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ASSESSMENT OF THE ENVIRONMENTAL EFFECTS OF 2012 FLOODS IN UMULERI, ANAMBRA EAST LOCAL GOVERNMENT AREA OF ANAMBRA STATE, NIGERIA

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ABSTRACT: *This study assessed the environmental effects of 2012 floods in Umuleri, Anambra East Local Government Area of Anambra State were investigated using questionnaire survey, with a view to ascertaining its implications on the inhabitants of the area. The data were generated and analyzed using Independent samples T-test and Mann-Whitney U-test statistical technique. The result revealed that the 2012 floods were mostly caused by heavy rainfall and anthropogenic activities such as construction on flood plains. The study also showed that the inhabitants experienced effects such as displacement from homes, submerging of farmland, loss of income, destruction of infrastructures, scarcity of food, overcrowding in shelter camps and spread of communicable diseases. Consequently, since flood has been ravaging the area recently, further research to develop flood hazard map of the area and enlightenment of the residents on flood issues was recommended.*

KEYWORDS: Environmental Effects, 2012 Floods In Umuleri, Anambra, East Local Government Area, Anambra State, Nigeria

INTRODUCTION

Flooding is one of the major environmental problems facing man within the century. This is especially the case in most wetlands of the world. The reason of this is the general rise in sea level globally, due to global warming as well as the saturated nature of the wetlands in the Riverine areas. Periodic floods occur on many rivers, forming a surrounding region known as flood plain. Rivers overflow for reasons like excess rainfall. In extreme cases flooding may cause a loss of lives. As noted by Adeleye and Rustum (2011) torrential rains made rivers to overflow their banks and caused mud houses to collapse and also washed away livestock. In some places and cases, flooding has damaged bridges and caused overflow of dams, submergence of buildings, displacement of people from their homes, loss of people's valuables. The economy of a place can also be severely affected by flooding. Businesses may lose stock, patronage, data and productivity and disruption to utilities and transport. Tourism, farming and livestock can equally be affected. Vital infrastructure may also be damaged or disrupted. Electricity and gas supplies can be interrupted. Road links, railways, canals etc., may be blocked causing disruption to transport network and accessibility severely disrupted for local inhabitants, especially amongst those considered most vulnerable and loss of communications networks (Adeleye and Rustum, 2011). Although flooding, generally, is a bane to most people, floods can be quite beneficial. Actually, believe it or not, nature benefits more from natural floods than from not having them at all. What

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makes natural floods a disaster is when flood waters occur in areas populated by humans and in areas of significant human development. Otherwise, when left in its natural state, the benefits of floods outweigh the adverse effects (Bradshaw, Sodhi, Peh, and Brook, 2007). However, too much sand deposit will do the opposite. For farmers that maintain their crops along rivers, they should not feel threatened by yearly flooding. This gives their farm lands better soil consistencies and keeps their land fertile resulting to better harvests each year. Instead of preventing the natural flow of river floods, it might be beneficial in the long run to allow the flood waters to encroach into their lands (Hill, 1976). It was how nature intended it to be in the first place. However, there may be limits to how much farmers can tolerate such natural occurrences. One has to increase production to feed the demands of the human populace.

Statement of problem

Flooding is one of the most serious environmental problems pervasive in Anambra state. Over 30% of the inhabitants of Anambra state live along the riverine area and survive mainly on fishing and agriculture. The problem of flooding due to sea-level rise and storm surges constitute a significant source of threat to life, property, livelihoods, and infrastructure in the riverine region Ezirim (2010). According to Nwilo (2011), flooding is among the most devastating natural hazards in the state claiming more lives and causing damages to properties and infrastructure than any other natural phenomena. Umuleri has a landmass of 171.6 sq. km with a total projected population of 21,438 people (NPC, 2006). A large percentage of the landmass of Umuleri was inundated by the 2012 flood, this constitutes land area flooded and people were made refugees and lost their means of livelihood in this community. Unfortunately, most of these areas inundated are places where these towns carryout most of their economic activities like agricultural activities, fishing, industrialization, transportation activities and trading. This is to say, going by how flood plains of the areas are being ravaged, that these economic activities are in serious danger of being badly affected. The implications of this are that the inhabitants of the area and even people from distant places who depend on these activities are in serious danger of losing their means of livelihoods. This definitely will affect their lives. Several other problems where experienced by the people dwelling in the areas affected. These problems include migration of people, destruction of household properties, destruction of farm produce which lead to food scarcity causing hunger to the victims, overcrowding, spread of communicable diseases and water-borne diseases, people were attacked by animals washed into their homes, rate of crime and conflict increased as people resort to different social vices to survive. It is to this effect that this study seeks to assess the environmental effects of 2012 floods in Umuleri with a view to proffering solution to the menace.

