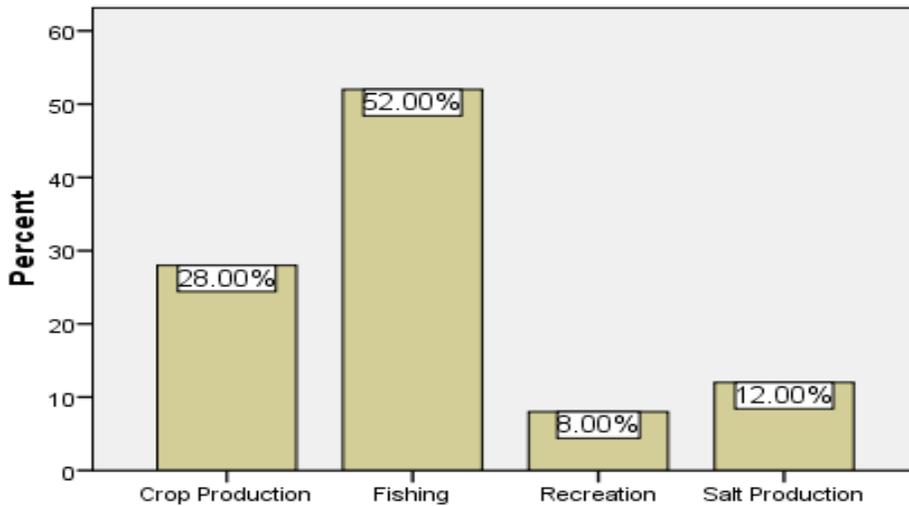


Fig. 2. Socio-economic activities in the wetland

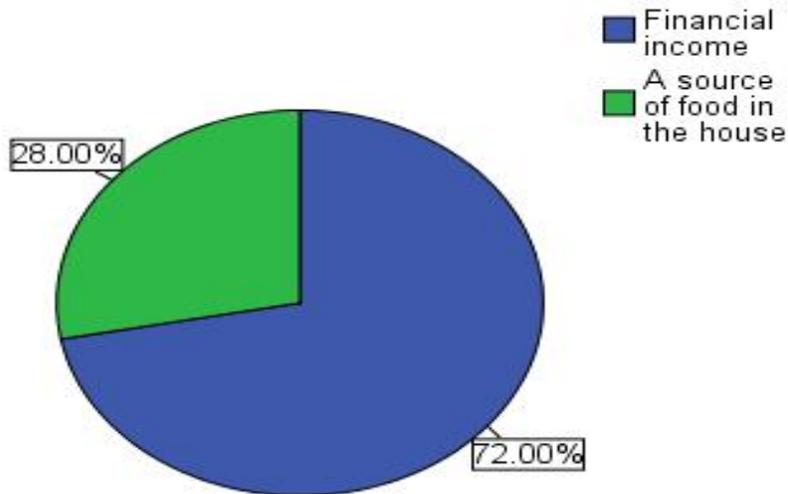


Fig. 3. Contribution of wetland to livelihood

3.9 Building in the Wetland

The respondents were asked why they prefer building in the wetland. Majority of the respondents said that they decided to build on the site in order to have access to the wetland resources; while the minority said that the wetland area is the only land available to them for building. In Fig. 4, most of them (60%) acquired land through inheritance. The rest of the respondents accessed the land by either purchasing (12%) or leasing (28%) it. This shows land acquisition in the wetland is mainly through inheritance and lease. The acquisition of land in the wetland is so flexible leading to the spreading of activities like building construction.

This shows that the land ownership is in the hands of the community folks and restriction of its usage is very difficult. The ease of acquiring the land is responsible for the abuse and misuse of the site as was noted in a study by [10]. Therefore, people have found it easy to carry out activities that degraded the wetland.

3.10 Preferred Place for Socio-economic Activities

Fig. 5 shows that, about 52% of respondents preferred to carry out their activities outside the wetland because the resources are now scarce. However, the minority, representing 48% prefers the wetland because their work hinges on the resources on the wetland.

