

Assessing the Niger Delta Residents' Awareness *on Socio-Culture Effect of Wetland Loss*

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Abstract

The degradation of Niger Delta ecosystem is due to activities such as crude oil exploitation, agricultural activities, urbanization among others that affects the socio-culture impact of its dwellers. The study's aim was to assess the Niger Delta residents' awareness on socio-culture effect of wetlands loss. This paper engaged the exploration of literature reviews, the randomly selection of communities in three Niger Delta states which includes Rivers, Bayelsa and Delta state and a questionnaire was utilized with 150 participants. The findings demonstrated that less awareness on the effect of wetland loss has impacted the residents. Also industrial activities have affected the wetlands and the health status of the dwellers where the loss of these wetlands have caused destruction as in flooding which had displaced many dwellers. Effective monitoring and enforcement of existing and new policies on conservation of these wetlands should be prioritized. Consequently there should be increased sensitization and awareness in the communities on environmental protection and conservation.

Keywords: *Wetland, Ecosystem, Degradation, Socio-culture Impact, Niger Delta*

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Introduction

Wetland can be defined as a place which the soil is covered by water and it can be close to the surface of the earth for a whole year. They are valuable and significant ecosystem that provides different ecosystem services such as habitation for wildlife genetic and biochemical materials, cultural services, fuel formation, purification of hydrology water, among many others (Dang et al. 2021). Wetlands are among the most important ecosystem and they are also the most threaten (Hu et al. 2017). According to Nwankwoala & Okujagu (2021), wetlands are sites where water exists either close or at the surface of the soil for a whole year even through the season of planting. Wetlands are the most significant sources of fresh water, serving as both a habitat and a source of food for a variety of aquatic life (Abir 2014) and one of the most vital ecosystems on earth is a wetland, sometimes known as a swamp or a marsh. In terms of global climate change, wetlands like mangroves can provide a haven for a variety of coral species by lowering environmental stress (Stewart et al. 2021). Despite having these advantageous functions wetlands are threatened globally by numerous factors such as climate change and human activities that leads to 64-74% loss since 1900 (Dang et al. 2021). Gucel et al., (2012) described loss of wetlands in Cyprus to be due to high rate human activities such as managing of mosquitoes, pollution, use of drainage and water wetlands for agriculture and construction purposes.

The Ramsar Convention on wetlands defined wetlands to be areas that are fend, peat or water, native or synthetic, mashed, enduring or transient, having either static water or flowing water, brackish or salty, fresh, which includes marine areas with a low tidal depth of no more than 6 meters (Adekola and Mitchell 2011). Ramsar classified wetlands into three categories which includes wetlands in the ocean, on the shore, inland, and artificial (Ramsar Convention Secretariat 2016), they are an integral part of the overall ecosystem and serve a variety of purposes, including the purification and maintenance of the planet's ground and surface water resources as well as numerous services for local communities, local populations, and the overall health of the economy of the country (Edo and Albrecht 2021).

Ramsar Sites in Nigeria

International conventions designated wetlands that are internationally significant to be Ramsar sites, presently there are more 2023 Ramsar sites globally (Popoff et al. 2021). Ramsar Convention emphasizes on the vital importance of wetlands for human welfare, economic growth, cultural values, and recreational activities (Ramsar Convention Secretariat 2016). According to Oluwapamilerin et al. (2009) stated that the enforcement of the existing policies and laws of wetlands in Nigeria is very weak. Figure 1 describes the Ramsar sites in Nigeria and their location.

| Site | Designated Date | Coverage Area (ha) | Location | Coordinates |
|--------------------------------------|-----------------|--------------------|----------|-----------------|
| Apoi Creek Forests | 30 April 2008 | 29 213 | Bayelsa | 5°47'N 4°42'E |
| Baturiya Wetland | 30 April 2008 | 101 095 | Kano | 12°31'N 10°29'E |
| Dagona Sanctuary Lake | 30 April 2008 | 344 | Yobe | 12°48'N 10°44'E |
| Lake Chad | 30 April 2008 | 607 354 | Borno | 13°4'N 13°48'E |
| Lower Kaduna-Middle Niger Floodplain | 30 April 2008 | 229 054 | Niger | 8°51'N 5°45'E |
| Nguru lake marma channel complex | 02 Oct. 2000 | 58 100 | Jigawa | 10°22'N 12°46'E |
| Foge Islands | 30 April 2008 | 4229 | Kebbi | 10°30'N 4°33'E |
| Maladumba Lake | 30 April 2008 | 1860 | Bauchi | 10°24'N 9°51'E |
| Oguta Lake | 30 April 2008 | 572 | Imo | 5°42'N 6°47'E |
| Pandam and Wase lake | 30 April 2008 | 19 742 | Plateau | 8°42'N 8°58'E |
| Upper Orashi Forests | 30 April 2008 | 25 165 | Rivers | 4°53'N 6°30'E |

Figure 1. Table of Ramsar sites in Nigeria (Ayanlade and Proske 2016).

