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ASSESSMENT OF FLOOD VULNERABILITY IN YENAGOA, BAYELSA STATE, NIGERIA

***OLUKU, S. IDEHEN, O.F. AND MISSION, A.Z.**
Department of Geography and Regional Planning, Igbinedion University, Okada, Edo State, Nigeria
*Corresponding author: oluku.sunny@iuokada.edu.ng

Abstract
This study investigated the assessment of flood vulnerability in Yenagoa, Bayelsa State, Nigeria. Multistage sampling and simple random sampling techniques provided the sampling framework for administration of 400 questionnaires across the entire sampling/spatial unit. Descriptive statistics, 5-points and 3-points Likert scale framework were deployed in data analyses and presentation. The study found that inadequate drainage network, lack of proper planning, overflow of river(s), construction work in the area and lack of effective legislation were most perceived factors of flooding in Yenagoa. Similarly, sickness/water borne diseases, blockage of access road(s), destruction of shrines/sacred areas as well as reduction in business income, slow down development activities and displacement of families were the most perceived effects of flooding in Yenagoa. Besides, looking for alternative source of livelihood/ income, construction of drains/drainages, forming of local groups in order to address the issue, the use of sand bags and dependent on government support were the most adopted flood coping strategies across the communities assessed in Yenagoa. The study recommended that there should be immediate construction of earth dams to trap excess water. Also, mitigation measures such as good drainage system, proper waste management systems should be highly promoted. This will go a long way in enhancing community resilience and drastically reduce flood vulnerability.

Key Words: *Assessment, Flood, Vulnerability, Disaster*

Introduction

Flood is one of the natural disasters that affects people, society and economies worldwide. Flood events often lead to damages and loss of human life and livelihood sources, deterioration of environment and retardation to development (Wizor and Week, 2014). Approximately 80% of the world's population spread across just fifteen (15) nations suffers from severe impact of flooding annually. India, Bangladesh and China topped the list while over 167,000 people in the United States of America (USA) are exposed to flooding every year. Nigeria occupied the 10th position in terms of food occurrence and vulnerability annually (Luo *et al.,* 2015).

In sub-Sahara Africa, there is virtually no country without it fair share in terms of

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impacts of flooding. Within the last three decades, more than 654 flood events have been reported. These have led to over 13,000 deaths with more than 38 million people vulnerable in the region (Tiepolo, 2014). In Northern African, in Egypt, 26 people were killed and 72 others wounded in several flood events that ravaged the Assuit, Red Sea, Sohag, South Sinai and Qena regions of Egypt around October and November, 2016. Not less than 32,500 inhabitants from about 6,500 households were exposed to food shortage, water and sanitation as well as accommodation problems (International Federation of Red Cross and Red Crescent Societies [IFRC], 2016).

In Southern Africa, Ongwediva (2017) reported that about 23,581 students in Namibian region of Omusati were forced to stay at home to avert the effect of flooding. Floods have inundated more than 67 schools due to heavy and continued rainfall. The floodwater took over several lecture theatres in Ohangwena Region disrupting academic activities in the affection schools. In the Eastern African nation of Kenya, over 211,000 were dislodged from their homes, 72 killed and 33 wounded since March 2018. Turkana, Tana River, Garissa, Isiolo, Kisumu, Taita, Mandera, Wajir, Marsabit, West Pokot, Samburu and Narok were reported to be highly vulnerable to flood disaster.

In Nigeria, flood event is not alien. In the last four decades, the country has recorded several numbers of devastating flood events (flash flood, urban floods, channel floods, back-swamp floods, coastal inundation etc.) with severe consequences. The flood event of 2012 shook the nation's human and capital resource base. Heavy rainfall and Lagdo Dam failure in Northern Cameroon were responsible for the 2012 flooding (Eyers *et al.*, 2013).

However, the National Emergency Management Agency (NEMA) reported that about 30 of the 36 States of Nigeria were affected by the 2012 flood disaster. About 7 million people were affected in these states, 597,476 houses destroyed, 2.3 million people displaced and 363 death were reported. Also, several farmlands and means of livelihood, animals and biodiversity were also gravely impacted (NEMA, 2013). The Department of Petroleum Resources (DPR) cited by Nwachukwu and Kalejaye (2012) reported that the country also lost about 500,000 barrels of crude oil output per day due to the severe flooding (Nwachukwu and Kalejaye, 2012).

