Global Journal of Applied, Management and Social Sciences (GOJAMSS); Vol.22, August 2021; P.49 – 60 (ISSN: 2276 – 9013)

NATURAL DISASTER IN ANAMBRA FROM THE VIEW OF THE PEOPLE OF ANAM

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Abstract
This paper examine flooding as a natural disaster in Anam, urban landscape. It is a combination of field observation through the distribution of questionnaire to the residents of the area and library research, problems were identified such as the causes and devastating effects of flooding in Anam which necessitated the need for this study. Research objectives were stated among which is to identify the flood generating structures and the areas vulnerable to flooding. Research questions and hypotheses were formulated to guide in achieving the objectives. The study review both theoretical and related empirical literatures under headings such as the concept of flood, types of floods, effects of flood, pattern of floods among others. The study adopted the quasi-experimental research design which is a combination of both survey and field work. 170 respondents were selected using the stratified rand sampling techniques from each of the study areas; structured questionnaires were distributed to them. The descriptive and inferential statistics were used to analyze the data obtained from the respondents and field, while the questionnaires were analyzed and presented in tables using frequency and simple percentages; and the data were analyzed using the standard multiple regression technique to estimate how the parameters (i.e ponds, drainage, polythene, vegetation and house clustering) affect the rate of flooding. Some of the findings of the study revealed that the major cause of flooding in the area is rainfall and lack of sufficient drainage system, which occur mostly from July to September annually to high amount of rainfall within that period. The residents close to the drainage or blocked surfaces experience higher rate of destruction than those far away from the drainage. The paper recommend that the environment should be well taken care to avoid escalation of floods in addition to construction of dry dams for the purpose of flood control as well as flood-mapping of vulnerable areas as these will go a long way in reducing the incidence of flooding in the study area.

Introduction

The world at large has in the recent past developed great concern over environmental issues such as global warning and its effect, flood which constitute a great problem to man, is both human-induced (anthropogenic) and natural disasters. Global warming is as a result of human activities such as deforestation, the release of carbon monoxide into the atmosphere in various ways and thereby creating hole in the ozone layer. The Intergovernmental Panel for Climate Change (IPCC, 2007), fourth assessment report reveals that the frequency of heavy precipitation has increase over most land areas that appear to be consistent with the global warming phenomenon. The impact of global warming on specific regions of the world has been estimated and predicted that "heavy precipitation events which are very likely to increase in frequency will augment flood risk". This means that floods will get more severe in areas that are already prone to such disaster. They also observed increase in atmospheric water vapour, extreme temperature and increase in intense tropical cyclones in some regions. Natural and Anthropogenic disasters had from prehistoric periods had serious impact on man and his environment. Natural disasters and anthropogenic disasters could come in form of earthquakes, cyclones, volcanic eruptions, landslides and floods. Impact of disasters on men are exacerbated by a number of factors which include poor land use planning, population growth, environmental mismanagement, increasing levels of vulnerability, poor governance and climatic change.

In 2015, Nigeria was hit by a large wave of flood which was probably the biggest and most deadly flood disaster in Nigeria's history, which affected about 2/3 of the federation, leaving scores of people dead and properties worth millions of naira destroyed, with Anam, Anambra West LGA in Anambra State having more than a fair share of the disaster.

Normal Flood Pattern ; Normal flood is a natural fundamental process for the transfer of water and sediments from drainage channel to the immediate basin and modification of valleys. The overflowing of water limited to the basin of the river and is not destructive, but occurs periodically.
Abnormal Flood Pattern; Abnormal flood is the inundation of an area not normally covered with water during normal floods in a stream, lake or sea. It can result in loss of lives and properties in the environment where it occurred.
Causes of Flood; Many factors are responsible for flooding in any geographical location. According to Ahmed, (2002), Udoeka, (2008), Kerle, (2007) flood can be broadly categorized according to the following processes and factors: meteorological processes, geological processes, hydrological factors, mass movement, anthropogenic factors.