In Nigeria there are eleven freshwater and coastal wetlands designated by Ramsar and has a total number of 1,076,730 ha (Ayanlade and Proske 2016), in which three are located in Niger Delta area. Niger Delta wetlands is number three among mangrove in the whole world while it is the largest wetland in Africa (Ayanlade and Howard 2017). The Niger Delta wetlands are incredibly rich and provide a wide range of services essential for human wellbeing, including a place for and recreation (ecotourism), purifying air and water, regulating climate, regenerating soil, pollination of crop controlling flood, raw material, supplying food, and medicines, energy (Nwankwoala and Okujagu 2021). The ecosystem of the Niger Delta is split into four ecological regions: freshwater swamps, coastal barrier islands, mangrove swamps and lowland rainforest it is a very significant and abundant ecosystem that supports a wide range of native plants and creatures (Mustapha and Ayodele 2016). According to Gucl et al. (2012) man-made or artificial wetlands help in providing significant dwellings for fauna and flora if well managed water resources and biodiversity. Figure 2 describes the importance of Niger delta wetlands. The aim of this study is to assess the Niger Delta residents' awareness on socio-culture effect of wetlands loss in three states in Niger Delta, Nigeria the states includes Rivers, Bayelsa and Delta state, simply the aim is to assess the socio-culture effect of the loss of wetlands awareness of the residents of these three states in Niger Delta.

| Wetlands in the Niger Delta provide or derive important ecosystem functions. | |
|--|--|
| Service Provided | Examples of Niger Delta Wetland Services Offered |
| 1. Food | Thorny meat |
| 2. Construction Materials | Product made from timber such as, building poles fuelwood and chewing sticks, saw logs, bamboo |
| 3. Clean water | Agricultural crops such as yam, cocoa, cocoyam, maize, cassava, rice among others. |
| 4. Fiber and oil | Barnacles, crabs, fish and invertebrates |
| 5. Biochemical | Sea insects |
| 6. Genetic components | Medic species |
| Regulating | |
| 7. Regulating climate | A CO ₂ and CH ₄ reservoir for greenhouse gases are provided |
| 8. Regulating water | Buffers are provided against natural hazards like shoreline erosion and floods are regulated |
| 9. Purification of water and treatment of waste | Water movement, volume and quality are regulated |
| 10. Regulating erosion | Habitat for pollinator |
| 11. Regulating hazard | Natural attenuation |
| Cultural | |
| 12. Inspirational | Source of spiritual inspiration |
| 13. Recreation activities (Eco-tourism and transportation) | Fishing festivals and inland ports transportation which link places |

Figure 2. Importance of Niger Delta wetlands ecosystem service (Edwin-wosu and Dirisu 2022).

Causes of Wetland Loss

According to Amoussou et al. (2022) despite the importance of their ecological, social, and environmental components, wetlands ecosystems are threatened and fragmented due to the combined impacts of human-made activities and climate change. Wetland resources in Nigeria are currently in danger due to a number of human and biological variables, such as a growing population, pollution, urban sprawl, and mining, among others (Olajuyigbe et al. 2015). Tijani et al. (2011) in their research, they discovered, that there is a drastic reduction in the wetland due to the human activities influence such as encroachment, land-use and waste effluent discharges. The nation's main resources such as its crude and gas are located in Niger Delta, which is a major conflict zone that now poses a serious threat to both the nation's economic foundation and national progress (Mustapha and Ayodele 2016).