Aim and objectives

The aim of this study is to ascertain the environmental effects of 2012 floods in riverine community of Umuleri. This will be achieved through the following objectives.

1. To identify the causes of 2012 floods in the area.
2. To ascertain the most affected environmental parameters in the study area.
3. To ascertain the ways in which the flood affected the inhabitants of the area.
4. To determine the mitigation measures applied to remediate the effects in the study area.

Research Hypothesis

This work tested the following hypothesis

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Ho: There is no significant difference between the causative factors of 2012 floods in the community.
Ho: There is no significant difference between the environmental effects of 2012 floods in the community.

Study Area

The study area is Umuleri, Anambra East Local Government Area of Anambra State. Umuleri has latitude of 6^0 29′N and longitude of 6^0 86′E with a landmass of 171.6sqkm. It has an elevation 82 meters above sea level. It is bounded by Anambra River and Anam communities on the north, Nteje on the south, Aguleri and Nando on the east and Nsugbe on the west.

Conceptual framework of the research

The problems of flood can best be understood when one understands the concept of hydrologic cycle, which is the concept that describes the fluxes of water between the various reservoirs of the hydrosphere. The hydrologic cycle maintains a mass balance, which means that the total amount of water in the system is fixed and the cycle is in a state of dynamic equilibrium, that the hydrologic cycle is seen as the exchange of water through processes of phase exchange, precipitation, transportation and runoff. Earth's atmosphere is a great solar-powered heat engine that draws up water as vapour and cloud, and discharges water after condensation as rain and for snow. The precipitated water may complete its cycle by following via the rivers, streams and/or percolated down into ground water systems back to the oceans or may be shot-circuited back into the atmosphere by evaporation from the land surface or by transportation from plants. The hydrologic cycle is important is important in moving chemical elements, sculpturing the landscape, weathering rocks, transporting and depositing sediments and providing water resources Hutchinson and Ridgeway (1975).

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The hydrologic cycle concept is illustrated below;

