

Assessment of the Impact of Urban Floods on Real Property Development in the Port Harcourt Metropolis, Nigeria

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Authors' contributions

This work was carried out in collaboration between both authors. Author CHW designed the study, performed the statistical analysis, wrote the protocol, wrote the first draft of the manuscript and managed the analyses of the study. Author RAA managed the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

Property value is a product of property characteristics, accessibility, neighborhood and environment. Property development is therefore progressive when all the above-mentioned attributes are favourable as it is a capital-intensive project. Flooding in most cases are natural occurrences causing great damage to life and properties. A once-off flood is unlikely to damage property value; however, the likelihood of a reoccurrence will definitely affect property value and discourage property development. The study examines the impact of flooding on property development in the Port Harcourt metropolis. In achieving the objectives of the study, questionnaires were administered to 266 respondents and professional opinions were also harnessed from 5 estate firms with 10 questionnaires administered to each of the five selected estate firms. The researchers sought to know if people are aware of the relationship between flooding and property development, what effect does flood have on property development and

existing control and management measures for real property development in flood prone areas in Port Harcourt Metropolis. The study results showed disparity in rental values of property in flood-prone areas and non-flood prone-areas, resulting to a difference in pace of property development at both areas. Further evidence from the study revealed that if feasibility study was carried out either by written or verbal opinion of a professional, an intending property developer is most likely to refrain from investing in flood-prone areas. The study therefore recommended enforcement of urban planning control measures and intensified efforts by relevant authorities to be proactive in planning. Expansion of existing drainage channels to improve their water carrying capacity and adequate provision of drainage systems were also suggested. A further need for the creation of landuse system for Port Harcourt metropolis was recommended, as this will help value appreciation of properties. The research also recommended the need for viability and feasibility appraisals to be carried out by real estate developers to avoid loss of investment.

Keywords: Development; flood; land value; Nigeria; planning; property; Urban.

1. INTRODUCTION

The occurrence of a natural disaster typically leaves some economic damage in its wake and the severity of such damage is dependent on the resilience of the affected population and the available infrastructure. Predicting weather patterns has been a dynamic journey for man whose end is still far as windstorms, earthquakes, floods, disease and other numerous forms of natural disasters still plague the earth resulting in millions of death. Natural disasters can have wide reaching effect on property market both specific to the area affected as well as generally. Properties are usually evident casualties in cases of natural disasters leading to damage and loss and next to it is the loss to human life. The destruction is usually done quickly and with little warning people can be left homeless or even in situation where destruction is so bad that rebuilding is almost an impossible feat.

Flooding is one of the major environmental crises contended globally. Most wet lands of the world experience flooding disasters as a result of global warming and the saturated nature of wetlands [1]. Real properties are exposed to damage by natural disasters. According to Bell [2], these natural disasters include floods, mud slides, bushfires, volcanic eruptions, cyclones, hurricanes, tornadoes, hail storms, earthquakes and land slide. With any of the above natural occurrences, any extreme situations will result in loss of property, loss of life or both.

Property development is a vital tool in the gross domestic growth of every state. It is a business process with multiple aspects, encompassing activities ranging from the renovation and release of existing buildings and new buildings to

the purchase of raw land/building and the acquisition of developed land or bare land to prospective clients. The process of property development ranges from initiation phase to valuation, design, coasting and disposal stage. Cadman and Topping [3] stated that availability of land is vital to the development procedure and is required to be stringently adhered to by all stakeholders.

The product in property implies “change of landuse” or an “alteration to an existing building” in a combination with other factors of production – labour [4,5] materials (Ball and Grilli, 1997); and finance [6,7].

Cadman and Topping [3] supported this perspective by teaching the ‘eight stages’ of the development process from initiation to disposal (Fig. 1). There is usually no stipulated sequence of stages as the stages sometimes overlap or reoccur. The progression is characteristic of a speculative development process where an occupier is not sought until the buildings have been completed.

However, if the improvement is pre-sold to a resident, then stage ‘8’ precedes stages ‘2’ and ‘7’ [3,8].

The conceptual theory underlying the theory of real estate is the environmental contamination of property values due to flood disasters. In the occurrence of a flooding disaster, the question of temporal or permanent loss is brought into consideration. Examples of temporal losses will include loss due to rental vacancy, out of pocket expenses related to repair works, cost of temporal alternative accommodation and time spent away from work. For rural communities, temporal losses may also include loss of income

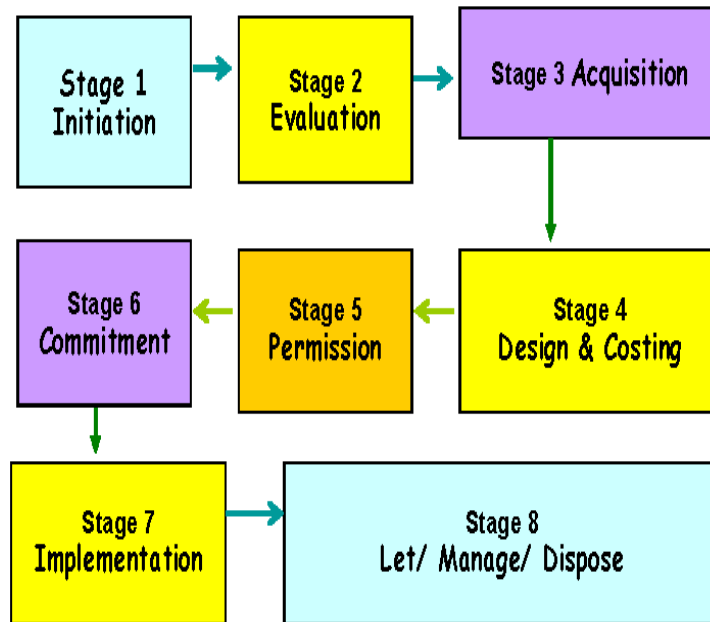


Fig. 1. The property development process (adapted from Cadman and Toppings, 1996)

from not being able to use farmlands or lease out the farm lands. Temporal losses are however only for a period of time, but if they are sustained and continue into the future, they can affect property value through future reduction in property investment projections and therefore can permanently affect property value.

Roddewig (1999) have shown that the stigmatization of a property or location due to an occurrence of disasters is wrong as in some cases there may not be physical damage of the said property, while other Gregory, Slovic and Flynn [9] insist that even the proximity of a property to source of contamination/disaster is enough to stigmatize the property. However, with the passage of time the property market seems to forget about the disaster event and in some cases the contamination may be cured, as in the case of flooding, the provision of wide drainage systems and strict adherence to zoning and building regulations, and when such happens the property value comes back toward full value. As flooding occurrence can lead to vacation of property, the multiplier effect is the vacation or reluctance of property developers to delve into development when armed with the information of flood prone-areas. There is therefore a decision of spending much more in such investment or seeking for alternative site.

