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Influence of Flood on Building Site Selection in Yenagoa Metropolis

Tamunoiminabo Lawson
Department of Architecture
Faculty of Environmental Sciences
Rivers State University, Port Harcourt
Port Harcourt, Rivers State, Nigeria

Correspondence Email: lawson.lawson@ust.edu.ng

ABSTRACT

Flooding is a global phenomenon that pose a threat to humanity. Building site layouts are usually affected in flood prone areas. This study therefore aims at investigating the influence of flooding on building site selection in Yenagoa metropolis. The survey research approach was used in the study and the study population was household heads, property owners, tenants, and built industry professional. Primary and secondary data combination were used utilizing random sampling techniques. Taro Yamane method was adopted in sample size determination giving 400. Thereafter, the proportional allocation method was applied in distributing the sampled population into ten strata covered by the study. 400 copies of questionnaire were administered but 329 copies retrieved. The analysis used both descriptive and differential statistics. The study has shown that flooding varies in the ten communities influencing building site selection. The study also showed that the p-value (0.000) is less than the critical level of alpha (0.05), hence there is a statistically significant variation in the influence of flooding on building site selection in different locations in Yenagoa. Based on this, the study recommends that government should ensure that building developers comply with building on areas mapped out of designated flood prone zones. In addition to adherence to planning codes on building regulations.

Keywords: Flooding, Building, Urban City, Site, Selection, Nigeria

Introduction

Urban centres are social centres which deliver quite several services and functions such as energy and water provision, transport links, housing, education and employment that make city life very attractive and luxurious (Tibaijuka, 2008). Around the world, cities are repositories of knowledge and agents of socio-political change and they play a key role towards liberating people from the shackle of poverty (UN-Habitat, 2003; 2006). Urban spaces are not just simply places made of bricks or mortar but places of dreams and fancy, of nostalgia and imagination, of emotions and

desires but focal points that enhance the economic and social activities of the people and society at large. In describing a city, Watson (1993) argued that a city is a living system made up of different interacting parts and functioning through the interplay of different sectors. Nonetheless, the services offered by a city can be significantly disrupted by flooding. Flooding is a general temporal state of partial or fully submersed inundation from overflows of inland or tidal waters or from frequent and rapid accumulation of runoff water (Jeb & Aggarwal, 2008; Onuigbo *et al.*, 2017). Global warming is likely to increase the frequency and severity of floods due to the combined effects of increased precipitation, storminess, distorted regional weather patterns, and deforestation with the increasing capacity of surface runoff leading to soil erosion and rising sea levels (Gwilym & Chen, 2011). According to Olanrewaju and Fadairo (2003), flooding is often intensified by human activities such as the presence of riverside infrastructure (dams, piers, and lands). It is aggravated by poor development practices including riverside development, excessive cleaning, encroachment upon waterways, and dredging which may result in changes in the hydrological balance of the waterways involved (Nolan & Marron, 1995; Chakraborty & Chakraborty, 2021).

Flood is a leading cause of natural disaster that affects dwelling units and livelihoods (UN-Water, 2011). Floods are considered the most recurring, widespread, disastrous and frequent natural hazards of the world. It is indeed one of the most devastating hazards that are likely to increase in many regions of the world partially because of global climate change and poor governance United Nations Office for the Coordination of Humanitarian Affairs (Askew, 1999; UNOCHA, 2018). Generally, urban flooding impacts negatively socioeconomic activities. It destroys the ecosystem and dislocates sociological functions. Human lives are also lost (Sato, 2006; Genovese, 2006; IFRC, 2009). It causes major disruptions in cities; leading to significant impacts on people, the economy and on the environment. The United States of America (USA), in the 1990s, lost approximately 5.4billion USD annually due to flooding while more than 1.6 million people were displaced. The loss further jumped to USD 10 billion annually in the 2000s mostly affecting housing infrastructure (Association of State Flood Plain Managers (ASFPM, 2013). Nearly 525,000 houses were affected; 39,000 were destroyed and 485,000 were damaged. The estimated loss was over USD 401 million. In another development, more than 1.6 million people were displaced by flooding and landslides while nearly 525,000 houses were affected in Myammar (Government of the Union of Myanmar, 2015). Usually, the impact of flooding is not only varying in the amount of damage but also in the type of damage experienced.