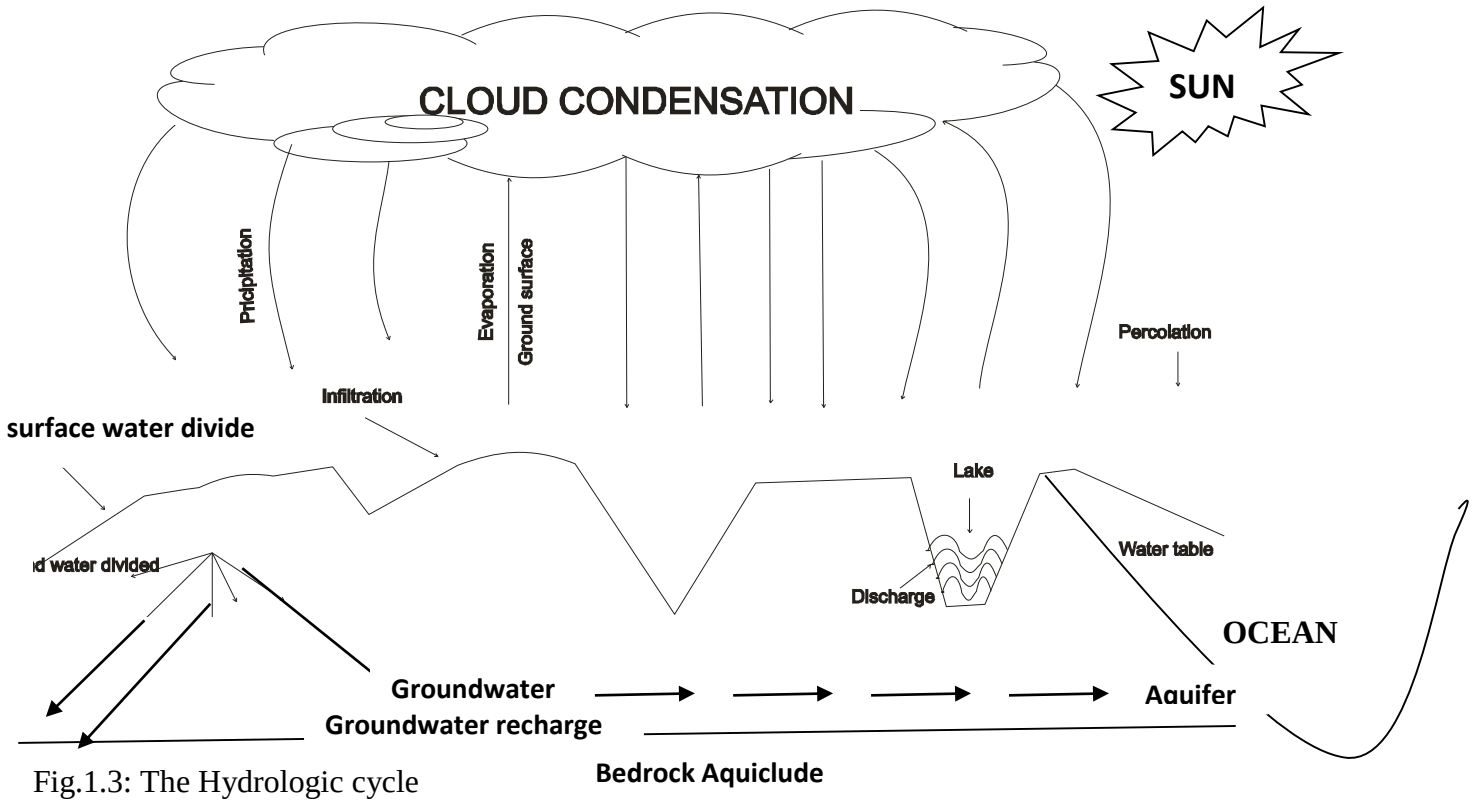

Fig.1.3: The Hydrologic cycle
Source: Egboka et al (1989)

METHODOLOGY

Survey design was used to derive information used for the study. Questionnaire method was employed in collecting information on the causes of flooding in Umuleri, the effects of flood on social and economic activities, and impacts of flood on the residents of Umuleri. This methodology was chosen because the data needed for study assessed the population sample size affected by the flood. The population of Umuleri was collected from the national population commission and projected to 2013 and the sample size was determined using YaroYamine's formula.

Population Projection and Sample Size Determination

Population projection $Pn = P_o (1+r)^n$

Where Pn = Projected Population

P_o = Base year population

r = estimated annual growth rate of the entire population obtained from the National population commission

n = time lapse (in years)

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Umuleri
Pn = 10,721 $(1 + 0.032)^{22}$
Pn = 10,721 × $(1.032)^{22}$
Pn = 21,438

The sample size determination using YaroYamine's Formula

$$S = \frac{N}{1 + N(e)^2}$$

Where:
S = Sample size
e = Margin of error assumed (0.07)
1 = theoretical constant
N = No of populations
No of population for Umuleri – 24,438 Source (NPC, 2006)

Sample size for Umuleri

$$S = \frac{N}{1 + N(e)^2}$$

S = $\frac{24438}{1+24438(0.07)^2}$ $S = \frac{24438}{120.7462}$ $S = 202.4$

Table 1: Sample Size Distribution of Questionnaire

Community	Number of questionnaires distributed	Number of questionnaires returned	Percentage returned rate (%)
Umuleri	200	179	49.2

Source: Author's Computation from Field work (2013)

From the table above, the number of questionnaire distributed and the percentage returned is shown.

RESULTS AND DISCUSSIONS

The discussions were approached from two ways: firstly, the discussions of the causes of 2012 flood in Umuleri and the various environmental effects of the 2012 flood as shown in the tables 2, 3, 4, 5, 6, 7 below, and discussions based on the statistical analyses made.