Meteorological Processes; Some disastrous floods can be caused by monsoons rainfall especially in some equatorial countries such as Bangladesh. Hurricane can cause storms surge and sea flooding as high as 8 meters. Some of the storms that cause flood could result from severe rain or thunderstorms, monsoons, hurricanes, typhoons, mid-latitude storms and tropical cyclones. Floods are also caused by heavy oceanic surges which push the water to the coast. In August 2005, hurricane Katrina hit New Orleans, and destroyed levees and floodwalls in the riverine area, resulting in the flooding of 80% of the town.

Geological Processes; Tectonic movement such as earthquake and volcanic eruptions in the sea, ocean, river or lake can lead to flood through violent wave action such as Tsunamis. Tsunamis are popularly called tidal waves but they actually have nothing to do with the tides. These waves, which often affect distant shores, originate from undersea or costal seismic activity, landslides, and volcanic eruptions. Whatever the cause, sea water is displaced with violent motion, surging over land with great destructive power. An example of such a flood occurred along the costal part of China and in part of Asia in September 1998 and 2004.

Hydrological Factors; According to hydrologist such as (Shaw, 1996), (Reddy, 2004, 2006), (Yousef and Wanielista, 1993), some of the hydrological factors responsible for flood are; the base flow of a river, the rate of run-off, soil moisture, precipitation, the level of the built-up in the basin, evaporation and transpiration.

a. Base Flow

Base flow is defined as the sustained or fair weathered run-off originating from groundwater or delayed interflow. The difference between the direct run-off and base flow is on the basis of the time of arrival of the run-off in the stream rather than on the path followed by the run-off. When the base flow of a river is high it has a moderate contributing factor to the rainy season floods on the tributaries of that river.

b. Precipitation Type

Precipitation is the fallout of water drops or frozen particles from the atmosphere onto the ground surface. Liquid types are rain or drizzle, while frozen types are snow, hail, small hail, ice pellets. All precipitation types are called hydrometeors, of which additional forms are clouds, fog, wet haze, mist, blowing snow, and spray. Precipitation is the random event over time and can be defined as the volume, intensity and inter-event dry periods, of atmospheric vapour falling to the ground as rain or ice, (Wanielista and Yousef, 1993). Seasonal rains may be intense with multiple storms, causing monsoon floods. Rainfall associated with seasonal cyclonic depressions may be long in duration and extensive in coverage. When in an environment there is intense and continuous rainfall for some hours or days, in association with other environmental factors it may lead to flash flood or urban flood.

c. The Rate of Run-Off

Urbanization has a great effect on surface runoff patterns. Flooding problems resulting from runoff of surface water generally increase as areas become more urbanized. This reduction in the amount of natural ground that can absorb rainfall results in an increase in the amount of surface runoff generated. Flooding of structures and road ways is caused by uncontrolled runoff. When it rains some water infiltrates into the sponge and some water runs off the surface of the sponge into the stream. Greater population density generally increases the amount of imperviousness in an area. As more of the natural landscape is replaced by impervious surfaces, Such as roads, houses, parking lots, and buildings it reduce the infiltration of water into the ground and accelerate runoff to ditches and streams. Surface run-off is the excess of precipitation after meeting the demands of evapo-transpiration and in filtration.Soil Texture/Moisture Relation (Porosity)

Soil structure refers to the grouping of soil particles (sand, silt, clay, organic matter and fertilizers) into porous compounds. Coarse textured soils have large pores in between them while the fine textured soils have small pores in between them. The soil moisture content indicates the amount of water present in the depth of one meter of soil. The water stored in the soil depends on the packaging of the clay or sand particles and the amount of space available between the solids.

i. The Height of the Built-Up Area below Sea Level

When people temper with the balance in the ecosystem by locating their structures and activities below sea level, these actions leads to flooding. In the Netherlands for example, as the name implies, more than two-thirds of the country lie below sea level. Some parts of Lagos in Nigeria are also below sea level, hence the recurrent floods occurrence inundating most parts of the settlements in the country. Flood occurrence in Laos is not as a result of this factor but other factors such impervious surfaces, wrong habits of disposing waste and drainage dimensions which are common to many urban area of the world.

ii. Human Factor

Man's activities such as deforestations, cultivation, roads and bridges constructions, buildings and mining in an area, exposes th land to wind and water erosion and high rate of runoff which eventually lead to flooding during rainy season.