In most cities in Nigeria, flooding is recognized as a significant environmental challenge or major hazard that is constantly affecting the effective functioning of the urban environment, particularly influence building site selection for future development which are critical to a sustainable development. Tragedies associated with flood disasters in Nigeria have significant effects on the people, city infrastructure and urban governance. According to National Emergency Management Agency (NEMA, 2022), no fewer than 203,371 housing units have been damaged by flooding. In light of this level of damage, flooding in Nigeria has further depleted Nigeria's housing stock thereby widening the accommodation gap among Nigerians. Housing is a fundamental need critical to the welfare, survival and health of humans whether in the city or in the rural area (Soriwei, 2013). It is worth noting that flooding damages housing infrastructure and other urban social infrastructure such as water supply, electricity, roads and railway lines (Doocy *et al.*, 2013).

Housing is one of the three fundamental needs of mankind and it is the most crucial for the physical survival of man after the provision of food. Adequate housing contributes to the attainment of the physical and moral health of a nation and stimulates social stability, work efficiency and the development of the individuals. It is also one of the best indicators of an individual's standard of living and of his place in society. Housing, both in units or multiple forms is a significant component of the physical form and structure of a community, while the human and family contents of the house are parts of the very spirit of life and prosperity of the society.

Study Area

Yenagoa is the Bayelsa State administrative capital and lies within the Nun River, Ekole and Epie Creeks. It is located on latitude 4055N and longitude 6016E as shown in figure 1. It is located in the north eastern region of the state and is bounded at the north and east by Rivers State, at the South by Southern Ijaw and Ogbia Local Government Area and at the west by Kolokuma – Opokuma Local Government Area. Yenagoa is situated within the subequatorial south which extends from the coast to roughly 130 to 160km inland. The study area experiences heavy rainfall for eight to nine months of the year. The highest rainfall values are obtained in June (322.92mm), July (413.59m), August (438.34mm) and September (439.84mm), (Yenagoa Master Plan, 2004 cited in Ebinemi, Tari, & Ibama, 2021).

Bayelsa State is predominantly under two ecological zones; the barrier island forest (mangrove forest) and the freshwater swamp forest. It has a large deposit of hydrocarbon. Yenagoa is situated in the freshwater swamp forest eco-zone. The people of people are predominately fishermen (NNDC, 2006).

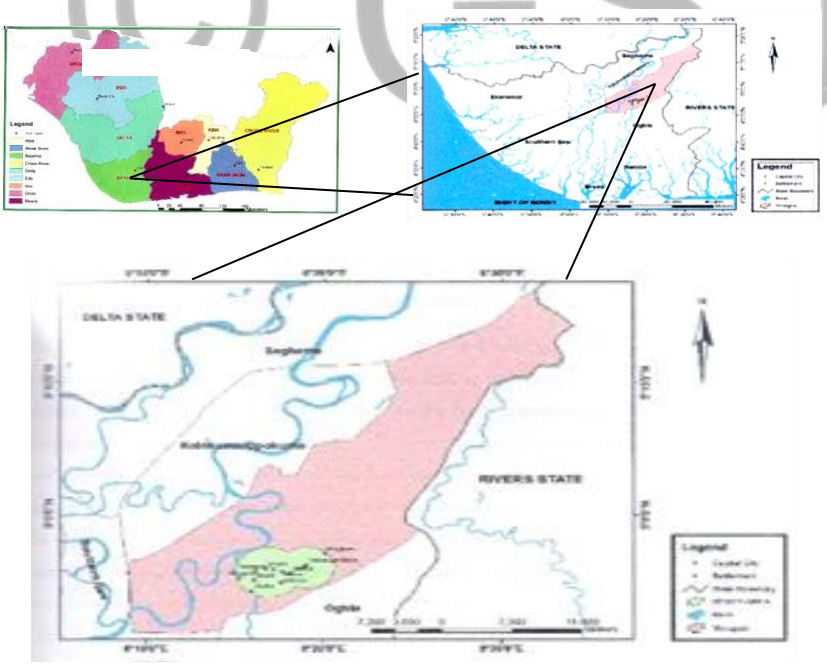

Figure 1: Map of the Study Area

Source: Surveyor General Office Bayelsa State (2016)

Methodology

The survey research design was employed in this study. Household heads constituted the study population. Out of the 29 areas that make up Yenagoa, 10 (34%) of them representing the areas were selected using the simple random sampling technique as shown in Table 1. The sources of data for the study included primary and secondary data.