Several researches on impact of flooding on property value has been done in the past by scholars. Proverbs and Soetanto [10] carried out

a research on the adverse effect of flood on residential property values in the United Kingdom, the findings showed a direct depreciation in property values within areas affected by flood and an onward appreciation over a passage of time. A research on flood risk and its impact on commercial and residential properties in Readings done by Sara et al. [11] also add to the body of knowledge on flood as it affects property.

Ajibola et al. [12] worked on assessing the effect of flooding on residential property values in Lekki Phase 1, Lagos, Nigeria. The research was extensively done as factors affecting property value was analysed and variables were projected in other to achieve the aim of the research. RICS [13] investigated flood memory, insurance and property value in United Kingdom. The research analyzed the role of flood memory in property value to ascertain if property value in flood-prone areas overtime can appreciate well after victims and people alike forget about the flood incidence.

While residential values and vacancy rates have been affected by flooding according to study carried out by Ayedun et al. (2018), the need to research on flood effect on property development as a holistic unit is yet to be met, as there is an increasing decline of investors carrying out feasibility studies of intending property development. In spite of all these studies, no known work has been carried out on assessment of the impact of flooding on property

development in Port Harcourt Metropolis. This is the gap that this present study seeks to fill. This research is focused on assessing the impact of flooding as it affects real property development putting into perspective the observance of flash floods after heavy downpours in the state. In recent times many urban areas in Nigeria have been facing series of environmental problems and most specific and recurrent is flooding and hence the need to assess its impact on our built environment in Port Harcourt Metropolis.

2. MATERIALS AND METHODS

The survey research design was adopted. The entire research was carried out in three stages;

- The pre-field work stage
- The fieldwork stages
- The post-fieldwork stages

The pre-field work stage entails a reconnaissance study to familiarize with the area that usually experiences flood and also the research population identified in preparation of sampling. At the fieldwork stage, stakeholders and parameters were analyzed to enable the researcher systematically generate information. Information was gathered from residents who are at risk of flood and estate firms. Data was collected through the use of structured questionnaires and interview. At the end of the fieldwork stage, statistical data analysis was carried out for the interpretation of the results of questionnaire analysis. The results of statistical analysis were then interpreted for conclusion and recommendations.

The population of this study was made up of residents (people living and/or working) in Port Harcourt metropolis (Port Harcourt, Obior/Akpor and Eleme Local Government Areas) of Rivers state and Estate surveyors from five different Estate firms practicing in the metropolis.

Two hundred and sixty-six questionnaires were administered. Seventy-two questionnaires each was administered within six systematically selected streets of Eleme Local government, Obior/Akpor Local government and Port Harcourt Local Government respectively. Five Real Estate firms were selected and ten questionnaires administered to each firm. The purposive sampling method as was utilized by Ebdon (1977) was adopted and applied in the study to the residents and estate agents for the

administration of the questionnaires. To get to the final respondents, the use of systematic sampling technique was adopted, whereby each house with an odd municipal number was selected. The selection of sample was independent of sex and age; selection was from 20 years and above. The criteria adopted in selection of estate firms to administer questionnaires include;

- Years of professional practice (minimum of 10 years).
- Versatile property portfolio (200 properties in different locations of Port Harcourt metropolis).
- Presence of experienced surveyors in the firm (over 5years of practice).
- Firms with proper structural documentation practice.

The technique adopted in analyzing data collected from the use of questionnaire includes figures, tables, percentages, bar and pie charts. Tables are used to show variation in elements, percentage was used to express the relationship between the various responses; figures were used to show the extent of study area and locations of various objects within the study area.

2.1 Study Area

This study is limited to three Local Government Areas (LGA) of Rivers State, Nigeria, which make up the Port Harcourt metropolis (Fig. 2). These LGAs are:

- Port Harcourt City Local Government Area
- Obior/Akpor Local Government Area
- Eleme Local Government Area

Rivers state (Fig. 2) recently celebrated its 50th anniversary, thus one can rightly say that Port Harcourt is one of Nigeria's leading industrial cities. The intricacies of the geographical integration of Port Harcourt metropolis can sometimes be intriguing for a guest as the metropolis sprawling development is gradually entering into the hinter lands. Port Harcourt city is one of the major capital cities of Nigeria. It is the capital of Rivers State, lying along Bonny River, an eastern tributary of the Niger River, 66km upstream from the Gulf of Guinea, located at the coastal region of Nigeria. Its geographical coordinates are 4°47' 21" north, 6° 59' 55" east with 15.83 meters elevation above sea level.