iii. Types of Drainage Network

The type of drainage network in an urbanized area is one of the landform/morphological factors that affect the rate of runoff. In undeveloped area, the runoff water is provided by nature. The basic philosophy of urban drainage has typically been to seek maximum convenience at a particular sit by the most rapid, possible way of eliminating excess surface water after rainfall. This meant that no matter how large the rainfall or its duration, the drainage system is expected to remove runoff as quickly as possible.

iv. Mass Movement

Mass movement such as landslide, talus creep/mudflow in the lake, river, or water bodies, raises the level of water above the bank's full capacity leading to mass flooding of the surrounding areas. Heavy rainfall from the storm of December 16-16, 1999 triggered thousands of landslides on steep slopes of the Sierra de Avila north of Caracas, Venezuela which caused flooding and massive debris flows that damaged coastal communities in the Stat of Vargas along the Caribbean Sea, (Wieczorek, G.F, Larsen, M.C, Eaton, L.S, Morgan, B.A and Blair, J.L., 2000).

Effects of Flood

Flooding is a common environmental hazard affecting man. This is because rivers and coastal regions are widely distributed geographic features that offer wide range of attractions for socio-economic activities in their vicinity. The damage potential of floods is dependent on many factors such as the magnitude of the flood, speed of onset, and the duration of the event (Reed, 1977). The main factors influencing the magnitude of a flood and its effects on the environment as earlier discussed are; nature of precipitation, the drainage

characteristics of drainage basin, the velocity of stream flow. The effects are the marks created on the environment by the force and volume of water.

Long Term/Tertiary Effects

There is economic hardship due to temporary decline in tourism and rebuilding cost of some structures, temporary suspension of economic activities, food shortage leading to price increase. An entire harvest may be lost together with animal fodder resulting in long-term food shortages. Susceptibility to destruction depends on the type of crop and duration of flooding. Some crops, such as taro are quickly killed by relatively small amounts of flood water, others may be able to resist submersion but may die eventually, if large amounts of standing water stagnate as in the disastrous 100 year of 1988 Bangladesh flood. Large numbers of animals, including draught animals, may be lost if they are not moved to safety. This may reduce the availability of milk and other animal products and services. These losses, in addition to possible loss of farm implements and seed stocks, may hinder future planting efforts. The psychological or emotional effects due to loss of loved ones are all the long term effects that result from flood.

Positive Effects of Flood

Although floods have devastating effects on man and his environment, it also have some benefits such as making soil more fertile and providing nutrients where it is deficient. Periodic flooding was essential to the Trigris-Euphrates Rivers, the Nile River, the Indus River, the Ganges and Yellow Rivers. Positive effects of floods therefore, includes the creation of wetlands, recharging of ground-water, and maintaining the river ecosystems by providing breeding, nesting and feeding areas for fish, birds and wildlife. In Bangladesh, floods replenish the inland fish supply which supports a major industry for dwellers of the delta regions. Generally, floods flush out the pollutants in the water ways, where dams prevent it. The resulting effects are in the downstream areas, where soil fertility reduces and lack of drainages may eventually affect agricultural productivity.

The Roles Geographical Information System (GIS) in Environment Studies

Geographical Information System (GIS) is defined as "a system for capturing, storing, checking, integrating, manipulating, analyzing, and displaying data which are spatially referenced to the Earth. This is normally considered to involve a spatially referenced computer database and appropriate application of software".

In GIS software, two basic spatial data model exist which are, the vector and raster data model. The vector data model handles geometric spatial data such as points representing discrete point features, lines representing linear features and polygons representing bounded areas which are fundamental to spatial data models. Raster data model is a simple data structure; a grid with a single number (code) in each cell, which makes analysis easier in environmental studies especially in mapping areas vulnerable and at risk to flooding, (Halilu, 2008).