Table 1: Selected Communities and their Population

S/No	Community	Population
1	Amarata-Epie	23,519
2	Azikoro	16,819
3	Biogbolo	10,728
4	Ekeki	10,728
5	Kpansia	24,564
6	Okutukutu	11,045
7	Opolo	24,677
8	Swali	16,667
9	Yenagoa	57,694
10	Yenezue-Gene	13,767
	Total	210,208

Source: **National Population Commission, 1991**

In the sampled areas, Taro Yamane formula was used in determining the sample size because it reduced large sample size to a manageable population. See Table 2. The formula is written as:

$$n = \frac{N}{1 + n(e)^2} \qquad \text{(Equation 1)}$$

Where

N = Target Population (210,208)

e = Constant (0.05 at 95%)

n = Sample Size

After substitution, the derived sample size was 400. To avoid bias, the proportional allocation method was used to allocate samples to the different strata that the study covered. The instrument used for the study was the questionnaire. It should be noted that out of the 400 copies of the questionnaire administered, 329 of them were successfully completed and retrieved. Therefore, both descriptive and inferential statistics were used in the analysis of data.

Table 2: Derived Sample Size

S/No	Community	Population	Sampling Size
1	Amarata-Epie	23,519	45
2	Azikoro	16,819	32
3	Biogbolo	10,728	20
4	Ekeki	10,728	20
5	Kpansia	24,564	47
6	Okutukutu	11,045	21
7	Opolo	24,677	47
8	Swali	16,667	32
9	Yenagoa	57,694	110
10	Yenezue-Gene	13,767	26
	Total	210,208	400

Source: **Researchers' Computation, (2022)**

Results and Discussion

Revealed in Table 3 is the perceived influence of flooding on building site selection.

Building Site Section

Building site selection in this study entails knowledge of the varying degrees of flooding in the 10 communities. This study showed that Azikoro Community is the area mostly affected by flood in Yenagoa metropolis yielding to a mean score of 3.54. Yenezue-Gene Community is the area least affected by flood in Yenagoa metropolis. In can be inferred that in Table 3 the selection of a site for building construction in Yenagoa metropolis, Azikoro Community ranked number one (1) will be given the utmost attention while Yenezue-Gene will have the least. This agrees with the findings in Table 3. This findings agree with Lawal's (2021) report on Bayelsa flooding, where some residents in the study areas have been forced to vacate their homes as some areas have been submerged.

Table 3: Responses on the Area mostly affected by Flood in Yenagoa Metropolis

S/N		SA (4)	A (3)	D (2)	SD (1)	Mean	Rank	Remark
1	AMARATA	100	149	61	19	3.00	8th	Agreed
2	AZIKORO	212	91	19	7	3.54	1st	Agreed
3	BIOGBOLO	108	170	34	17	3.12	6th	Agreed
4	EKEKI	131	125	55	18	3.12	6th	Agreed
5	KPANSIA	115	141	57	16	3.08	7th	Agreed
6	OKUTUKUTU	198	109	13	9	3.51	2nd	Agreed
7	OPOLO	117	190	13	9	3.26	5th	Agreed
8	SWALI	201	84	34	10	3.45	3rd	Agreed
9	YENAGOA	172	97	42	18	3.29	4th	Agreed
10	YENEZUE-GENE	97	140	75	17	2.96	9th	Agreed

***** Reject if the mean score is greater than 2.0

Source: **Researchers' Computation, (2022)**

The empirical test on the data set using ANOVA as depicted in table 4 shows that the p-value (0.000) is less than the critical level of alpha (0.05) hence there is statistically significant variation in the influence of flooding on building site selection in the different areas that make up the metropolis of Yenagoa. This finding is in tandem with the report of (National Emergency Management Agency (NEMA, 2012). The report noted that the intensity and effect of flooding vary from community to community depending on location and recovery response time.

Table 4: ANOVA Table

ANOVA

Mean score

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7.349	6	1.225	8.118	.000
Within Groups	9.506	63	.151		
Total	16.855	69			

Source: **Researchers' Computation, (2022); SPSS v.23 Output.**

Recommendations and Conclusion

It is recommended that Government should ensure that building developers comply with building only on areas/locations mapped out of designated flood prone zones. Also, buildings should be sited where the identified flood plain level is known. In essence the setting-up, implementation and use of code specified flood levels for Yenagoa metropolis is recommended.

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