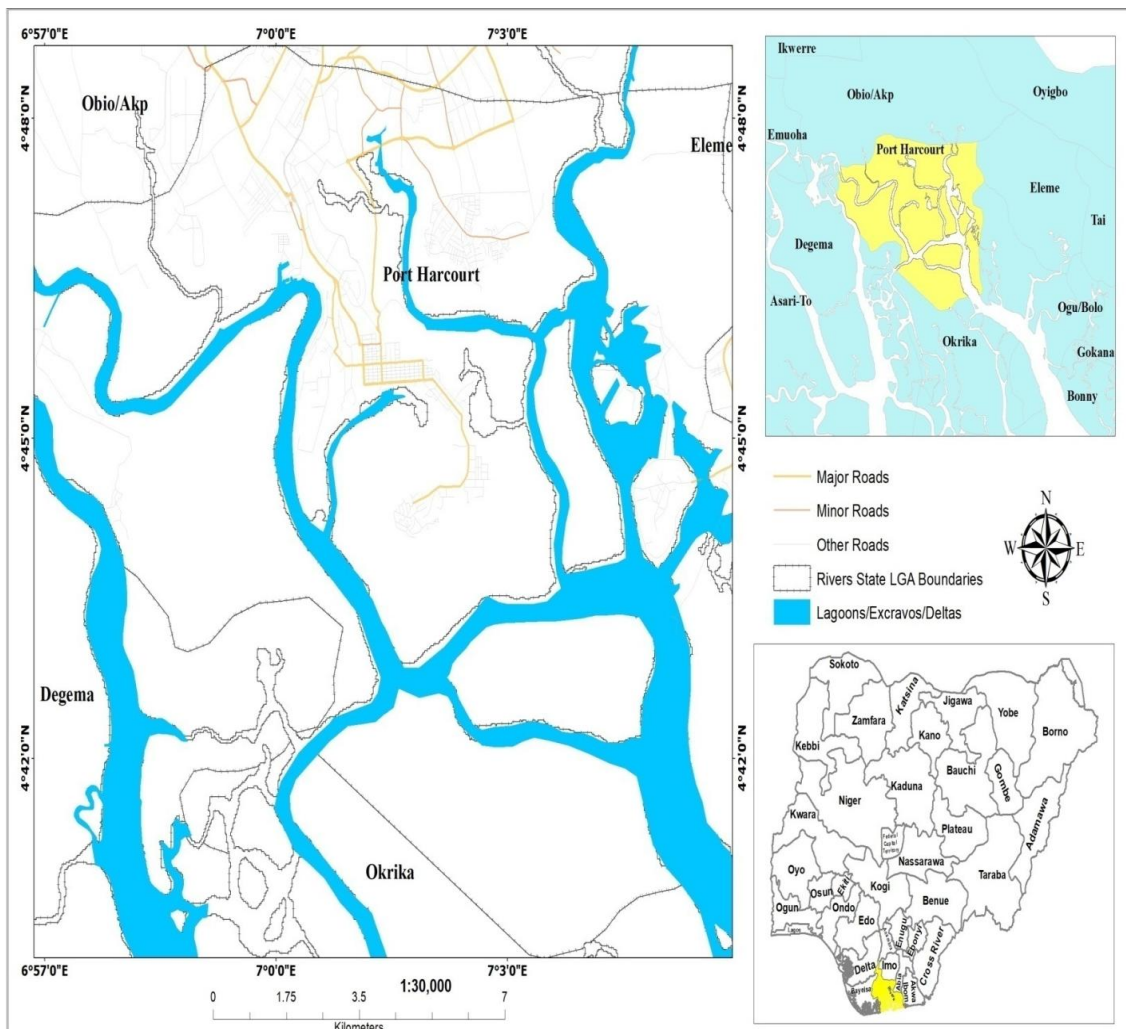


Fig. 2. Port Harcourt Metropolis

The relief of Port Harcourt region is low-lying plane with tidal variations that influences the numerous rivers, creeks, swamps and the Atlantic Ocean serving as a unique drainage surface, though with a poor network essentially due to low relief, high water table and high rainfall. The land surface slope gently (30 to 50 on the average) in a NW-SE direction [14]. While the dry land area of the region is characterized by equal thickness of the upper soil layer of silt and sand. The entire topography is made up of low-lying planes generally less than 20m above sea level and sloping gently in north-south direction to the sea. It is relatively flat terrain with a gradient of not more than 3%.

The climate of Port Harcourt features a tropical monsoon climate with long and heavy rainy seasons and very short dry seasons. Only the month of December and January can be said to be truly the period of dry season. Harmattan is

less pronounced in Port Harcourt. By observation over time, the heaviest rainfall in the city occurs during the month of September. Temperature throughout the year in the city is relatively constant, showing little variation throughout the course of the year. The Average temperature in the study area is typically between 25°C – 28°C. The vegetation in Port Harcourt is sparse. In places that are not yet overcome by infrastructural development, the vegetation is majorly swampy. The proximity of Port Harcourt to the ocean makes available a lot of fresh water vegetation.

The pace of property development in Port Harcourt Metropolis is said to be one of the fastest in the country, however the issue of flooding is a reoccurring decimal in real property development in the city [15]. According to Chukwudi (1989) Port Harcourt has been expanding physically at a fast rate. It has grown

from 15.34 square meters in 1914 to a metropolis covering an area of about 360 square kilometer in the 1980s.

The growth of Port Harcourt and its fringe areas has been phenomenal since its inception in 1913. Growth has been experienced in terms of population and space. Two years after its founding, the population was 5,000. Census figures for the city through its history are 7,185 in 1921; 15,201 in 1932 and 71,634 in 1953 [16]. The 1963 census gave the city's population as 179,563 and in 1973 it was 213,443 [17]. The 1991 census fixed the population of Port Harcourt and Obio/Akpor Local Government Areas alone at 645,883. The projection for 1996 by the National Population Commission is 832,471 for the two local governments and the interim figures for the 2006 national census is over one million. The total population was estimated at 2,000,000 as of 2009, making it one

of the largest metropolitan areas in Nigeria and covered about 360 km².

Spatially too, Port Harcourt city has grown to cover much of the Upper Bonny River Basin. Originally the city covered a 25 km² area between the UTC junction and the New Layout Market. In the landuse and vegetation map of Nigeria (1975/76), the built-up area of Port Harcourt covered 17.4 km². Twenty years later, a similar map showed the extent of the city as 89.4km². Port Harcourt metropolis has today continued to progressively stretch, encompassing communities that were once rural such as Rumumasi, Choba, Rumueme, Orowurokwu, Akpajo, Alode, etc. As an urban area, Port Harcourt metropolis has so many economic opportunities for residents and guests, hence the need to assess the impact of flooding as regards the pace of property development.