Flood Risk Mapping

Flood risk mapping is the act of producing maps that identifies areas vulnerable or at risk or prone to flooding in any part of the world. Flood risk maps are produced by GIS software packages such as Ilwis, ArcMap, ArcInfo in ArcGIS. In mapping spatial locations prone to flooding using GIS software package, base mapping which started gaining recognition globally since 20th century is fundamental. Mapping areas prone to flooding is a pre-requisite to exploiting resources, planning the physical and socio-economic environment. Information from flood risk mapping will help environmental managers and planners in building resilient societies and cities prone to flooding. The United Nation Conference on Environment and Development 9UNCED) in 1992 in Rio de Janeiro Agenda 21, chapter 40 expresses the requirement of mapping for the purpose of environmental monitoring and the expansion of basic topographic mapping. One of the flood risk maps produced is the digital elevation model or digital terrain model which is the digital representation of ground surface topography or terrain, helping to identify areas at risk or prone to flooding. The land areas, buildings, people's vulnerability and risk to flood depends on their location, type of building, the people's economic status and the age group of the people.

Data Presentation

Table .1: Sex Distribution of the Respondents

SEX	FREQUENCY	PERCENTAGE
Male	105	53.7
Female	65	46.3
Total	170	100

Source: Field Survey, 2021

The table above revealed that the sexes of the respondents is dominated by Male as 105, accounting for 53.7 percent and 65 representing 46.3 percent of the total respondents are female. So here, more males are involved in farming activities than females because of the attitudes of women in the East due to religion and culture.

Table .2: Marital Status of the Respondent

SEX	FREQUENCY	PERCENTAGE
Single	33	21.9
Married	49	27.6
Divorced	21	13.0
Widow	67	37.4
Others	-	-
Total	170	100

Source: Field Survey, 2021

Table .2 indicated that about 67 respondents representing 37.4% are widows, 49 representing 27.6% of the respondents are marries people, 33 representing 21.9% of the total populations are single, and 21 representing 13% are divorced.

So the number of widowed shows that they dominate the area. The difference in the various figures shows widowed people as the highest figure revealed that people whom are widowed largely depend and dominate the farm work.

Table .3: Age Rang of the Respondents

AGE RANGE	FREQUENCY	PERCENTAGE
20-29	45	21.9
30 – 39	34	17.1
40 – 49	50	33.7
50 – 59	22	13.8
60 and above	18	13.4
Total	170	100

Source: Field Survey, 2021

Table .3 indicated the age distribution of the people. These data revealed that people between 40 – 49 and 20 – 29 are the majority in the area followed by 30 – 39. The data also showed decrease in the number of people with increase in age.

The cause of this decrease could be attributed to the fact that most people whose age fails between 20 – 29 are likely to be migrants, who were stimulated by the transfer of the rural areas to urban (suburban areas) due to creation of other job opportunities and businesses in the urban and social amenities provision e.g hospitals, schools, industries etc.

Table .4: Major Occupation of Respondents

OCCUPATION	FREQUENCY	PERCENTAGE
Civil servants	16	15.4
Students	52	21.1
Farmers	59	26.8
Traders	26	19.9
Others	19	16.7
Total	170	100

Source: Field Survey, 2021

This indicated that the study area is undergoing the process of urbanization from agricultural to commercial and administrative function. Historically, the study area was a village inhabited by farmers, but the recent phenomenon has drastically changed the economic activities dominating the area. The consequence of this change is the general decline in food production, which initiates the persistent rise in foodstuff price in the market.

Since the study area according to history started as a small agricultural settlement with very few people with vast land for agriculture, the table above signified the reality of the problem on ground.

Data Analysis

Areas Vulnerable to Flooding

Table .5: Table showing vulnerable areas

OPTION	FREQUENCY	PERCENTAGE
Unplanned areas	87	51
Building along flood plains	18	10.6
Areas with poor environment al sanitation	12	7
Areas with sufficient drainage system	39	23
Areas with high house cluster	14	8.2
Total	170	100

Source: Field Survey, 2021

The above table indicates that unplanned areas have the level of vulnerability of flooding in Anam with a 51% of the respondent testifying to this, buildings along flood plains and poor environment sanitation have 10.6% and 7% respectively. Areas with insufficient drainage are also identified as major vulnerable areas of flooding with 23% of the total respondents saying so. Areas with high house clustering were also discovered to be vulnerable to flood; it has a percentage value of 8.2%.