Vulnerability depends on the character, magnitude, and rate of climate variation to which a location is exposed, its sensitivity, and its adaptive capacity (IPCC, 2007). In rural areas, exposures, sensitivities and adaptive capacities are replicates of the inherent mechanisms determining local level vulnerabilities (Fussel, 2007). The higher the individual, household of community adaptive capacities, the less vulnerable they are to climate-related hazards (IPCC, 2007). Rahman (2014) linked flood vulnerability to poverty, lack of knowledge, low livelihood sources, lack of insurance, weak institutions and problems with emergency response and early warning preparation. Vulnerability to flood is multidimensional and based on robustness and capability of integrating the three principal components. Extreme weather events including heat waves, droughts and flooding among others have been occurring globally manifestations of climate change and global warming. On the whole, African countries are

recognized to be highly vulnerable to climate related hazards including flooding (Niang *et al.*, 2014). To contain flooding, measures such as flood sensitisation campaigns, flood mapping and flood vulnerability studies were recommended by NIHSA (Nnodim, 2018). Flood vulnerability assessment in Yenagoa is therefore, one of such attempt to respond to the clarion call made by NIHSA. Assessment of the vulnerability to flooding is not only apt but necessary to forestall continued loss of life, properties and biodiversity. This formed the prime motivation for this paper in order to support policy and decisions towards a workable adaptation agenda.

Study Area

Yenagoa Local Government Area is one of the eight (8) LGAs which constitute Bayelsa State. Geographically, the LGA is located between latitudes 4° 49′ 34.137″ – 5° 23′ 58.595″ North of Equator and longitude 6° 8′ 21.249″ – 6° 37′ 39.766″ East of Greenwich. With a total land area of about 711.024 km^2 (National Population Commission, 2010). Yenagoa is bordered in the north and by Rivers State as well as Ogbia and Southern Ijaw LGAs in the south. Also, in the west, the LGA is neighboured by Kolokuma/Okpokuma as seen in Figure 1.

The Niger Delta region, which Yenagoa is a part of, comprises of the area covered by the natural delta of the River Niger and the areas to the east and west, which also produce oil. Its approximate northern boundaries are located close to the bifurcation of the Niger River at Aboh, while the western and eastern boundaries are around the Benin River and the Imo River, respectively. Land elevation is generally less than 50 meters above mean sea level and there is a marked absence of imposing hills that rise above the general land surface (Aweto, 2002).

Yenagoa falls under the equatorial climate and it is characterised by high temperature. Average daily temperature is 27°C. The sun is high throughout the year. Rainfall is characteristically double maxima, with the two peaks often occurring in July and September. Annual rainfall amount is usually above 2000mm. The area is heavily cloudy coupled with high relative humidity, especially during the wet season (Ibaoya, 1991).