Since the discovery of crude oil in 1956, terrestrial oil pollution has been one of the main sources of ecological harm in Nigerian region of the Niger Delta and has resulted in a sizable loss of mangroves and arable croplands (Ozigis, Kaduk, and Jarvis 2019). Akujuru (2014) stated that the wetlands in Niger Delta have seen massive contamination from oil pollution, however, it is believed that during the past few decades, ongoing environmental strain brought on by industrial oil extraction and illegal logging has significantly impacted the ecosystems of the Niger Delta (Ayanlade & Proske, 2016; Chidumeje et al., 2015). Most of Nigeria's rural population relies on wetlands for agricultural and fishing activities, re-

source gathering, whose intensity has frequently led to degradation the loss of ecosystem services in Nigeria's wetlands has been made worse (Amoussou et al. 2022). Also Edo & Albrecht (2021) in their paper they reviewed the changes that occur in Niger Delta was due to, human activities i.e anthropogenic activities and the pressure that comes as a result of the large scale oil exploitation and exploration, agriculture, urban sprawl and pipeline installation. The distribution of biodiversity in terms of richness and diversity seems to be steadily declining in recent years. According to Izah et al. (2018) in his study on biodiversity in Niger Delta discovered, the primary causes of biodiversity loss include so much exploitation, industrialization, habitat destruction, urbanization, bushfires, pollution, soil erosion, deforestation, and climate change. The decline in biodiversity has an impact on its functions as a source of plants used for medicine, raw materials for various works of art and construction activities, shelters, mineralization of nutrient through cycles of biogeochemical, protein loss in animal, and species of global importance.

Adekola et al., (2015) in their study they compiled research and organized it using the framework for Drivers' Pressure, State, and Impact Response (DPSIR) to discuss how the ecological services provided by wetlands are changing and what it means for reliant communities in Niger Delta they discovered the drilling for oil and gas, dredging, water pollution introducing exotic plants, migration of fish, and reclaiming wetlands, diminishing ecosystem services. Urbanization has also caused the loss of wetlands by resulting in the conversion of wetlands, vegetation, and fertile agricultural land to urban settlement, as well as an increase in impervious areas, even to the point of eradicating some land use/cover characteristics, like drainages (Mustapha and Ayodele 2016). Another threats faced by Niger delta wetlands is management of sustainable water supply, the demand for water is very high and despite being a wetland there is an inadequate supply of water (Chukwu 2015), damages in a part of wetland does not only have effect on the wetland, but it has a severe impact on the entire wetland environment, and consequently, the population of people and animals (Olajuyigbe et al. 2015). Threats of wetlands are shown in Figure 3.

| Factors | Threats |
|-----------------------------|--|
| 1. Aquaculture | Mangroves and their abundant biodiversity loss that results it effects on livelihoods |
| 2 Oil exploration | Narcotic effects, fish death and other faunal organisms, turbidity increases, obstruction of filter feeding mechanisms, a decrease in plant photosynthetic activities as a result of reduced light penetration. |
| 3. Excavating | Increased erosion and siltation, topographical changes, estuarine acidification, heavy metal pollution, tremendous flooding and ponding of the back swamp, direct engulfment and eradication of fringing mangroves and the fauna associated with them, direct eradication of fringe mangroves and their associated fauna, and the switch to freshwater vegetation are all factors. |
| 4. Damaging behaviors | High form of decrease in sediment and flow of water |
| 5. Human activities | Loss of wildlife and plants (including deforestation overfishing, logging) |
| 6. Reclaiming wetlands | Flora and fauna loss (agriculture and urbanization) |
| 7. Change in climate | Flooding, sea level rise, and the destruction of life and property |
| 8. Industrial and | Pollution of the soil and water, oil spill domestic runoff |
| 9. Uncontrolled application | Water pollution of fertilizer |

Figure 3. Wetland Threats in Niger Delta (Nwankwoala and Okujagu 2021).

Methods and Materials

Study Area

The Niger Delta is located in the down portions of the River Niger, between the coordinates of 5.32611°N 6.47083°E and 05°19'34"N 06°28'15"E is the Southern Atlantic Coast of Nigeria. (Chidumeje, Lalit, and Subhashni 2015) as shown in Figure 4. Geo-politically, the Niger Delta is made up of Bayelsa, Cross River, Akwa Ibom, Rivers, Abia, Edo, Delta, Imo, and Ondo state as shown in Figure 4. The region covers about 12% total surface area of Nigeria's. The Niger Delta is a low-lying region in the southern part of Nigeria, in the Gulf of Guinea, at about 3.5 meters above sea level. The Niger Delta is a complex web of waterways and creeks. Mangroves, swampy watery areas, and rainforests and descended savannah are just a few of the several types of vegetation that make up the environment of Niger Delta, together with the brackish lagoons and river systems, man-grove vegetation covers the Niger Delta's coastal region. For the maintenance of this biodiversity, the ecological resources of the Delta must be protected. Niger Delta is situated at Atlantic coast of Southern part of Nigeria's (Elekwachi et al. 2019) (Figure 4).