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Table 2: Percentage Response on Causes of 2012 Floods in Umuleri

S/N	1SSUES RAISED	SD		D		U		A		SA	
		F	%	F	%	F	%	F	%	F	%
1.	Damage of pipe-borne water	32	17.9	68	38.0	42	23.5	19	10.6	18	10.0
2.	Drainage failure	24	13.4	32	17.9	56	31.2	35	19.6	32	17.9
3.	Heavy rainfall	8	4.5	15	8.4	18	10.1	110	61.5	28	15.6
4.	Increase in development	16	8.9	20	11.2	36	20.1	63	35.2	44	24.6
5.	Blockage of flood channels through erection of structures	12	6.7	19	10.6	36	20.1	81	45.3	31	17.3
6.	Overgrazing and agricultural activities	18	10.1	22	12.3	28	15.6	73	40.8	38	21.2
7.	Over population	16	8.9	18	10.1	47	26.3	62	34.6	36	20.1
8.	Bush burning	22	12.3	26	14.5	18	10.1	69	38.5	44	24.6

Source: Author's Computation from Field work (2013)

From table 4.3 above, there was a firm agreement that heavy rainfall, increase in development, blockage of flood channels through erection of structures, and agricultural activities and bush burning were the major causes of 2012 flood in Umuleri. This could be seen from the frequency/percentage values of 77.1%, 59.8%, 62.6%, 62.0%, and 63.1% respectively. There are divergent percentage agreements on other supposed causes of the 2012 flood. This implies that drainage failure, damage of pipe-borne water led to the 2012 flood in Umuleri.

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Table 3: Percentage Response on Health Effects of 2012 Floods in Umuleri

S/N	Issues Raised	Frequency	Percentage
1.	Any health problem as a result of the flood?		
	Yes	149	83.2
	No	30	16.8
2.	What type of health problem?		
	Cholera	7	3.9
	Typhoid	18	10.0
	Hepatitis	12	6.7
	Diarrhea	25	14.0
	Dysentery	25	14.0
	Skin infection	61	34.1
	Others	31	17.3
3.	Did you lose anyone as a result of the flood?		
	Yes	0	0
	No	179	100
4.	How did you feel after the flood incident?		
	Depressed	53	29.6
	Happy	0	0
	Angry	65	36.3
	Frustrated	61	34.1

Source: Author's Computation from Field work (2013)

From the above table, the Umuleri community proved that the 2012 flood have caused several health effects such as skin infections, cholera, typhoid, hepatitis, diarrhea, dysentery and others with the following percentages 34.1%, 3.9%, 10%, 6.7%, 14%, 14% and 17.3% respectively. People affected by the 2012 flood in Umuleri didn't suffer serious diseases because of the immediate shelter and aid rendered to them by concerned individuals and non-governmental organizations and immediate treatment administered to them.Also as a result of 2012 flood, people in Umuleri were frustrated and traumatized. This can be said to be the expected case of people affected by the disaster.

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Table 4: Percentage Responses on Personal Effects of 2012 Floods in Umuleri

S/N	Issues Raised	Frequency	Percentage
1.	Were you displaced from your home?		
	Yes No	104 75	58.1 40.5
2.	Were you attacked by animals during the flood?		
	Yes No	97 82	54.2 45.8
3.	Did you lose any of your properties?		
	Yes No	116 63	64.8 35.2
4.	Did you lose any relatives?		
	Yes No	O 179	0 100
5.	Did the flood affect your children's education		
	Yes No	141 38	78.8 21.2
6.	Did the flood disrupt your personal programs/project?		
	Yes No	131 48	73.2 26.8

Source: Author's Computation from Field work (2013)

From the above table, the people of Umuleri agreed that the 2012 has exposed the people to several personal effects such as displacement from homes, loss of personal properties and attack from animals with the following percentages of 58.1%, 64.8% and 54.2% respectively. Also, they were of strong opinion that the 2012 flood has disrupted several activities in the area. The 2012 flood disrupted children's education as schools were flooded in the area and other schools were shut down to provide shelter camps for the affected indigenes. People's personal programs/projects were also disrupted as the project were drained by the 2012 flood and cannot be accessed or worked till after the flood dries up.