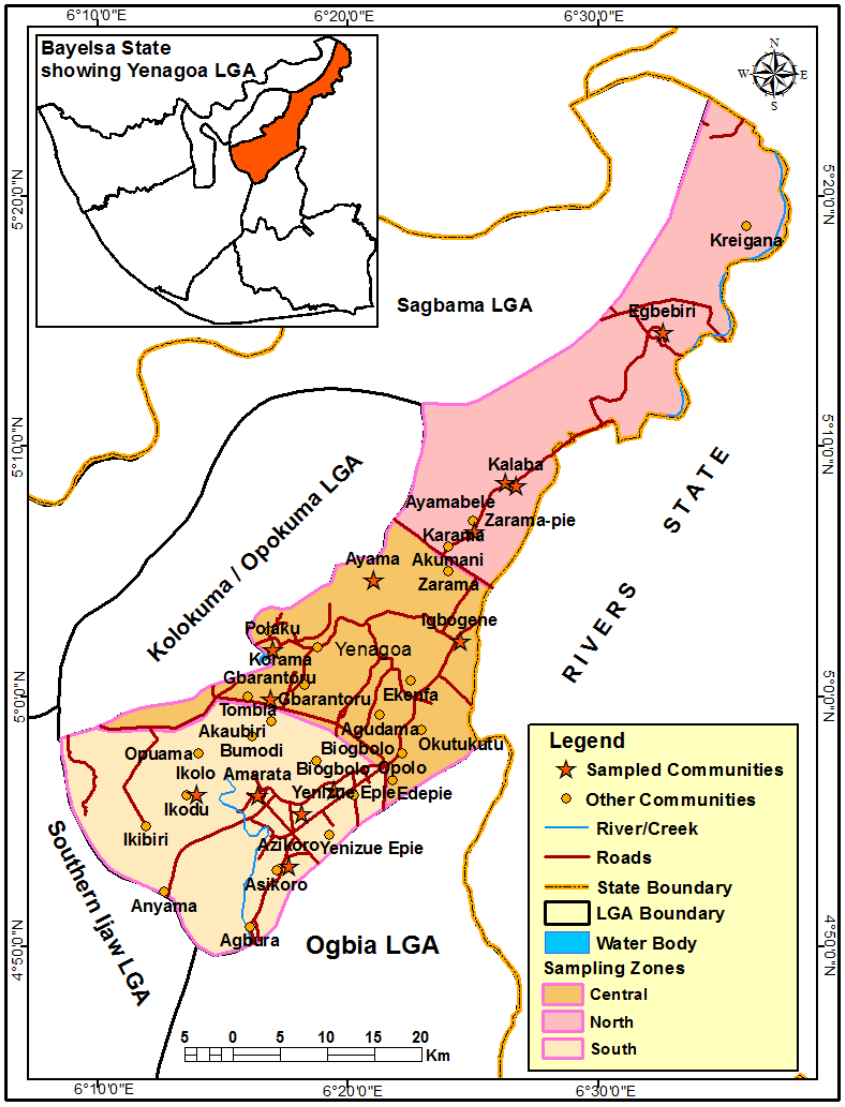

Fig. 1: Yenagoa LGA Showing Sampling Zones and Communities

Methodology

The 1991 census revealed that there are about 72 gazette communities in Yenagoa. However, 13 of the flood prone communities were selected, representing 19% of the communities in the LGA. Cooper and Schindler (2003) as cited in Fab-Ukozor and Ejem (2015) asserted that 5% of the population is ideal for a sample size, and anything that exceeds 5% may be useful for good statistical inference.

In 2006, the population of Yenagoa was 352,285 people. Given that the population of any place is not static but dynamic, the 1991 population of the selected communities was projected to 2019 using 3.5% annual national growth rate provided by NPopC in 2018. This gave a total figure of 66,042 which therefore, forms the population for the study. In this study the sample size was determined using Yamane method (Imperial Writers, 2016). The method

ensures that questionnaire distribution is proportional to population size. Brown (2007) recommended the use of this method when the population is known. Yamane equation is as follows.

$$n = \frac{N}{1+N\,(e^2)} \quad \text{- - - - - - equation 1}$$

Where N, is the population size,
n is the sample size,
1 is constant
e is the allowable error margin of 0.05 level of significance will be used. Given that;
N = 66,042
n = ?
e = 0.05 therefore, $n = \frac{66{,}042}{1+66{,}042\,(0.05^2)} = \frac{66{,}042}{1+66{,}042\,(0.0025)} = \frac{66{,}042}{165.1075} =$ 399.99
n = 400

Multistage sampling methods was used to select the 13 study communities and 400 respondents. In the first stage, Yenagoa was divided into three zones namely north, central and south. In the second stage, at least 4 flood-prone communities were randomly chosen in each zone. In the final stage, simple random sampling was then deployed to select the 400 respondents in sampled community based on the ratio of their population distribution. The distribution is shown in Table 1.

Table 1: Distribution of Sampled Communities and Number of Respondents

Zones	Sampled Communities	1991 Male	1991 Female	1991 Total	2019	No of Respondents
North	Egbebiri	765	766	1531	4011	24
	Kalaba	1048	1019	2067	5416	33
	Zarama-Epie	1339	1144	2483	6506	39
Central	Ayamabele	513	528	1041	2728	17
	Igbogene	1960	1576	3536	9265	56
	Gbarantoru	402	428	830	2175	14
	Polaku	1044	913	1957	5128	31
	Ayama	504	468	972	2547	15
South	Biogbolo	932	690	1622	4250	26
	Yenizue-Epie	582	493	1075	2817	17
	Amarata	1777	1779	3556	9317	56
	Azikoro	1393	1150	2543	6663	40
	Ikolo	1050	942	1992	5219	32
		13,309	11,896	25,205	66,042	400

Source: Projected by the researcher from 1991 Census

The questionnaire consists of four sections. Section A covers the demographic information of the respondents while Section B consists of information on factors of flooding. Also, Section C dwelled on effect of floods on

socio-ecological systems while Section D focused on flood hazard coping capacities. The questionnaires were administered to respondents with the assistance of the community leadership. The filled questionnaires were retrieved immediately from the respondents to avoid misplacement.