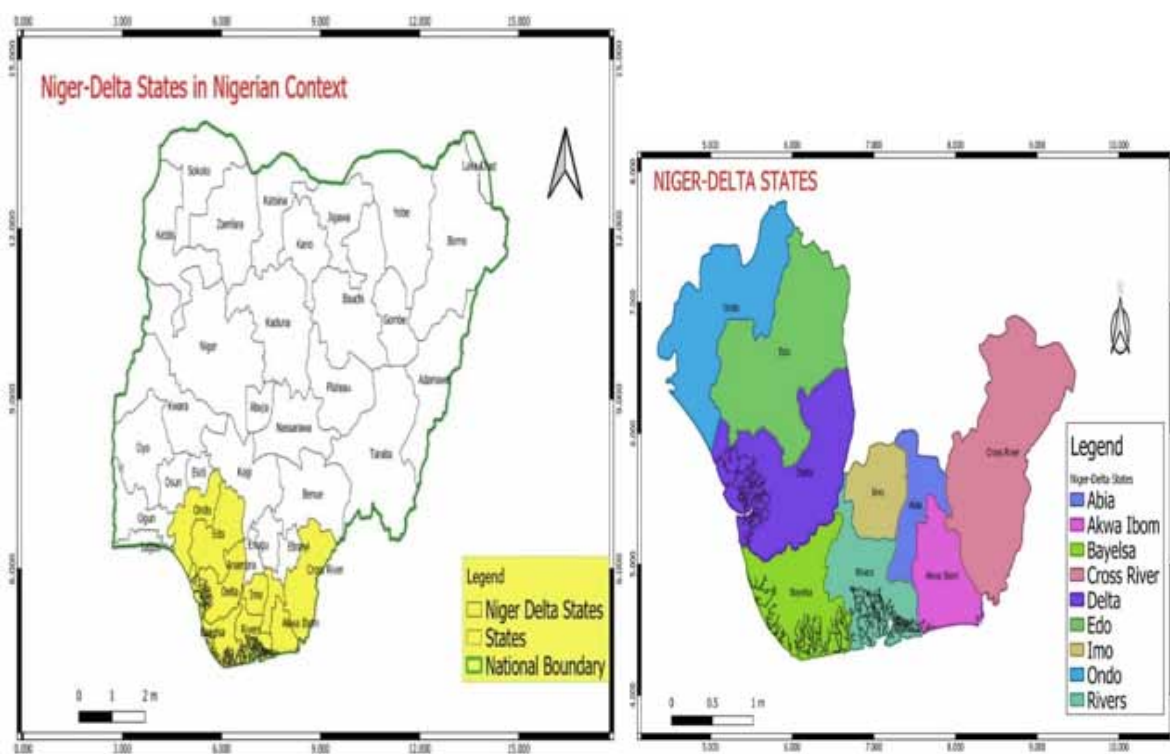


Figure 4. Left, map of Nigeria in context of Niger Delta. Right, Niger Delta states.

For the local inhabitants and the country as a whole, the Niger Delta wetland ecosystem is extremely important economically. Both aquatic and terrestrial biodiversity are abundant in the area, which also provides a major source of income for rural residents and maintains the ecosystem (Chidumeje, Lalit, and Subhashni 2015). Its average temperature monthly is 27°C, and there are between 3000 and 4500 mm of rain each year. The area is home to many indigenous species of mammal, reptile, amphibian, bird, a microorganism, fish, and species of moss, liverwort, pteridophyte, gymnosperm, chlamyosperm, monocotyledon, and dicotyledon species (Izah, Aigberua, and Okechukwu Nduka 2018).

Research Questions

- How has loss of wetland affected the dwellers of Niger Delta communities?
- Is there any enacted policies and regulations enacted and implemented to protect wetlands in this areas?
- What are the communities’ economic benefits of the extensive income derived from crude oil production?

Methodology

The study questionnaire was conducted in communities of three (3) states in Niger Delta which are River state, Bayelsa state and Delta state. It was distributed randomly among the residents of the communities.