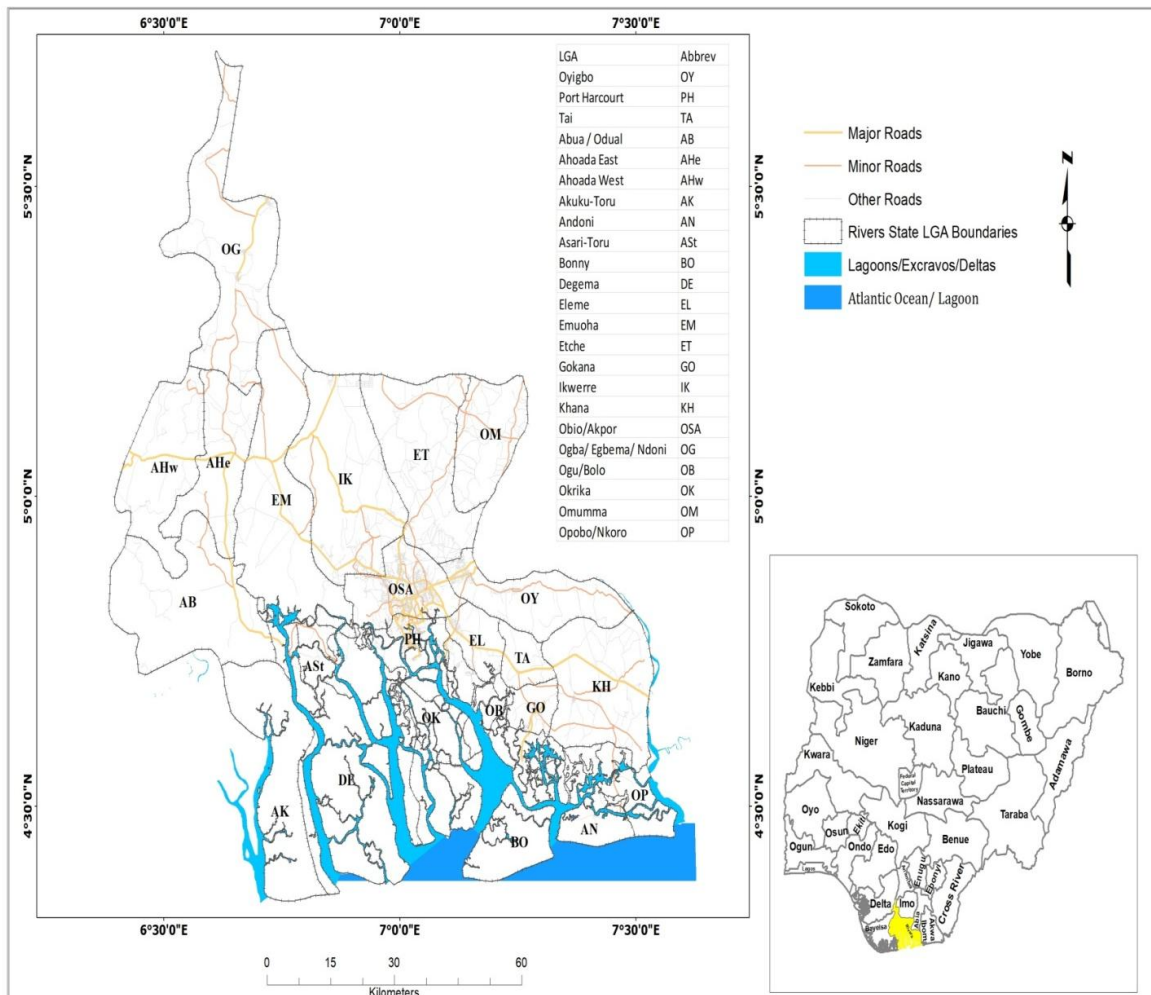


Fig. 3. Map of Rivers State

3. RESULTS AND DISCUSSION

Table 1 shows the total number of questionnaires distributed and the number returned for both respondents living/working in flood-prone areas and real estate firms in the metropolis.

Tables 2 to 4 on the other hand shows the sampled streets/roads in the three LGAs and the total number of questionnaires retrieved in each of the LGAs.

3.1 Analysis of Data for Estate Surveyors

This segment deals with the analysis of the response from estate surveyor working in Port Harcourt Metropolis. The responses were tabulated and their percentages calculated.

Table 5 clearly shows that 83% of the estate firms interviewed in this research render full professional services ranging from property management, valuation, agency and

feasibility/viability studies within the study area laying credence to the reliability of data collated from the estate firms.

Table 6 reveals that 63% of Estate Surveyors interviewed affirmed that clients desire to have information on the incidence of flood in a particular location which informs their decision to rent or lease a property. On further probe, most of the respondents stated that where such information is disclosed to a client, he/she will most likely never return if there is an incidence of flood. The table therefore reflects that people within the study area are aware of an inter relationship between real property development and flooding. This shows that flooding is one of the factors considered in property development.

Fig. 4 further supports the result on Table 6. The figure shows that 69% of respondents who desire to know if an area is prone to flooding, regard it as a very important factor.

Table 1. Questionnaires distribution/retrieval

Questionnaires	Respondents living/working in flood prone areas	%	Real estate firms	%
Number Distributed	216		50	
Number Returned	196	90.7	46	92

Table 2. Selected streets for administration of questionnaires in Port Harcourt LGA

S/no	Selected streets	Questionnaires retrieved
1	Rotimi Amaechi Drive, GRA Phase II	12
2	Abacha Road, GRA Phase II	10
3	Orubo Close, Off Peter Odili Road	9
4	Horsfall Street, Old GRA	12
5	Blue Pearl Street, Off Peter Odili Road	11
6	Abanna Street, Old GRA	12
	Total	66

Table 3. Selected streets for administration of questionnaires in Obio/Akpor LGA

S/no	Selected streets	Questionnaires retrieved
1	Obi Wali Road, Rumuigbo	12
2	Uyo Street, Rumumasi	12
3	Salem Close, Off Ada George	12
4	Kenka Road, Off Mgbuoba Road	11
5	Zion Street, Rumuodumaya	10
6	Nkpolu Road, Nkpolu Rumuigbo	11
	Total	68

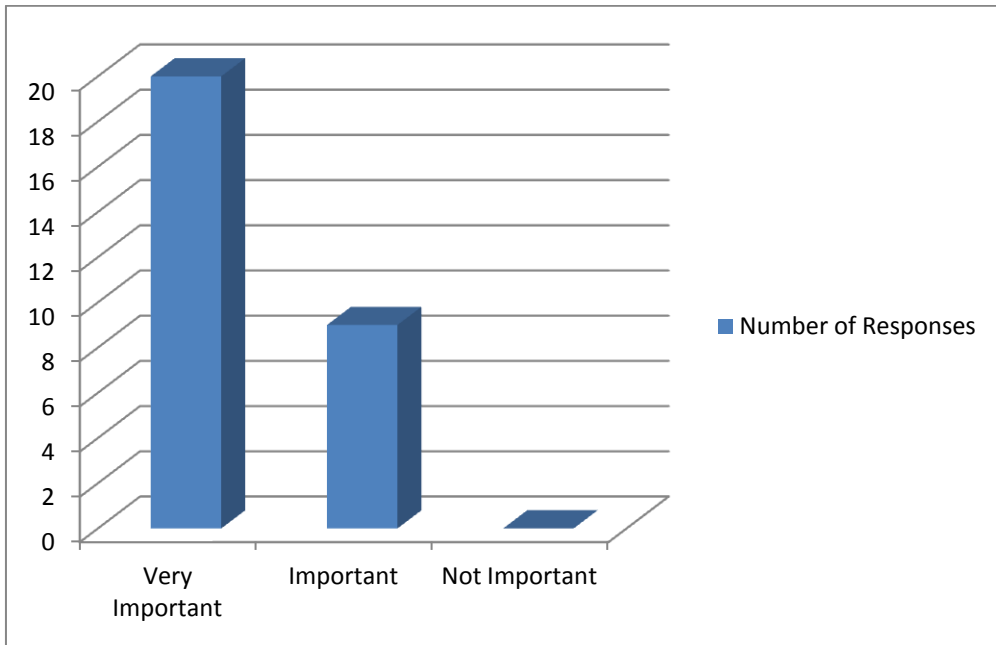


Fig. 4. The importance of flooding as a factor for decision making in property development

Table 4. Selected streets for administration of questionnaires in Eleme LGA

S/N	Selected streets	Questionnaires retrieved
1	School Road, Akpajo	12
2	Pipeline Road, Akpajo	12
3	Alode Road, Eleme	8
4	Hospital Road, Ogali,	9
5	Chief Odi Street, Ogali	10
6	Refinary Road, Alesa	11
Total		62

Table 5. Services rendered by Estate surveyors

Options	No of responses	%
Estate Agency	-	0
Property and Facility Management	-	0
Valuation	8	17
Feasibility/ Viability Studies	-	0
All of the Above	38	83
Total	46	100

Table 7 indicates that flooding strongly influences structural designs in property development as this factor directly affects the life span award. The implication of this result is that a property developer will no longer be at liberty to develop/redevelop according to his choice in a flood-prone area but will rather adopt a suitable

structural design without recourse to his taste and cost thereby making property development less attractive to investors.