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Table 5: Percentage Responses on Social Effects of 2012 Floods in Umuleri

S/N	ISSUES RAISED	SD		D		U		A		SA	
		F	%	F	%	F	%	F	%	F	%
1.	Traffic congestion	43	24.1	57	31.8	36	20.1	28	15.6	15	8.4
2.	Migration of people	9	5.0	14	7.8	21	11.7	103	57.5	32	18.0
3.	Increase in social vices	10	5.6	26	14.5	101	56.4	35	19.6	7	3.9
4.	Destruction of social infrastructures	7	3.9	15	8.3	32	18.0	86	48.0	39	21.8
5.	Impairment of communication	17	9.5	41	22.9	39	21.8	54	30.2	28	15.6
6.	Overcrowding of people in one place	9	5.0	28	15.6	22	12.3	81	45.3	39	21.8
7.	Loss of privacy	6	3.4	33	18.4	25	14.0	96	53.6	19	10.6

Source: Author's Computation from Field work (2013)

From the above table, the Umuleri community confirmed that the 2012 flood caused migration of people, impairment of communication, destruction of social infrastructures, overcrowding of people in shelter camps and loss of privacy with the following percentages 75.5%, 45.8%, 69.8%, and 64.2% respectively. They were also of different opinion if the 2012 flood caused traffic congestion and increase in social vices as everyone was sheltered in resettlement camps and the basic needs of the people being provided by the government and concerned individuals.

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Table 6: Percentage Response on Economic Effects of 2012 Floods in Umuleri

S/N	ISSUES RAISED	SD		D		U		A		SA	
		F	%	F	%	F	%	F	%	F	%
1.	Loss of farmland	7	3.9	11	6.1	9	5.0	131	73.2	21	11.7
2.	Loss of farm produce	0	0	3	1.7	10	5.6	146	81.6	20	11.2
3.	Loss of income (fiscal cash)	6	3.4	13	7.3	9	5.0	130	72.6	21	11.7
4.	Increase in price of goods and services	2	1.1	7	3.9	6	3.4	148	82.7	16	8.9
5.	Submerging of agricultural land	5	2.8	14	7.8	11	6.1	131	73.2	18	10.1
6.	Loss of domestic animals	9	5.0	19	10.6	33	18.4	94	52.5	24	13.4
7.	Expenses on the government	8	4.5	27	15.1	41	22.9	92	51.4	11	6.1
8.	Loss of structural properties	3	1.7	10	5.6	9	5.0	147	82.1	10	5.6
9.	Loss of household properties	3	1.7	6	3.4	8	4.5	154	86.0	8	4.5

Source: Author's Computation from Field work (2013)

From the above table, Umuleri community were of conclusive opinion that the 2012 flood caused loss of farmland, loss of farm produce loss of income, loss of structural properties, loss of household properties. The evidence can be seen on the response frequency percentages of 84.9%, 92.8%, 84.3%, 87.7%, and 87.7% respectively.Also, there are other responses on economic effects of 2012 floods in Umuleri, this includes submerging of agricultural land83.3% and this led to the increase in price of goods and services. The prices of farm produce such as cassava, rice, cocoyam and sea-food such as food were on the high side and this exposed the indigenes of the state to a period of food scarcity and untold hardship.

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Table 7: Percentage Response on Post Effects of 2012 Floods in Umuleri

S/N	ISSUES RAISED	SD		D		U		A		SA	
		F	%	F	%	F	%	F	%	F	%
1.	The crime rate increased in the area after the flood	16	8.9	43	24.0	37	20.7	58	32.4	25	14.0
2.	There is increase in the scarcity of food	5	2.3	14	7.8	28	15.6	85	47.5	47	26.3
3.	Many people were able to recover their lost properties	8	4.5	26	14.5	102	57.0	33	18.4	10	5.6
4.	There has been an increase in the rate of poverty as a result of the flood	6	3.4	7	3.9	6	3.4	153	85.5	7	3.9
5.	Some houses were totally washed away and destroyed	9	5.0	12	6.7	22	12.3	107	59.8	29	16.2
6.	Some houses were recovered after the flood	7	3.9	5	2.3	7	3.9	145	81.0	15	8.4

Source: Author's Computation from Field work (2013)

From the table above, the Umuleri community agreed that the 2012 flood led to several post effects such as scarcity of food such as cassava, yams, plantain, cocoyam and increase in the rate of poverty. This can be seen from the frequency/percentage of 73.8% and 89.4% respectively. This shows that the people inhabiting the area suffered serious post effects of the 2012 flood. Also, there was strong agreement that some houses were totally washed away especially those built with mud and also some house were recovered after the flood event while some that collapsed are under reconstruction. There was serious problem of scarcity of food as farmland were totally submerged and farm produce washed away and this caused a serious increase in the rate of poverty as farmers couldn't harvest and sell their farm produce. Furthermore, they were of the opinion that people were able to recover their properties after the flood and they negatively responded on the increase in crime rate being as a result of 2012 flood.