Research Design

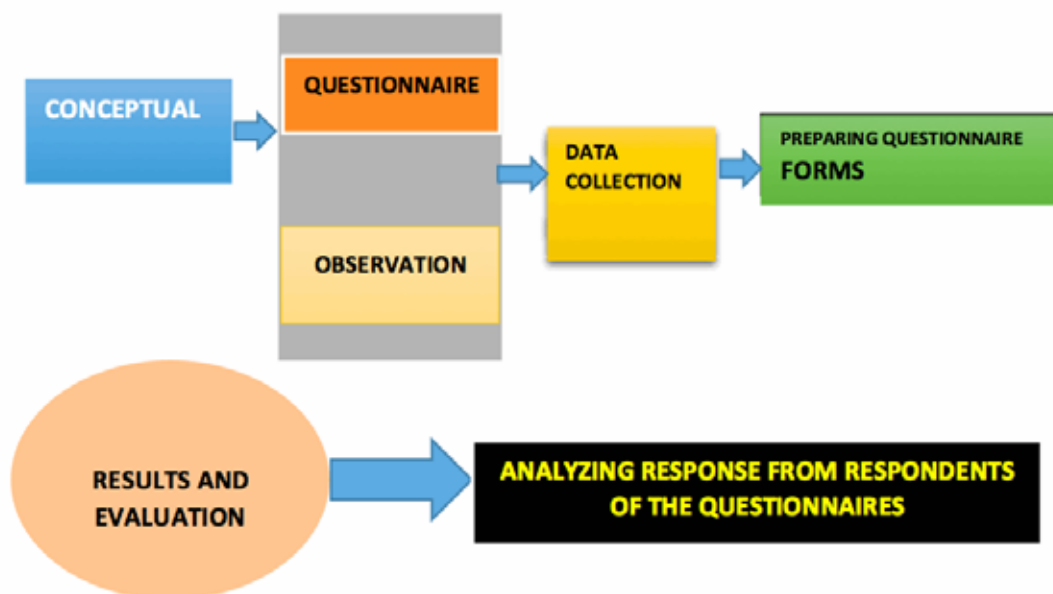


Figure 5. Research Design.

Questionnaire Administration and Content

The instrument that is used in this study is the questionnaire instrument. Data was obtained via an interview-like form of questionnaire to investigate the study's conceptual model.

The questionnaire was issued randomly to some communities and it was input manually into SPSS, where the platform helped with the analysis of collected data.

The Questionnaire was divided into two sections Section A which is titled as “socio-demographic data” they include four questions and Section B “effect of wetland loss on inhabitant” investigates the effect of the loss of wetlands on the dwellers of Niger Delta, they include nine questions, Likert scale was adopted in all questions, (strongly agree, agree, unsure, disagree, and strongly disagree).

Results

This is targeted at the residences of communities in Niger Delta. A total of 150 residents completed the questionnaire were 50 was for each states.

First Section of Questionnaire

The first section of the questionnaire covered the demographics of the respondents, such as gender and age, number of years living in Niger Delta with socioeconomic information including occupational status. The results shows the following:

Section A 1: Gender and Age

The result of the chat in Figure 6 below indicates the G of resender and Age of respon- dent that live in Rivers, Bayelsa and Delta, state was majority of the contacted were young people between ages 26-40 years and they are male.

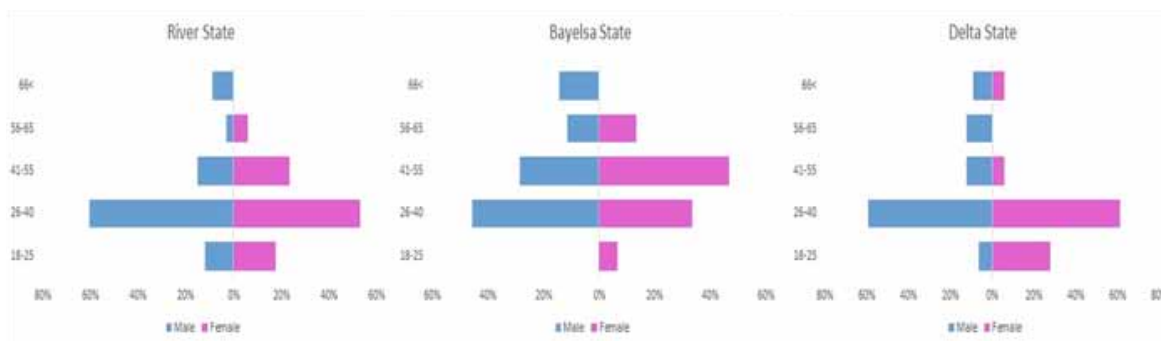


Figure 6. Age and gender distribution in three states.