Table 6. Flood incidence inquiry

Options	No of responses	%
Yes	29	63
No	17	37
Total	46	100

Table 7. Flooding influence the structural design of property development

Options	No of responses	%
Yes	39	85
No	7	15
Total	46	100

Fig. 5 shows that over half of the properties found in flood-prone areas are predominantly residential. That is to say that flooding hampers the development of properties for commercial and industrial purposes. Further interview with respondents revealed that customers would rather avoid shopping with the inconvenience of flood and this therefore informs the decision on the type of property development within the area.

Fig. 6 clearly revealed that out of the 46 respondents (estate surveyors), 35 representing 76% alluded to the position that

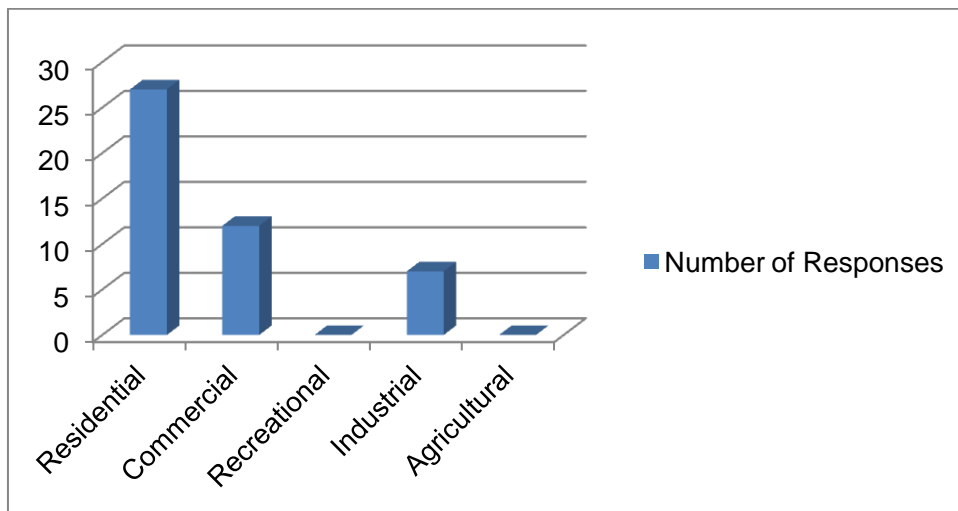


Fig. 5. Types of property development found in flood prone areas

flooding was responsible for void in property flooding, whereas 11 respondents (estate surveyors) representing 24% felt differently. This shows that flooding is indeed a contributory cause of void amongst other causative factors leading to property void.

a sharp contrast where less repairs are done quarterly (26%). This result agrees with the work of [18]. Which affirms that the continuous water action on property either by act of nature or human use, results to the deterioration of property and escalation of its aging process.

Tables 8 and 9 reveals that the frequency of repairs carried out on building in flood-prone areas by property managers surpasses repairs carried out in non-flood-prone areas within the study area. This will inadvertently bring about increased cost of property maintenance in flood-prone areas. Table 9 shows that 59% of the professionals indicate that maintenance work is very often (quarterly basis) while Table 10 shows

Table 8. Frequency of repairs on properties in flood-prone areas

Options	No of responses	%
Weekly	-	0
Monthly	10	22
Quarterly	27	59
Annually	9	20
Total	46	100

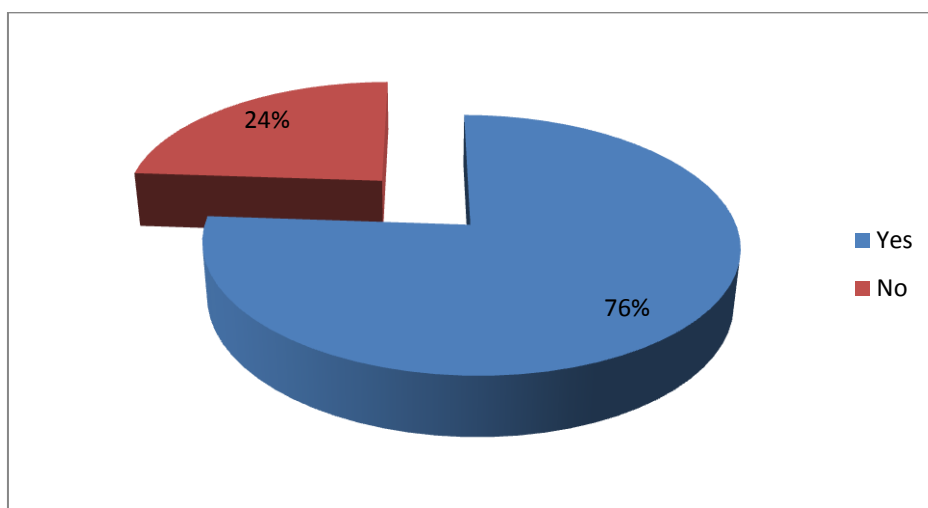


Fig. 6. Property void due to flooding

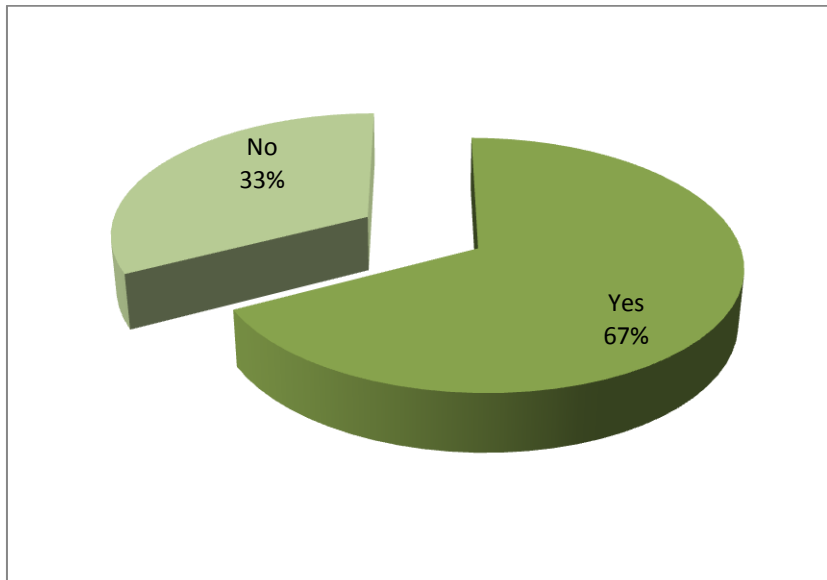


Fig. 7. Respondent’s perception on the effects of flooding on the rate of property development