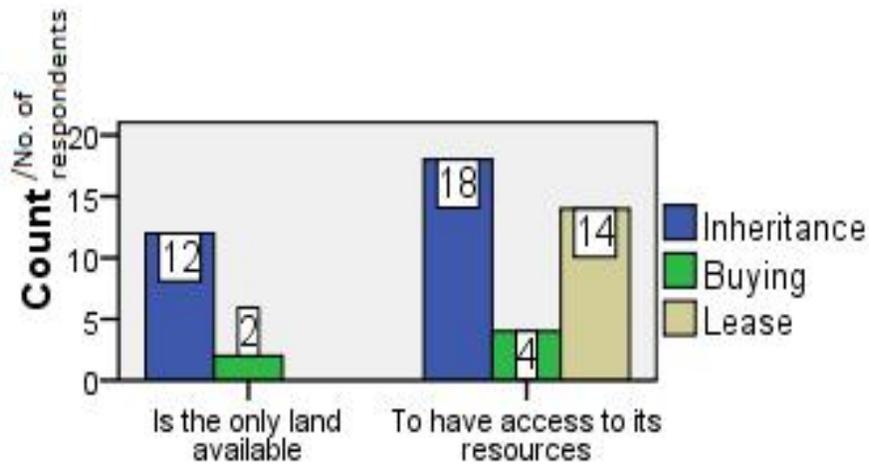


Fig. 4. Reason for building in the wetland

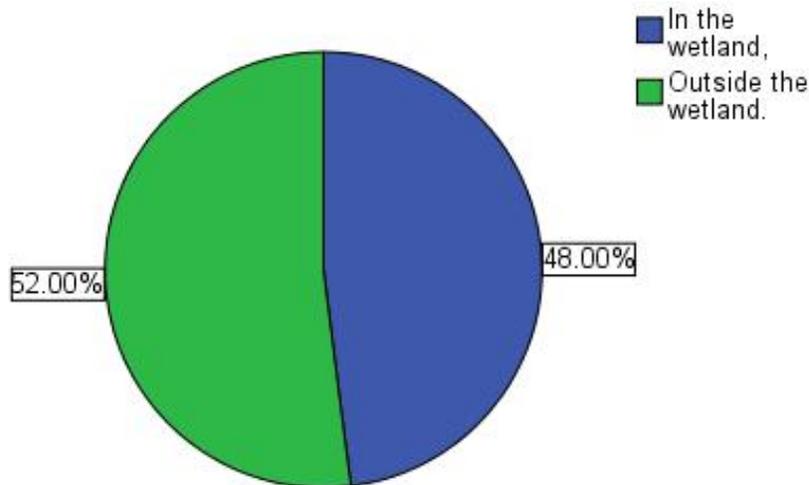


Fig. 5. Preferred place for socio-economic activities

3.11 Making the Wetland Suitable for Building

Fig. 6 represents the response on how the wetland was made suitable for building. Majority of the respondents, 60% said the whole community land was reclaimed with sand to make it suitable for the construction of buildings; however the minority admitted they did nothing before building. It is noted that, wetland is an abode for runoff waters when it rains and also to accumulate flooding waters. Therefore, reclaiming of the wetland for human settlement leaves the runoff waters nowhere to go leading to floods whenever there is high tide and rain.

One amazing result of the study is the revelation by the community members that one of the communities, Azizanya, was a wetland area but was totally reclaimed with sand for settlement of the community. It is not only in the Azizanya community but, this activity occurs in other communities during expansion development of their community. This is just for the reason to get access to the wetland resources. It is rather unfortunate that ignorantly, it is not recognized that by reclaiming the wetland, it would destroy and deprive them of its resources and its protections as well. [15] explained how such activities can have effect on wetland in his studies.

3.12 Harvesting and Measures to Sustain Trees

Majority of respondents, 84%, in Fig. 7 said that harvesting of the trees in the wetland is restricted

whiles the minority representing 16% of the respondents, admitted that they have harvested mangrove in the wetland. For measures put in place to sustain the mangrove and other tree resources in the wetland ecosystem, 64% of the respondents said there are no measures to sustain the plants since harvesting is restricted, while 12% said they replant the trees to replace the harvested ones and on rare occasions do they harvest.