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CONCLUSION

From the work done, the following conclusions are drawn

- That anthropogenic activity like construction on flood plains, deforestation, bush burning, drainage failure, over grazing and agricultural activities, over population and urbanization trigger and aggravate flood activities in Umuleri.
- That flood has impacted on both social and economic activities in Umuleri in a number of ways including displacement of families, migration of people, poor health condition, traffic congestion, impairment of communication, loss of farmlands, loss of income, loss of household and structural properties, increase in the price of goods and services, destruction of social infrastructure.
- That flood is a manifestation of climate change, reducing greenhouse gas emission is essential to avoiding the worst parts of climate change, because mitigating alone is not enough. It is instructive to note that adaptation planning can limit the damage caused by climate change, as well as the long-term costs of responding to climate-induced flooding that are expected to increase rapidly in level in the decades to come. Adapting to the impacts of climate change is vital if we are to manage the risks of flooding. We can't ignore the consequences which is why we need to start adapting now.

RECOMMENDATIONS

● Flood Hazard Mapping: To reduce and manage properly the adverse consequences of flood in the country, there should be immediate Flood Hazard Mapping of the affected areas using best practiced modern technologies.
● Regular removal of constrictions along the river channels and water channel maintenance plan.
● Dredging is recommended along river channels in some areas to widen it up and give the channel the ability to contain excess water.
● Construction of more dams in the country could also go a long way as a control measure. The federal government needs to act quickly to provide a permanent solution to flood problem. The plan to construct buffer dams between the Nigerian and Cameroonian borders as the solution should now be put in place.
●Capacity building to integrate climate change and its impacts into urban development planning involving local communities, raising public awareness and education on climate change and enabling representation at international meetings.
● Enforcement of extant city and building regulations,Authorities responsible for town planning should be more alert to their duties if meaningful and long-lasting solutions are to be found. Development control agencies and other governmental departments responsible for allocation of land for building purposes should ensure that such structures are not erected on water ways or areas that are prone to floods. Those who violate such regulations should be appropriately sanctioned no matter how highly placed to deter others from doing the same.
● Enlightenment campaigns are important to put an end to the habit of dumping refuse in drainages. Relevant government agencies in collaboration with non-governmental organizations should educate people both in rural and urban areas about the dangers inherent in blocking water ways. Community leaders and association, including the media should be involved in this sensitization campaign. More of such education should be done at primary and secondary schools.

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The National Orientation Agency (NOA) has a vital role to play in facilitating the success of the programme.

● Changes in water and land-use management policies: Devising land-tenure markets, appropriate town planning, and encouraging use of water ways for higher values such as transportation.

● The authorities in areas where people have been displaced by flooding should endeavor to ameliorate their suffering. Adequate relief materials should be provided to enhance the well-being of particularly children exposed to the harsh weather conditions in open camps. If need be, efforts should be made to resettle them elsewhere. Relief should not be limited to providing mattresses and blankets and food items, as the National Emergency Management Agency (NEMA) does when disasters strike, but should encompass measures to ensure that such occurrences have minimal impacts on people and the environment.

●There is a great need for agro forestry and green belt development in flood prone areas that is agricultural practices such as the planting of trees to retain extra water.

● Environment policy reforms, changes in urban and housing design, removal of laws that can inadvertently increase flood vulnerability.

● Appropriate infrastructure investments, build-up of unblocked drainage patterns, flood defenses, increasing investment; improved health care through flood shelters and assistance shelters as part of community emergency preparedness programs.

REFERENCES

Abowei, J.F.N. and Sikoki, F.D. (2005) Water Pollution Management & Control, Double Trust Publications Co., Port Harcourt, Pp.236.