Flood Generating Structures

When examining the flood generating structure in an area with dense population such as Anam, many factors are put into consideration. These are lack of waste material dumping, ponds, drainage system, vegetation cover and buildings clustering. These factors were identified by the respondents residing in the area. Percentages and bar charts diagram have been used, to show how large and effect each factor is in generating flood occurrences in Anam.

Table .6: Showing Generating Structures of Flooding in Anam

VARIABLE	FREQUENCY	PERCENTAGE
Polythene deposit	34	20
Ponds	38	22.4
Drainages	52	30.6
Vegetation cover	11	6.5
House clustering	35	20.6
Total	170	100

Source: Field Survey, 2021

The table above shows that 34 representing 20% of the respondents indicated that polythene deposit is responsible for flooding in Anam, 38 representing 22.4% went for ponds, 52 respondents representing 30.6% selected drainages as the urban structure responsible for flooding, vegetation cover was selected by 11 (6.5% of the respondents as being responsible for flooding, while 35 respondents representing 20.6% of the total respondents indicated that house clustering is the urban structure responsible for flooding in Anam.

Table .7: Amount of Rainfall between 2015 – 2017

MONTH	2015	2016	2017
April	30.9	14.1	13.2
May	100.6	69.6	48.5
June	161.4	173.0	262.8
July	254.1	573.0	467.9
August	451.9	271.8	545.2
September	251.5	444.1	402.1
October	4.1	26.40	29.9
Total	1291.4	1872.0	1609.8
Average	179	224.6	252.8

Source: Anambra State Meteorology Centre

The final result of the data analysis reveals that the amount of rainfall is the major factor influencing the occurrences of flooding in Anam. It can be seen that the amount of rainfall starts gradually by April, the accumulates to its peak by August, and then starts declining down to October. It shows that the average amount of rainfall in 2015 – 2017 is 1691.1mm and the flood mostly occurs in the month with higher rainfall amounts usually July, August and September. Thirty two percent of the respondents believed that rainfall is the major cause of floods in the area.

Table .8: Duration of Flood in Anam

DURATION	FREQUENCY	PERCENTAGE
1 Month	110	73
2 months	40	21
3 months	30	6
Total	170	100

Source: Field Survey, 2021

The location of flood occurrences changes in the study area changes, from time to time and this may be as a result of the people efforts to take some kind of precautions in certain locations. Such areas may not experience flood in a particular year, as the flood shifts to other locations, where no precaution have been taken. Such neglects coupled with high rainfall amount result in very serious flood events. For example, the flood of 2015 was regarded as low flood by 65% of the respondents as a result of their effort to help themselves.

A serious flood was experienced in the year 2016 by 40% of the respondents while a low flood was experienced by 22% of the respondents in the year 2017.

- Magnitude of Rainfall in Anam from 2015 to 2017

The respondents asked on their assessment of the magnitude of flooding that has occurred within the study area. The results of the findings are presented in the table below:

Table .9: Magnitude of Flood between 2015 – 2017

YEAR	RATING	PERCENTAGE
2015	Serious flood Low flood	35 65
2016	Serious flood Low flood	60 40
2017	Serious flood Low flood	45 55

Source: Field Survey 2021

Table .5 shows the respondnts' assessment of the magnitude of flooding that has happened in Anam from 2015 – 2017. It is evident from the table that in 2015, 35% of the respondents experienced serious flood, while 65% experienced low flood.

In 2016, a whopping 60% of the respondents attested to experiencing serious flood, while the other 40% experienced mild flood. More so, in 2017, 45% experienced serious flood, while 55% experienced low flood.

- Consequences of Flooding in the Area

The consequences of flooding in any environment are disastrous, though its role in changing phase of human life especially where it seems to be serious. Different in different parts of the country resulted in bad consequences, for the environment of both human and animals through its role in the loss of life and properties including dwelling places. Areas worst hit were 3 Crescent in Phase II of the FHA Estate, Phase 1B and parts of Phases 2-1, 2-2 and PW Estate in Anam. On the Phase III area, 10 blocks of 20 flats on 32 Crescent were marked by the Officials, who informed residents that their houses lay within the flood plain. The residents association said it would be seeking a legal action to stop the planed demolition.