Section A 2: How long have you been living in Niger Delta

The result of the chat in Figure 7 below indicates the duration of respondent that live in Rivers, Bayelsa and Delta state, were majority of those contacted lived for more than 10 years and they are male.

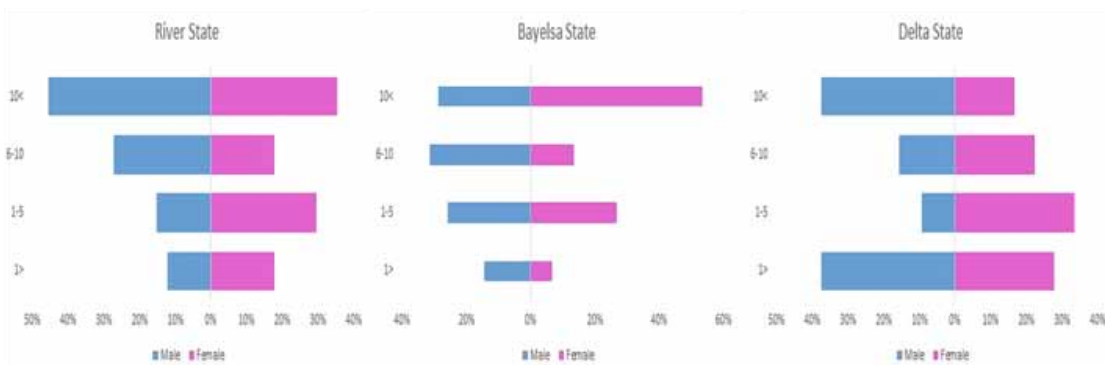


Figure 7. Duration of living in the Delta.

Section A 3: Occupation

The result of the chat in Figure 8 below indicates the occupation of respondent in Rivers, Bayelsa and Delta state were majority of those contacted are employed followed by farmers and fishers.

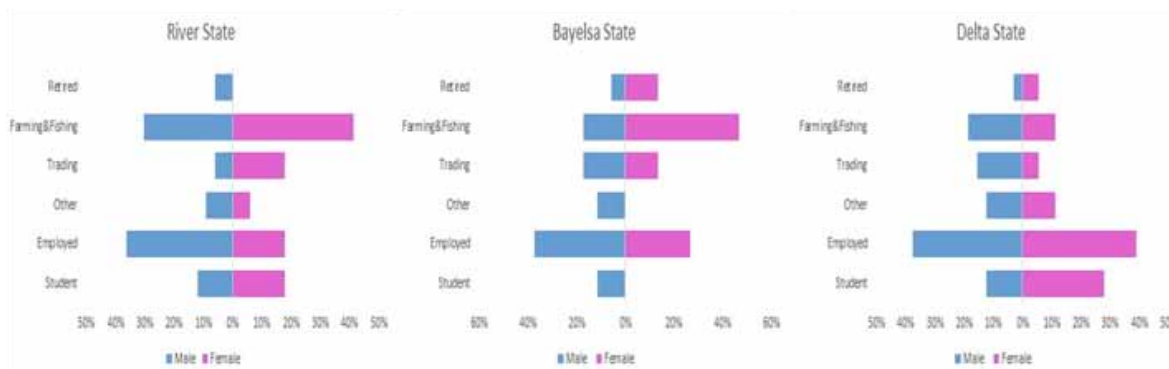


Figure 8. Occupation in the Delta.

Second Section of the Questionnaire

The second section of the questionnaire covered the effect of wetland loss on inhabitants. The results shows:

Section B 1: Wetlands in the community has been converted to others activities

47.3% strongly agreed that wetlands in the community has been converted to others activities, 20% agreed, 20% are unsure, 7.3% disagree, 4% strongly disagree, while 1.4% has no response.

Section B 2: Wetlands are affected by the industrial activities in my community

42.7% agreed that wetlands are affected by the industrial activities in the community, 35.3% strongly agreed, 8.7% were unsure, 8% strongly disagree and 5.3% disagree.

Section B 3: Flooding and other natural disasters has affected my community

48.7% agreed that flooding and other natural disasters has affected their community, 32% strongly agreed, 8.7% disagree, 5.3% strongly disagreed and 5.3% are unsure.