Table 9. Frequency of repairs on properties in non-flood-prone areas

Options	No of responses	%
Weekly	-	0
Monthly	4	9
Quarterly	12	26
Annually	30	65
Total	46	100

growth in property development as against areas not prone to flood. This is further validated by Table 6 where 63% of respondents (Real Property Professional) confirm that clients make inquiries on the flood nature of a property; that is to say that a client who wishes to rent or lease an apartment would avoid flood-prone areas except when not informed, leading to a slow pace of property development.

Fig. 7 indicates that 67% of respondents (Real Property Professionals) strongly agree that flooding in Port Harcourt metropolis reduces the pace of property development. This shows that flood-prone areas will exhibit a slower rate of

Fig. 9 shows that 31 out of 46 respondents are unaware of legislative control measures for flood-prone areas while 10 respondents affirm their legislative control measures. This can be

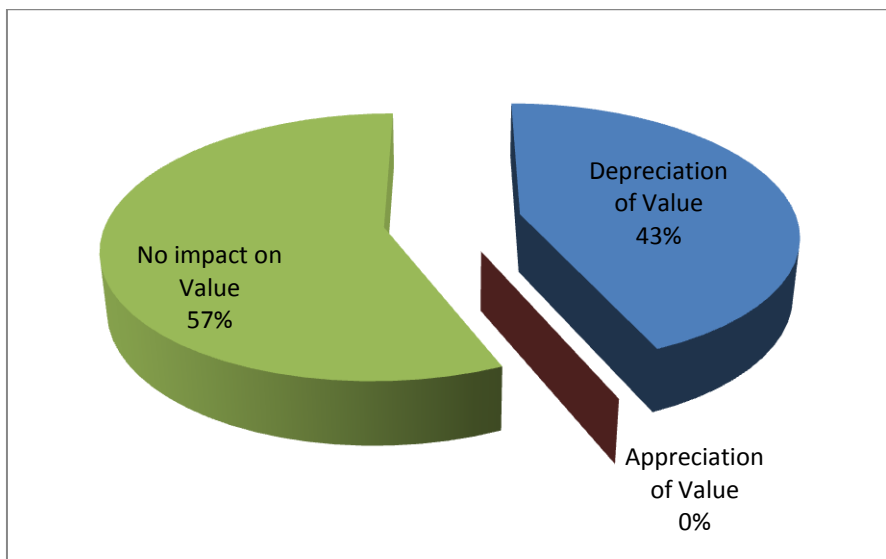


Fig. 8. Impact of flood on property value

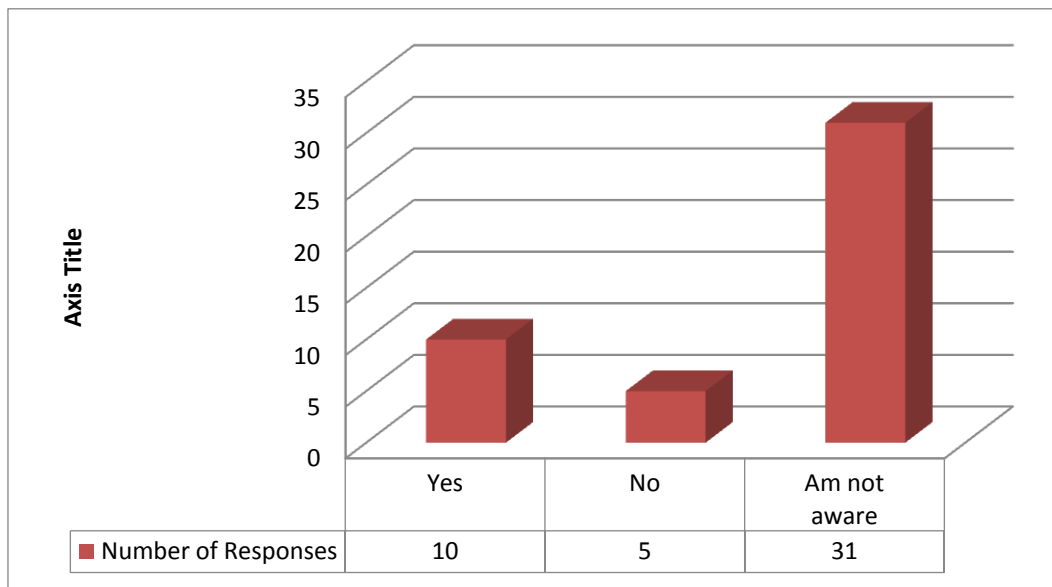


Fig. 9. Existing legislative control measures for property in flood-prone areas

Table 10. LGA and questionnaire distribution

Options	No of distributed questionnaires	No of retrieved questionnaires	%
ObioAkpok Local Government Area	72	68	35
Eleme Local Government Area	72	62	32
Port Harcourt Local Government Area	72	66	34
Total	216	196	100

deduced as a causative factor to blatant disregard for adherence to legislative provisions for flood control.

3.2 Analysis of Data for Residents of Flood Prone-Areas

This segment deals with the analysis of the response from respondents living/working in flood-prone areas of Port Harcourt Metropolis. The responses were tabulated and their percentages calculated. Table 10 shows number of questionnaires distributed and retrieved in each LGA while Table 11 shows that there may be a relationship between flooding and short-term tenancy in property located in flood-prone area, as 43% of the total respondents indicated the duration of their stay in the neighborhood to be 0- 5years.

Table 12 revealed that 83% of respondents living in the three LGAs under study have a firm understanding of property development. This informs the reliability of data that was captured for the purpose of this research.