The consequences of flooding in Anam area are very serious; people are suffering very much through their displacement and the loss of their properties. All these cost them lots of money to find houses and belonging somewhere else, apart from that, there is the payment of lots of money for transporting themselves and their properties to other places. The effect of floods in the area in the past includes loss of human lives, animals and different properties, worth thousands of naira between the years 2015 – 2017.

Table .10: Houses Affected by Flood

Distance from Plain	Total No of Houses	No of Houses Affected	Percentage
Near	110	55	65
Far away	60	8	35
Total	170	63	100

Source: Field Survey, 2021

From the table, it is seen that, out of total number of houses affected by the flood, 56% of the houses are located near water and 35% of the rooms of the houses near waterways were affected by the flood. It is also observed that the flood affected 28% out of the rooms of the houses located far away from the main drainage channel. The observation also shows that poor urban planning makes the houses to be congested, and jointly compacted with each other in Anam. Majority of the houses are made up of mud and wooden roofs, which are government absorbers of water and moisture. When there is heavy downpour of rainfall, the condition leads to the collapse of the houses, especially fold. This collapsing of houses sometimes leads to death of both human and animal and the loss of properties.

From the questionnaire, responses show that, the people of the area do not predict the cases of flood occurrences, due to lack of education. It is only when it happens that they start telling their colleagues who in some cases help them. It was also found out that most of the respondents get some assistance from government in terms of food and money that reach them through their ward heads.

Also from other relevant agencies like the National Emergency Management Agency (NEMA) shows that a lot of money spent almost every year to purchase materials in order to give victims. There is also substantial cash paid for construction of drainages and rehabilitation of drainage structures of flood.

- Test of Hypotheses

The hypotheses formulated earlier, will be tested in this section. Hypotheses 1 – 5 will be tested using the multiple standard regression technique to estimate the amount of variability in flooding that is caused by waste dumping, ponds, drainages, vegetation covering and house clustering. As stated earlier, the study will take a significant value at the 0.05 level of significance.

The result of the regression is presented in the table below – the coefficients column is the marginal units of flood that will change if the corresponding independent variable changes by 1 unit; the t-value measures the reliability of the variable in predicting the outcome of flood, while the significance column shows the p-value serves as a basis for accepting or rejecting null hypothesis.

Table .11: Regression Coefficients

	Coefficients	t-table	Sig
(Constant	115.265	7.069	.000
Polythene Deposit	.029	.127	.032
Pond	.235	5.374	.002
Drainage	-359	-242	.017
Vegetation Cover	.101	.281	.788
House Cluster	.061	-680	.522
R Squar	0.867		
Adjusted R-Square	0.756		
S.E of Estimate	8.20734		
Drubin-Waston	2.182		
F-Statistics	7.799 (0.03)		

The above table shows the summary of the multiple regression analysis conducted to estimate how each of the independent variables affect the dependent variable (i.e flooding). From the table, the Constant of the equation is 115.265 – this is the value of flood if all other factors are zero, it has a t-value of 7.069 which is significant at the 5% level of significance.

It can be seen from the table that Polythene Deposit (waste dumps) has a coefficient value of 0.029, this means that if the amount of polythene dumped is increased by 1 unit, it will lead to a corresponding increase of 0.029 increase in flooding, having a t-value of 0.127 which is statistically significant because the p-value is 0.032 which is less than 0.05. Based on this result, we can therefore reject the null hypothesis and conclude that polythene deposit has significant impact on flooding.

Furthermore, Ponds was shown to have a statistically significant impact on flooding as the table indicates that if the area covered with pond increases by 1, it will increase the rate of flooding by 0.235, with a t-value of 5.374 indicating that pond is effective in contributing to the outcome of flooding with a significance of 0.002. In light of this result, the null hypothesis is hereby rejected, and hence by concluded that ponds have significant impact on flooding.

However, Drainage system was discovered to have a negative effect on flooding – which seems like a good thing. It indicates that if the length, width and depth of drainages are increased by 1 unit, it result to a corresponding decrease of -0.359 in flooding with a t-value of 0.242 and a significance value of 0.017, indicating that drainage is a significant factor in contributing to the outcome of flooding. Based on this result, we can therefore reject the null hypothesis and conclude that drainage has significance effect on flooding.