It can be observed that some of the trees were planted but there is encroachment on them. Sustainable management and use of the wetland resource is the best to keep it from degrading as explained by other research works.

3.13 Fish Harvesting in the Wetland

The types of fish harvested in the wetland were represented in the bar chart (Fig. 8). Majority of the respondents representing 86% said that they harvest anchovy and chavali from the wetland while the minority responded that they harvest Tilapia. The data shows the different types of fish habited in the wetland, but continued overharvesting and method of harvesting could lead to it scarcity.

In addition, the community people admitted that, the quantity of the resources they harvest has declined over years. This has been attributed to the abuse or misuse of the wetland. Some of the reasons given are the use of light and chemicals in fishing which have led to a decline in the quantity of fish in the waters.

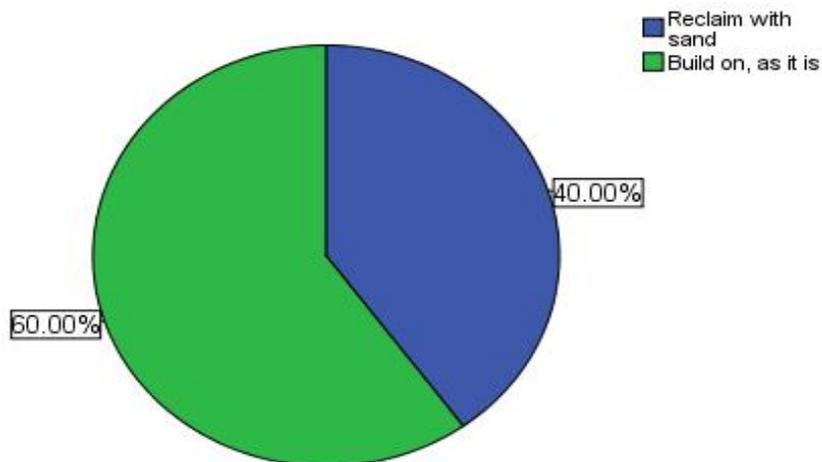


Fig. 6. Making wetland suitable for building

3.14 Using of Chemical in Fishing and Crop Production

In Fig 10, the response on whether they use chemical in fishing was rather a surprise as none admitted the use of chemical, but accused the other communities of using chemicals in fishing. This shows that, they do know that is a bad practice, yet it's still being used in some of the communities in fishing.

The respondents were asked if they do use chemical in their farming activities and their respond is represented in Fig. 9. Majority said they do not use chemicals in their farming. The use of chemical in cultivation of crops is one of the activities that could affect the wetland's ecosystem functions. It would affect the aquatic life as well as the plants in it. This would lead to the degradation of the wetland because it would lose its components and will affect its proper function.

As found out from the research, some members of the study communities use chemical fertilizers in their economic activities such as crop production and fishing. These chemicals could be drained into the wetland and cause effect to its biological function as indicated by [16] and [17].

3.15 Types and Reason for Chemicals use in Farming

Majority of respondents, 62% said they don't use chemical in their farming whiles 28% said they

use NPK 15-15-15 manure for their farm, 4% said they use any type of relevant chemicals available and 2% said they use fertilizers. The reason behind the usage of chemical by some respondents was attributed to the infertility of the land and also to have maximum productivity during harvest. This shows that the overuse and misuse of the wetland has led to the decreased in the nutrient in the wetland as justified by the majority of the respondents.

3.16 Causes of Flooding and Reason

Fig. 11 shows the response of the respondents on whether their community gets flooded. About 96% of the respondents agreed that they were experiencing the problem of frequent floods, whiles only 4% indicated that it does not get flooded. About 34% of the respondents said it is due to the low level of their land, whereas majority of 36% indicated it is due to the blockage of the waterway. About 14% think it is because their houses were built in the wetland whiles 4% said it is due to the high tide of the sea. This finding shows that, the local people were aware of some of the causes of the flooding of their community.