Table 11. Number of years lived/worked in the flood-prone area

Years	No of responses	%
0-5years	85	43
6-10 years	45	23
11-15 years	19	10
16 years and above	47	24
Total	196	100

Fig. 10 shows that 100% of the respondents have experienced flooding. This therefore satisfies the eligibility criteria for the respondents and further underscores the reliability of data gathered.

Table 13 shows that 61% of the total respondents in the study area says that there are no adequate and functional drainage systems; this further increases the impact of flooding of properties while 39% of respondents are of the opinion that the drainage systems provided are adequate and functional.

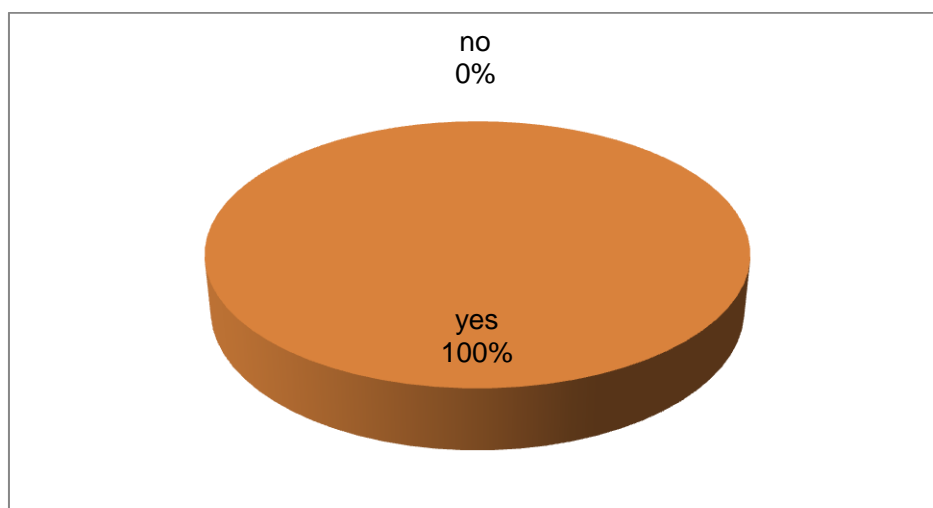


Fig. 10. Respondent's experience of flood in the area

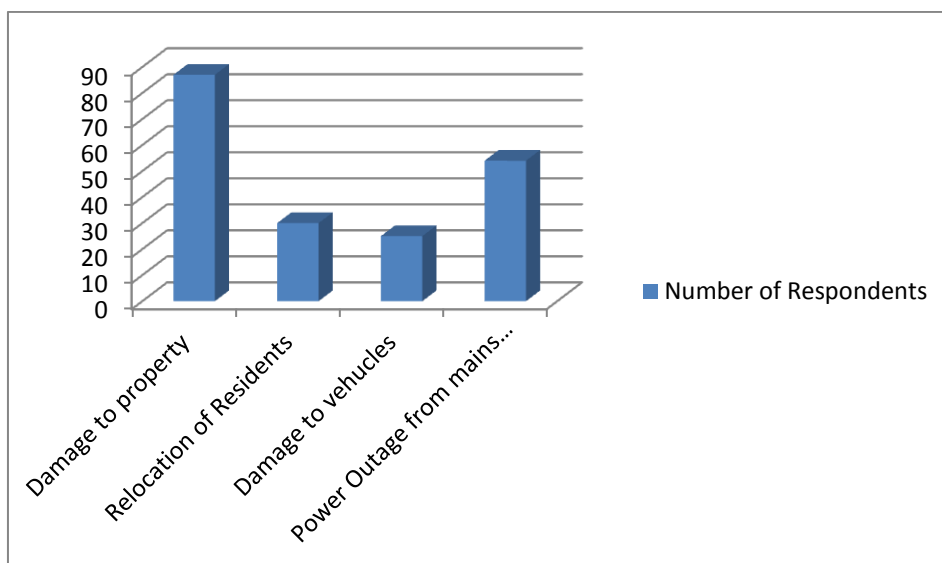


Fig. 11. Experience during flooding

Table 12. Knowledge about property development

Options	No of responses	%
Building/Renovation of properties	16	8
Selling/Buying of properties	13	7
Leasing/Renting of properties	5	3
All of the above	162	83
None of the above	-	0
Total	196	100

damage to building being the most evident. This assertion is supported by 87 out of 196 respondents which represents 44% of respondents in the survey.

Table 13. Presence of adequate and functional drainage systems

Options	No of responses	%
Yes	77	39
No	119	61
Total	196	100

Source: Authors' Analysis, 2019

Fig. 11 shows that during flooding the residents experience divers form of inconveniences with

From Fig. 12, the highest cause of property vacancy in the study area was attributed to

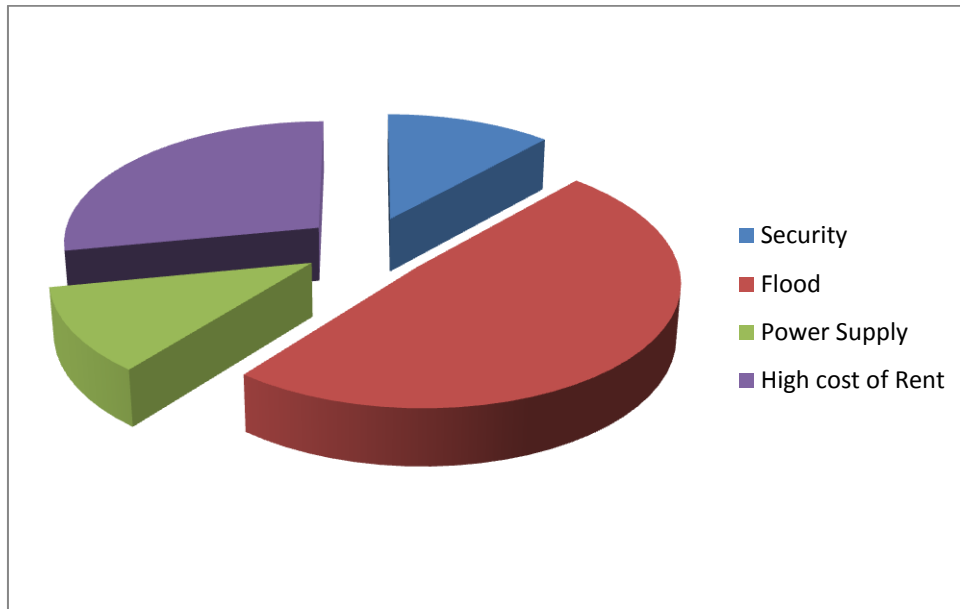


Fig. 12. Most common cause of property vacancy in the area

flooding as 49% of the respondents affirm this position. This shows that flooding not only causes damage to property but also brings about vacancies leading to loss of income to the investor and revenue to the government.