More so, the table shows that Vegetation cover has a positive but small and insignificant impact on flooding; it indicates that if vegetation is increase by 1, flooding will increase by 0.101 with t-value of 0.281 and significance value of 0.778 which means that vegetation cover is not statistically significant in predicting the outcome of flooding in Anam. Hence, null hypothesis is accepted and we conclude that vegetation has no significant impact on flooding.
Finally, the regression analysis indicated that flooding will increase by 0.061 if House Clustering increases by I unit. This result was however insignificant as the probability that the value might have occurred by chance is greater than 0.05. Based on the result, we therefore accept the null hypothesis and conclude that clustering is not statistically significant in predicting the outcome of flooding.

In summary, the R-Square Value which is the coefficient of determination has a value of 0.867 which means that ponds, drainages, vegetation, polythene and house clustering account for 86.7% changes in flooding in Anam, while the remaining 13.3% is the unaccounted changes in flooding that are not caused by the independent variables.
The Adjusted R-Square value of 0.756 shows that if other external factors such as rainfall, environmental sanitation etc are put into consideration, the independent variables would account for 75.6% variability in flooding.

The Standard Error of the estimate has a value of 8.20734 which means that the effects of the independent variables are reliability. The Durbin-Watson value of 2.182 proves that there is no presence if serial correlation. The F-Statistics has a value of 7.799 and significance value of 0.03 indicating that the independent variables are statistically significant in predicting the outcome of the dependent variable.

Conclusion

Flooding is a world-wide problem which, in many countries results in the loss of lives and extensive damage to infrastructure and agricultural production. This research has made efforts to interpret what causes the flooding in Anambra West Local Government Area, the consequences of the floods and formally its control. Right from the previous chapters, we have seen that the flood is caused by two major factors namely: natural and anthropogenic factor (human induce activities). Floods of devastating dimensions impact adversely on the social and economic life of the people. Adequate measurements must therefore be taken always to avert or minimi8ze the risk associated with its occurrences

The natural factors involve high amount of rainfall, the poor soil infiltration (meteorological factors). The human factors (anthropogenic) include indiscriminate refuse dumping in water ways, lack of public education, inadequate drainage system, buildings and structures along water ways, poor urban planning and finally effort of man in clearing natural vegetation to modernize his environment. A natural phenomena life flood has been causing great damage to physical and human environment stagnate development and well-being of any environment and resulting in the loss of lives and properties.

Due to hazards associated with flood, there is a need to control this annual flooding in our environment in order to come up with safe environment. This could be achieve through public relief, abatement and control, land elevation, emergency action structural adjustment, land use regulation and flood insurance. In other words, flood as a natural phenomena cant be completely stopped, rather there are some possible measures to control it and predict its consequences.

Recommendations

Based on the findings of this research, the following recommendations are hereby proffered:

This study recommends the need for better and effective flood mitigation system in Anam and the whole of the Anambra State to endure the safety of people and economy such as flood alert and early warning mechanism.

i. To avert damages from flood disaster in the future, there is need to educate the people living on the flood plain who are vulnerable about the risk and hazard associated with continuous occupation of the area.

ii. There should also be regular and periodic sanitation exercise to clear refuse in drainages as this will go a long way in averting possible incidences of flooding; ponds should be well taken care to avoid escalation of floods.

iii. Anambra State Government should create a system to convey and manage storm water in order to mitigate safety hazards and minimize property losses and disruptions due to heavy storm water run-of and flooding in Anambra West LGA.

iv. Demolition of illegal structures: Structures that are built on the pathways of flood waters which their obstruct flow should be demolished. This would reduce the increased rate of uncontrolled urbanization/urban creep and decongest Anam.

v. Local preparedness to mitigate the negative of flooding: This requires sensitization of the communities on flood and flooding and most important of all, educate them on what to do n the event of flooding.

vi. Flooding-lain mapping: Scientist all over the world are of the view that the most effective way of reducing the risk of destruction of people and properties is through the production of flood risk maps. The essence of this is to delineate flood prone areas so as to avoid their occupation. This is the responsibility of Commissioner of Agriculture and Water Resources and Ministry of Environment.

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