It was revealing from the research that, the major disasters experience in the communities around the wetland is flooding. This indicates that the function of the wetland to protect adjoining communities against flooding and storm attack has been undermined due to human induced degradation as indicate by [18].

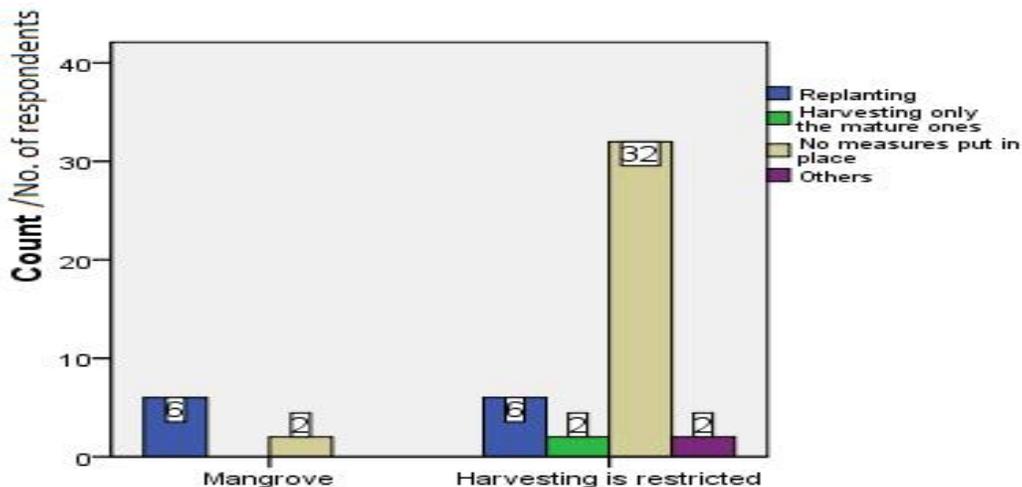


Fig. 7. Harvesting of Trees and Measures to keep it sustained

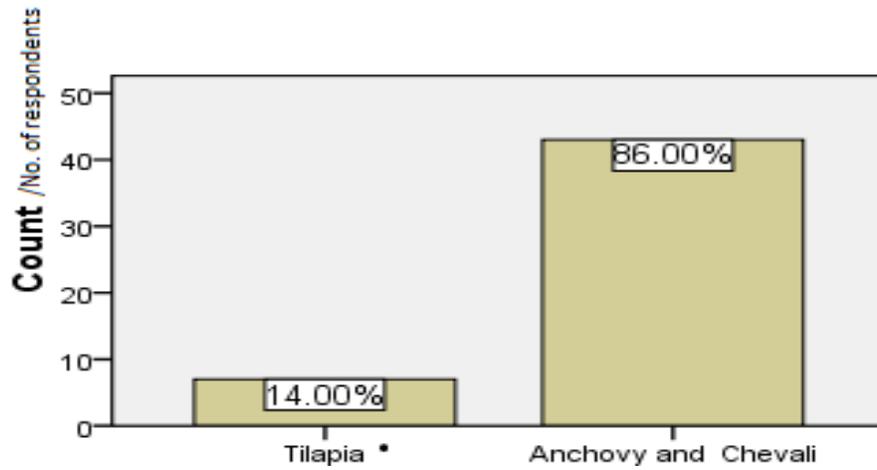


Fig. 8. Types of fish harvest from the wetland

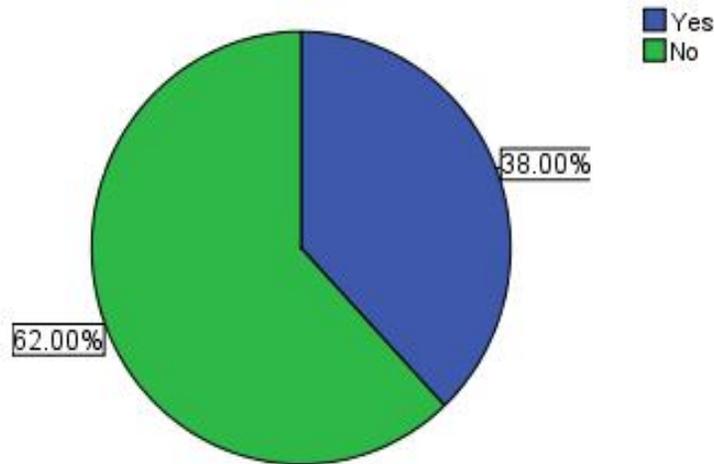


Fig. 9. Chemical use in fishing and farming

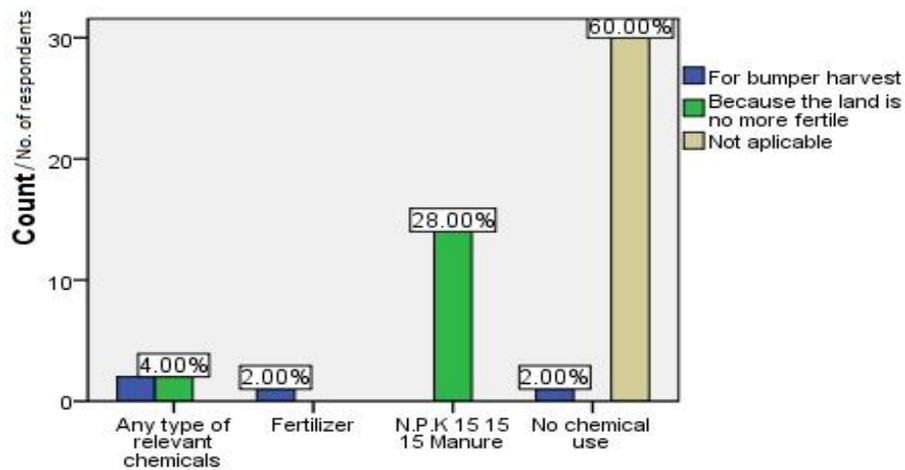


Fig. 10. Chemicals used in farming

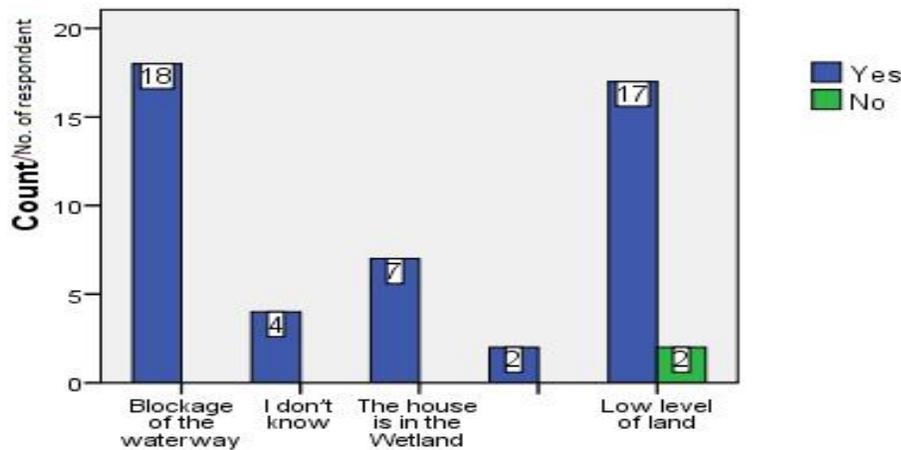


Fig. 11. Flooding of community

4. CONCLUSION

From the result, it is clear that Songor Wetland (Ramsar site) which if sustainably managed can provide ecological and socio-economic benefits to the government and the neighboring communities.

However, even though the site is ratified as a Ramsar site, and is under the management of the Wildlife Division, the public has access to wetland resources and is able to undertake activities that have a bearing on its integrity. This has made it difficult for the management authority to protect the wetland against human induced degradation accentuating the occurrence of environmental disasters like floods. As such, various policies regarding the management of wetlands should be reviewed in order to enhance sustainable utilization of wetland resources some neighbouring communities. It is also vital to promote public awareness of the importance of the site in order to solicit the support of the residents in restoring the wetland. To achieve this, the role of other stakeholders such as environmental and development agencies as well as civil society can be undermined.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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