Table 14 shows that half of the respondents (50%) in this study describe the rate of property development in the area as slow. This can be attributed to flooding and corroborated by Figs. 11 and 12 which depicts flooding as a cause of vacancy and damage to property.

Table 14. Description of the rate of property development in the area

Options	No of responses	%
Fast	22	11
Slow	98	50
Stagnant	76	39
Total	196	100

From Fig. 13, it is obvious that 66% of the respondents are willing to relocate to another area because of flooding. This shows that flooding hampers and negatively impacts on the growth of property development within the study area as it makes neighbourhood less attractive to investors and prospective occupants alike.

Table 15 below shows that 48% of the respondents own the properties they occupy, and from this cohort, 93% have an approved building plan (Table 16), but none of the respondents was giving any prerequisite or condition for property

development in a flood-prone area (Table 17). This underscores the fact that there is lack of legislative control measure and inadequate regulations by relevant agencies associated with property development. This results to chaotic and unsafe properties which are unsuitable for flood-prone areas within the study area.

Table 15. Ownership of property occupied

Options	No of responses	%
Yes, I do	95	48
No, I don't	101	52
Total	196	100

Source: Authors' Analysis, 2019

4. DISCUSSION

Flooding is seen to have affected property development in this study as values of property in flood-prone area may sometimes be perceived as depreciative by property investors, thus leading to a slow pace in property growth. The research has shown that flood-prone areas within the study area are predominantly residential; this therefore implies that property growth is lopsided as commercial and industrial development are not viable. Thus, flooding could be perceived as a nuisance to prospective customers. This finding is corroborated by the results of the study of Evans and Keppins [19].

Further analysis of the research data depicts that there is a higher cost of maintenance of

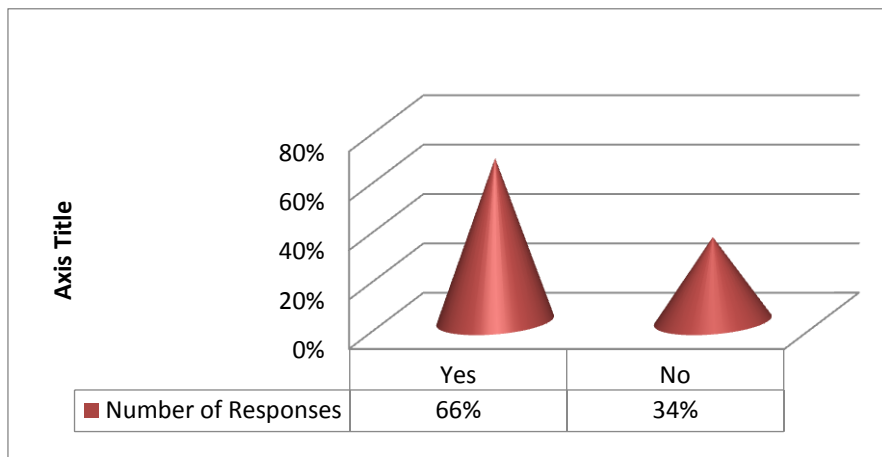


Fig. 13. Relocation to other areas of the city because of flood

properties in flood-prone areas; this could also lead to a source of discouragement for developers who intend to invest in real estate. Moreover, a greater percentage of the respondents clearly indicated their willingness to relocate if they had an opportunity due to damage to buildings and other related incidental losses. These findings are consistent with the study of Okereke and Ojukwu [20].

Table 16. If yes, do you have an approved building plan for this property

Options	No of responses	%
Yes, I have	88	93
No, I don't have	7	7
Total	95	100%

Source: Authors' Analysis, 2019

Table 17. Condition by the Urban development authority as a prerequisite for development in a flood-prone area?

Options	No of responses	%
Yes	-	0
No	88	100
Total	88	100

Source: Authors' Analysis, 2019

Ironically, from the analysis of research carried out, the presence of drainage systems within the study area was established. However, results gotten from the field survey and interviews reveals that though there is a presence of drainage system in most areas, the capacity of such drainages are not adequate for catchment of runoff water. In some cases, it was observed that most of the available drainage systems are blocked due to anthropogenic factors.

The research also investigated the existence of urban legislative control measures on flooding

and its awareness to the public. From the investigation it was deduced that legislative flood control measures are existing in the study area but awareness and enforcement by appropriate authorities is insufficient. Interestingly, the study established a relationship between property development and flood. It was further deduced that flood hinders the growth of socio-economic activities because flood-prone areas are less likely to attract commercial property as shown in the study.

5. CONCLUSION AND RECOMMENDATION

From the research, it is obvious that properties developed within Port Harcourt metropolis are potentially at risk of flooding, from rivers, rainfalls, ground water and coastal excess. Further findings depict that flood water as seen in the research contributes significantly to damage of property, as the activity of water absorption and drying out weakens the building materials leading to frequent repairs and reduction of life span of property. Floods in Port Harcourt Metropolis are characterized by poor adherence to planning regulations, inadequate drainage channels and rainfall which is a constant natural factor. From the result of the analysis, it is evident that the impact of flooding on property development in Port Harcourt metropolis is retrogressive.

Property developers in the metropolis are more willing to develop on sites less prone to flood than on site with history or incidence of flood. The susceptibility of land/property to flooding is usually obvious to man, however, planning is what reduces or removes the occurrence of flooding in built environment. There also

appeared to be an agreement of the opinion that a property exposure to flooding is detrimental to its value.

The assessment of the impact of flooding disaster on real property development has no doubt been a very interesting research topic. From the result of the analysis, it is evident that properties in flood-prone areas are underpriced and commands less value than same property in non-flood prone location in the study area. Thus, the need to arrest this negative impact of flood is crucial to encourage property development which in its self is an important factor in achieving a vibrant economy.

There is also the need for government to be proactive in urban planning and enforcement of flood control measures to ensure property development in flood-prone areas are flood-proof, promotion of flood resilient design and construction materials in flood-prone areas through building regulations in new development and redevelopment, upgrading of existing inadequate drainage channels to improve the flow capacity of the drainages by enlarging or replacement of the existing drainage systems and the need for regulatory agencies to resist development in flood-prone areas. This measure could be used to avoid flood rather than control it.

Finally, Property developers should ensure they carry out feasibility and viability appraisal to gather adequate information about flood risk to prevent loss on investment, publication of flood-prone areas and maps by governmental agencies to enlighten property developers and the construction of dams and ponds by government in flood-prone areas to harvest water for urban agricultural development.

CONSENT

As per international standard respondents' consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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