Section B 4: Biodiversity in my community has been sent into extinction due to excessive mining activities

38.7% agreed that the biodiversity in their community has been sent into extinction due to excessive mining activities, while 32% strongly agreed, 16.7% are unsure, 7.3% disagreed and 5.3% strongly disagreed.

Section B 5: No adequate measures has been taken by the government to preserve biodiversity in my community

34.6% agreed that no adequate measures have been taken by the government to preserve biodiversity in the community, 21.3% disagreed, 18.7% are unsure, 18% strongly agree and 7.4% strongly disagreed.

Section B 6: My family health and my health has been affected by the oil and other fossil fuel exploration and exploitation in my community

44% agreed that their family health and their health has been affected by the oil and other fossil fuel exploration and exploitation in the community, 33.3% strongly agreed, 12% unsure, 8% disagreed, 2.7% strongly disagree.

Section B 7: Light, heat and noise pollution has affected agricultural activities in my community

44% agreed that light, heat and noise pollution has affected agricultural activities in my community, 35.3% strongly agreed 10.7% are unsure, 5.3% strongly disagreed, 4.7% disagreed.

Section B 8: My community has benefited economically from the huge income of the oil sector in Niger Delta

32% disagreed that their community has benefited economically from the huge income of the oil sector in Niger Delta, 20.7% unsure, 16.7% agreed, 17.3% disagree, 13.3% strongly agreed

Section B 9: Global warming has displaced residents and biodiversity in my community

42.7% agreed global warming has displaced residents and biodiversity in my community, 32% strongly agreed, 13.3% are unsure, 8% disagree, 4% strongly disagree.

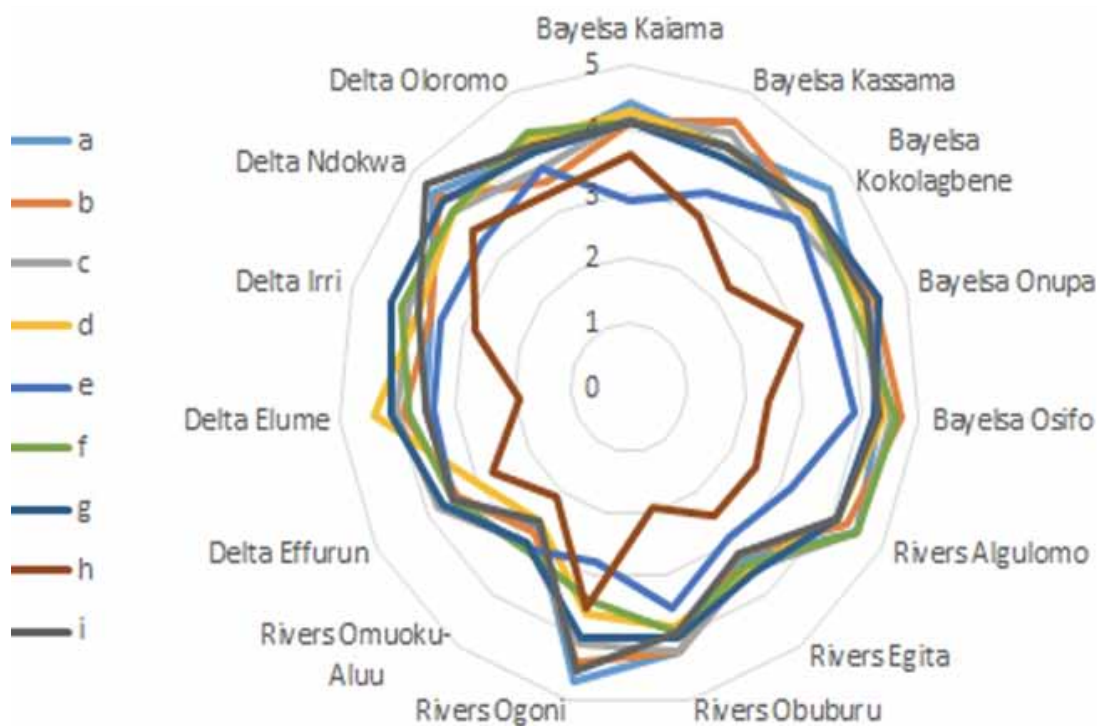


Figure 9. Comparison of the demographic differences.