Results and Discussion

Floods are caused by several human and environmental factors. However, knowledge of the flood instigating factor is a function of how long people reside in a particular place as well as the experience of flooding itself. In this paper, attempt was made to the duration of respondents stay in Yenagoa. The findings as seen in Table 2 indicate that majority of the sampled respondent, 125 (31.4%) affirmed that they have resided in Yenagoa between *6 – 10years*. This is followed by 118 (29.6%) respondents who claimed they have settled in the area between *11 – 15years*. Conversely, 78 (19.6%) and 77 (19.3%) reported to have resided in the area between *0 – 5years* and *16years and above* respectively. Thus, when asked whether respondents have experienced any flooding in their community, all of them overwhelmingly responded in affirmative "Yes" mean that flooding is part and parcel of the area.

Table 2: Distribution of Respondents by Duration of Stay in Yenagoa LGA

Duration	Frequency	Percent	Cumulative Percent
16years and above	77	19.3	19.3
11 – 15years	118	29.6	49.0
6 – 10years	125	31.4	80.4
0 – 5years	78	19.6	100.0
Total	398	100.0	

Nevertheless, a total of 12 factors capable of instigating flooding were extracted from the literatures and field surveys. The sampled respondents were required to rate 12 factors capable of causing flooding in the area. The extent to which each of the factor can lead to flooding were rated on a five point Likert scale based on the respondents duration of stay in the area, experiences and perception on the subject. The Likert scale ranged from Strongly Agree (SA), Agree (A), Undecided (UD), Disagree (D) and Strongly Agree (SD) which were weighted 5, 4, 3, 2 and 1 in that order.

The results highlighting the human – environmental factors causing flooding in Yenagoa based on their Likert weighted means score (WMS) is presented in Table 3. Thus, taking a critical look into Table 3, it could be seen that 174 (43.7%), 165 (41.5%) and 177 (44.5%) respondents *Strongly Agreed (SA)* to *inadequate drainage network, lack of proper planning* and *dumping of refuse in gutters* in that order as perceived factors of flooding in Yenagoa.

Table 3: Frequency Distribution of Factors Causing Flooding in Yenagoa

Flood Factors		Extent of Agreement					Total
		Strongly Agreed	Agreed	Un-decided	Disagree	Strongly Disagree	
Inadequate drainage network	Frequency/Percent	174 (43.7)	154 (38.7)	38 (9.5)	26 (6.5)	6 (1.5)	398 (100)
	Weighted Frequency	870	616	114	52	6	1658
Lack of proper planning	Frequency/Percent	165 (41.5)	162 (40.7)	40 (10.1)	22 (5.5)	9 (2.3)	398 (100)
	Weighted Frequency	825	648	120	44	9	1646
Dumping of refuse in gutters	Frequency/Percent	177 (44.5)	142 (35.7)	37 (9.5)	36 (9)	6 (1.5)	398 (100)
	Weighted Frequency	885	568	111	72	6	1642
Overflow of river(s)	Frequency/Percent	177 (46.3)	165 (43.2)	17 (4.5)	17 (4.5)	6 (1.6)	398 (100)
	Weighted Frequency	885	660	51	34	6	1636
Construction work in the area	Frequency/Percent	163 (41)	149 (39.7)	51 (12.8)	26 (6.5)	9 (2.3)	398 (100)
	Weighted Frequency	815	596	153	52	9	1625
Lack of effective legislation	Frequency/Percent	153 (38.4)	166 (41.7)	46 (11.6)	12 (3)	21 (5.3)	398 (100)
	Weighted Frequency	765	664	138	24	21	1612
Deforestation	Frequency/Percent	160 (40.2)	142 (35.7)	60 (15.1)	27 (6.8)	9 (2.3)	398 (100)
	Weighted Frequency	800	568	180	54	9	1611
Building on natural waterways	Frequency/Percent	155 (38.9)	149 (37.4)	51 (12.8)	35 (8.8)	8 (2)	398 (100)
	Weighted Frequency	775	596	153	70	8	1602
Heavy/ prolonged rainfall	Frequency/Percent	155 (38.9)	153 (38.4)	33 (8.3)	45 (11.3)	12 (3)	398 (100)
	Weighted Frequency	775	612	99	90	12	1588
Increase in paved surfaces	Frequency/Percent	158 (39.7)	124 (31.2)	61 (15.3)	48 (12.1)	7 (1.8)	398 (100)
	Weighted Frequency	790	496	183	96	7	1572
Nature of the soil	Frequency/Percent	153 (38.4)	157 (39.4)	38 (9.5)	41 (10.3)	9 (2.3)	398 (100)
	Weighted Frequency	765	628	76	82	9	1560

Besides, 177 (46.3%), 163 (41%) and 153 (38.4%) respondents *SA* to *overflow of river(s), construction work in the area* and *lack of effective legislation* respectively. Correspondingly, while 160 (40.2%), 155 (38.9%) and 155 (38.9%) respondents *SA* to *deforestation, building on natural waterways* and *heavy/prolonged rainfall*, 158 (39.7%), and 153 (38.4%) *SA* to *increase in paved surfaces* and *nature of the soil* as factors responsible for flooding. Similarly, 154 (38.7%), 162 (40.7%) and 142 (35.7%) respondents *Agreed* that inadequate drainage network, lack of proper planning and *dumping of refuse in gutters*, respectively, are among the key factors instigating flooding in Yenagoa. On the other hand, 165 (43.2%), 149 (39.7%) and 166 (41.7%) respondents *Agreed* that *overflow of river(s), construction work in the area* and *lack of effective legislation* respectively, are among the principal flood causing factors in Yenagoa. In contrast, while 142 (35.7%), 149 (37.4%) and 153 (38.4%) %) respondents *Agreed* that *deforestation, building on natural waterways* and *heavy/prolonged rainfall* are among the major driver of flooding in the area in that order, 124 (31.2%) and 157 (39.4%) respectively, *Agreed* to increase in paved surfaces and *nature of the soil* in that order.

Moreover, 38 (9.5%), 40 (10.1%) and 37 (9.5%) respondents choose *Undecided* with respect to *inadequate drainage network, lack of proper planning* and *dumping of refuse in gutters* respectively. Similarly, 17 (4.5%), 51 (12.8%) and 46 (11.6%) also opted for *Undecided with* regard to *overflow of river(s), construction work in the area* and *lack of effective legislation*. Likewise, 60 (15.1%), 51 (12.8%) and 33 (8.3%) of the sample population preferred *Undecided* as regards *deforestation, building on natural waterways* and *heavy/prolonged rainfall* respectively while 61 (15.3%) and 38 (9.5%) of the study population have preference on *Undecided* regarding *increase in paved surfaces* and *nature of the soil.*

Furthermore, the frequency/percentage of respondents who *Disagreed* include 26 (6.5%) for *inadequate drainage network*, 22 (5.5%) for *lack of proper planning* and 36 (9%) for *dumping of refuse in gutters*. Also *Disagreed* were 17 (4.5%) in favour of *overflow of river(s)*, 26 (6.5%) in support of *construction work in the area* as well as 12 (3%) for *lack of effective legislation*.

Besides, 27 (6.8%), 35 (8.8%) and 45 (11.3%) respondents went for *Disagree* with respect to *deforestation, building on natural waterways* and *heavy/prolonged rainfall,* whereas, 48 (12.1%) and 41 (10.3%) favoured *Disagreed* on *increase in paved surfaces* and *nature of the soil* flood factors in the study area. Additionally, 6 (1.5%), 9 (2.3%), 6 (1.5%), 6 (1.6%), 9 (2.3%), 21 (5.3%), 9 (2.3%), 8 (2%), 12 (3%), 7 (1.8%) and 9 (2.3%) of the respondents, in that order, *Strongly Disagree* with respect to *inadequate drainage network, lack of proper planning, dumping of refuse in gutters, overflow of river(s), construction work in the area, lack of effective legislation, deforestation, building on natural waterways, heavy/prolonged rainfall, increase in paved surfaces* and *nature of the soil* as factors causing flood in the study area.