- (a) Wetlands in my community has been converted to others activities
- (b) Wetlands are affected by the industrial activities in my community
- (c) Flooding and other natural disasters has affected my community
- (d) The biodiversity in my community has been sent into extinction due to excessive mining activities
- (e) No adequate measures have been taken by the government to preserve biodiversity in my community
- (f) My family health and my health has been affected by the oil and other fossil fuel exploration and exploitation in my community
- (g) Light, heat and noise pollution has affected agricultural activities in my community
- (h) My community has benefited economically from the huge income of the oil sector in Niger Delta
- (i) Global warming has displaced residents and biodiversity in my community

Discussion

Research results indicated that Omuoku-Aluu community in rivers state has less awareness on the effect of wetland loss; followed by Egita community next is Effurun community in Delta State (Figure 10). Communities with less awareness is due to little or no sensitization on wetlands loss, whereby the dwellers engage in deforestation, agricultural runoff and improper waste disposal, as a result they experience extreme flooding, loss of livelihood, loss of biodiversity and health issues.

Urbanization and infrastructure development plays a role in the loss of wetlands in Niger Delta were rapid growth cities has conversion of wetlands into settlements and industries from the study results the respondents agreed that wetlands have been converted to others activities and there are no adequate measures taken to preserve biodiversity in their community. The results also indicate that global warming affects the dwellers of these communities. The impact of global warming and climate change also exacerbates Niger Delta Wetlands. The results indicated that most of the respondents from Rivers State are mainly live on farming and fishing (Figure 9). It was clear that too much agricultural activities led to the loss of wetland and this is due to their less awareness of the implication of these activities.

On the other hand, Figure 8 shown that they respondents have been living in these communities for more than 10 years which they were engaged with these activities for long.

We can summarize the answers to some survey questions as follows:

How has loss of wetland affected the dwellers of Niger Delta communities?

From the result 47.3% strongly agreed that wetlands in their community have been converted to other activities and 42.7% agreed that industrial activities have affected wetlands in their communities, this depicts the rate of wetland loss. According to Uchegbulam et al., (2022) gas flaring has led to anthropogenic emission, acid rain and more than 250 different toxins has affected the living and health condition of the communities and its biodiversity, which has also caused climate change and global warming for the entire global communities. The loss of wetlands has caused destruction such as flooding which has displaced dwellers of Niger Delta (Loveline 2015).

Is there any enacted policies and regulations enacted and implemented to protect wetlands in this areas?

There is an extreme resistance in protecting areas in many communities in Niger Delta due to the defendant on natural resources by the residence. According Offiong et al. (2018) there is an ineffective implementation of policies despite several efforts placed by the government such as Niger Delta Development Commission (NDDC) and other regulatory frame work.

What are the communities' economic benefits of the extensive income derived from crude oil production?

The result of the questionnaire shows that the dwellers of this communities have not benefited from the extensive income derived from crude oil production, also as described by Okolo & Anthony (2022) that most of this communities still live in abject poverty despite the huge revenue it contributes to the of Nigeria economy. Amnesty program was initiated

in 2009 to eradicate Poverty but it yielded no effective result (Falana, Adedun, and Familoye 2022). According to Ebegbulem et al., (2022) poverty has become a way of life which is a call for concern in the region.

Recommendations and Conclusion

1. Awareness and sensitization of the communities: the residence should be sensitized on environmental protection and conservation; they should also be able to report the cases of oil spillage.
2. Policies: both national and international organization (IUCN, Ramsar, NESREA, Oil companies) should enacts compulsory polices on pollution. National environmental bodies should enforce acts and legislations that must be strictly adhered to by both the companies and the community.
3. Adequate monitoring and management: there should be adequate monitoring of oil pipelines and wells in case of oil spillage, illegal discharge of crude oil should be monitored and it can be monitored through remote sensing and Geographical information sensing techniques.
4. Sustainable management of wetlands: sustainability is an approach that can be used in the protection of wetlands in Niger Delta area.
5. Industrial management: industries should work on their management system in other to be able to improve on pollution of non-print substances on wetlands
6. Resources: alternative source of energy should be employed in other to mitigate or constrain the total dependence on fossil fuels by the country at large.
7. Ramsar: Only three wetlands are designated by Ramsar in the Niger Delta, more wetlands from the Niger Delta should be included among the Ramsar sites.
8. Wetland conservation and restoration: conserving and restoring wetlands are very important component in the protection of wetlands from human threat.

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