Flooding is one of the disasters that come with devastating negative impacts on the socio-economic and cultural lives of the people in the affected area. The extent of effects' on respondents were measured on a three point Likert scale

based on their respondents' duration of stay in the area, experiences and perception on the subject. The Likert scale ranged from *High, Moderate* as well as *Low* and were subsequently weighted 3, 2 and 1 in that order. The results as presented in Table 4 indicates that the most ranked effects of flooding in Yenagoa is *Sickness/water borne diseases* with LMS of 2.38 arising from 194 (48.7), 162 (40.7) and 42 (10.6) respondents who rated it *High, Moderate* and *Low* respectively.

The second most ranked effects of flooding in Yenagoa with the LMS of 2.32 is *Blockage of access road(s)* as it was rated *High, Moderate* and *Low* respectively by 179 (45%),168 (42.2%) and 51 (12.8%) of the sampled respondents in that order. Ranked 3rd each, in the order of effects based on the LMS of 2.3 and reflections of 174 (43.7%), 169 (42.5%) and 55 (13.8%) as *High, Moderate* and *Low* respectively as well as 169 (42.5%), 181 (45.5%) and 48 (12.1%) respondents who rated it *High, Moderate* and *Low* respectively were *Destruction of shrines/sacred areas* as well as *Reduction in business income*. These were in consistent with the findings of Gobo et al, (2006). Their findings revealed that the causes of flooding in Bayelsa include, rivers over flowing their banks, many communities are distributaries of the Niger – Benue Systems in the State, heavy rainfall and man induced (Anthropogenic).

Equally, *Slow down development activities* (LMS = 2.29) and *Displacement of families* (LMS = 2.28) were ranked 4th and 5th respectively because of the perception of 169 (42.5%), 174 (43.7%) and 55 (13.8%) respondents who rated them *High, Moderate* and *Low* respectively as well as 166 (41.7%), 178 (44.7%) and 54 (13.6%) respondents who rated them *High, Moderate* and *Low* in that order. Fascinatingly, two effects of flooding namely *Loss of soil nutrients* and *Poor water quality/water pollution* were jointly ranked 6th based on the LMS of 2.27. With respect to respondents rating of each effects, *Loss of soil nutrients* was rated *High, Moderate* and *Low* by 156 (39.2%), 195 (49%) and 47 (11.8%) respondents in that order, while 156 (39.2%), 192 (48.2%) and 50 (12.6%) affirmed *High, Moderate* and *Low* effect of flooding on *Poor water quality/water pollution* in the study area.

Moreover, *Destruction of houses/buildings, Traffic congestion/delays* and *Destruction of farmland*, with the LMS of 2.26 each were jointly ranked 7th among the flood effects. With respect to the extent of *Destruction of houses/buildings*, *High, Moderate* and *Low* effects were perceived by 146 (45%), 211 (53%) and 41 (10.3%) respondents in that order. Also, *Traffic congestion/delays* was rated *High, Moderate* and *Low* effects by 162 (40.7%), 179 (45) and 57 (14.3%) sampled individuals while *Destruction of farmland* was rated *High, Moderate* and *Low* effects by 162 (40.7%), 179 (45%) and 57 (14.3%) respondents in that order.

Besides, *Destruction of arable crops* and *Loss of animals/pets* were given the same rank as the 8th most perceived effect of flooding on the socio-economic and ecological and cultural spheres of endeavour in Yenagoa based on their LMS of 2.2. Regarding the extent of effects, 130 (32.7%), 219 (55%) and 49 (12.3%) respondents rated *Destruction of arable crops High, Moderate* and *Low* respectively, while 157 (39.4%), 164 (41.2%) and 77 (19.3%) rated *Loss of animals/pets High, Moderate* and *Low* in that order. Furthermore, the 9th, 10th and

11th were allocated to *Loss of sources of livelihood* (LMS = 2.11), *Destruction of economic trees* (LMS = 2.08) and *Loss of life* (LMS = 1.96). This is in consistent with the findings of Tonbra, (2014), his study revealed that the people of Southern Ijaw were devastated by 2012 flooding and their socio-cultural heritage was severely affected. Similarly, this was also in agreement with the work of Wizor and Week, (2014). Their findings showed that 86.2 % of the respondents claimed that school infrastructure was damaged due to flood. 80.6% agreed that there was disruption in accessing hospital services due to flood, also 69.5% agreed that health facilities were damaged. Furthermore, this was consistent with the findings of Ikemike, (2020). His findings include severe environmental and health hazards associated with flooding in Bayelsa State.

Table 4: Frequency Distribution of Effects of Floods in Yenagoa L.G.A

Effects of Flooding		Extent of Effect			Total	Mean Score/ Rank
		High	Moderate	Low		
Sickness/water borne diseases	Frequency/Percent	194 (48.7)	162 (40.7)	42 (10.6)	398 (100)	2.38
	Weighted Frequency	582	324	42	948	1st
Blockage of access road(s)	Frequency/Percent	179 (45)	168 (42.2)	51 (12.8)	398 (100)	2.32
	Weighted Frequency	537	336	51	924	2nd
Destruction of shrines/sacred areas	Frequency/Percent	174 (43.7)	169 (42.5)	55 (13.8)	398 (100)	2.3
	Weighted Frequency	522	338	55	915	3rd
Reduction in business income	Frequency/Percent	169 (42.5)	181 (45.5)	48 (12.1)	398 (100)	2.3
	Weighted Frequency	507	362	48	917	3rd
Slow down development activities	Frequency/Percent	169 (42.5)	174 (43.7)	55 (13.8)	398 (100)	2.29
	Weighted Frequency	507	348	55	910	4th
Displacement of families	Frequency/Percent	166 (41.7)	178 (44.7)	54 (13.6)	398 (100)	2.28
	Weighted Frequency	498	356	54	908	5th
Loss of soil nutrients	Frequency/Percent	156 (39.2)	195 (49)	47 (11.8)	398 (100)	2.27
	Weighted Frequency	468	390	47	905	6th
Poor water quality/water pollution	Frequency/Percent	156 (39.2)	192 (48.2)	50 (12.6)	398 (100)	2.27
	Weighted Frequency	468	384	50	902	6th
Destruction of houses/buildings	Frequency/Percent	146 (45)	211 (53)	41 (10.3)	398 (100)	2.26
	Weighted Frequency	438	422	41	901	7th
Traffic congestion/delays	Frequency/Percent	162 (40.7)	179 (45)	57 (14.3)	398 (100)	2.26
	Weighted Frequency	486	358	57	901	7th
Destruction of farmland	Frequency/Percent	162 (40.7)	179 (45)	57 (14.3)	398 (100)	2.26
	Weighted Frequency	486	358	57	901	7th

Destruction of arable crops	Frequency/Percent	130 (32.7)	219 (55)	49 (12.3)	398 (100)	2.2
	Weighted Frequency	390	438	49	877	8th
Loss of animals/pets	Frequency/Percent	157 (39.4)	164 (41.2)	77 (19.3)	398 (100)	2.2
	Weighted Frequency	471	328	77	876	8th
Loss of sources of livelihood	Frequency/Percent	128 (32.2)	184 (46.2)	86 (21.6)	398 (100)	2.11
	Weighted Frequency	384	368	86	838	9th
Destruction of economic trees	Frequency/Percent	125 (31.4)	179 (45)	94 (23.6)	398 (100)	2.08
	Weighted Frequency	375	358	94	827	10th
Loss of life	Frequency/Percent	110 (27.6)	161 (40.5)	127 (31.9)	398 (100)	1.96
	Weighted Frequency	330	322	127	779	11th

Conclusion and Recommendations

This paper investigated the assessment of flood vulnerability in Yenagoa, Bayelsa State, Nigeria. It is imperative to know that the coping strategies being adopted in the area were not effective and sustainable. And that, the local communities are currently overwhelmed by the flood situation inthe area and thus, urgent, adequate and sustainable invention should be made through appropriate mitigation measures. The challenges of flooding can be controlled and reduced when the inhabitants adhere to early warnings from government agencies. It is against this background that the following is recommended; there should be immediate construction of earth dams to trap excess water. The government and other stakeholders should engage communities in order for them to move permanently to higher grounds since a number of the flood victims have expressed willingness to relocate. As dove-tail to the aforementioned, the relocation should hand-in-hand with the provision of all basic and necessary social amenities and infrastructure such as schools, hospitals, water, agricultural inputs and support on a short to medium term basis. The relevant authorities and agencies concerned such as the National Emergency Management Agency (NEMA) including the Ministries of Environment and Agriculture, should as a matter of urgency delineate both the non-flood areas and flood areas. The non-flood areas may serve as temporary shelter for settlement during floods. Also, mitigation measures such as good drainage system, proper waste management systems should be highly promoted. This will go a long way to enhancing community resilience and drastically reduce vulnerability.

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