Bariweni, P.A., Tawari,C.C.andAbowei,J.F.N.(2012). "Some EnvironmentalEffects of Flooding in the Niger Delta Region of Nigeria".*InternationalJournal of Fisheries and Aquatic Sciences*, Vol.1, No.1,Pp. 35-46.

Adelye, A. andRustum, R.(2011). "*Lagos,(Nigeria) flooding and influence of urban planning". Journal of Urban Design and Planning*,Vol. 164, No.3,Pp. 175-187

Bradshaw, C.J., Sodhi,N.S.,Peh,S.H.andBrook,B.W.,(2007). "*Global evidence thatdeforestation amplifies flood risk and severity in the developing world"*.GlobalChangeBiology, Vol. 13, Pp.2379-2395

Center for Education and Career Innovation(CECI),(2004). "*Capacity building for adaptation to Climate Change".*Vulnerability assessment report, Hue.

Christie, F., and Hanlon, J., (2001). "*Mozambique & the great flood of 2000"*The International African Institute, Oxford.

Colten, C.E., Kate, R.W., &Laska, S.B., (2008). "*Three years after Katrina: Lessons forcommunity resilience"*. EnvironmentMagazine, *Vol.*50, No.5

Crossman, M.,Richardson, D., and Milne, J.,(2006). Proceedings of the Civil Engineers."*A partnership approach to Managing FloodRisk*".*Civil Engineering Journal*, Vol. 159 No.2, Pp.41-45.

Du Plessis, B. (1988). "*Drought, Floods a Major Setback*". The Citizen. 17 March, 2011

ISSN 2053-4108(Print), ISSN 2053-4116(Online)

Durotoye, B. (2000).“*Geo-Environmental Constraint in the Development of the Niger Delta Areaof Nigeria”*.(Akinjide,Oshuntokun” Eds. – Environmental Problems of the NigerDelta. Fredrick Ebert Foundation, Lagos.

Ezirim, G. E. (2010). *“Climate Change and National Security: Exploringthe Conceptual andEmpirical Connections in Nigeria*”. *Journal of Sustainable Development in Africa.*Vol. 12, No. 4

Etuonovbe, A.K. (2011). “*The devastating Effect of Flooding in Nigeria*”. Paper presented at the FIG Working Week, Marrakech, Morocco 18-22 May, 2011.

Folorunsho, R., and Awosika,L., (2001). “*Flood Mitigation in Lagos, Nigeria throughWiseManagement of Solid Waste: a case of Ikoyi and Victoria Islands*”. Nigerian-Paper presented at the UNESCO-CSI workshop, Maputo 19-23 November 2001

Gupta A. (2003). “*Flood and floodplain management in North East India: An ecologicalperspective”*. Proceedings, 1stInternational Conference on Hydrology and Water Resources in Asia Pacific Region, Vol. 1, Pp. 231-236.

Hill, A.R., (1976). *The environmental impacts ofagricultural land drainage*.*Journal ofEnvironmental Management*. Vol.4, Pp.251-27

Huq, S., Kovats, S., Reid, H. and Satterth-waitte, D. (2007). Editorial: “*Reducing Risks to Citiesfrom Disasters and Climate Change*”, Environment and Urbanization, Vol. 19, No1, Pp. 3-15.

Jimoh,H. I.andAlao,L. I. (2009).*Pakistan Journal of Social Sciences*Vol. 6, No 1, Pp. 19-25.

Lind, N., Mahesh, P. and Nathwani, J. (2008). “*Structural Safety: Assessment and AffordingtheControl of Flood Risk”*. *Journal*Vol.31, No.2, Pp.143-147.

Manuta, J. and Lebel, L (2005) “*Climate change and the risks of flood disasters in Asia: crafting adaptive and just institutions” Human Security and Climate Change”*. An International Workshop organised by Global Environment and Security project (GECHS), near Oslo, 21–23 June 2005.

Ministry of Environment, (2006).“*Land Forms in Anambra State*”.Vol. 17.Anambra State.

Mohapatra, K.P. and Singh, D.R. (2003).“*Flood Management in India”*.*Journal*,Vol. 28, Pp. 131-143.

Morris, K.N. & Edwards, M.T. (2008).“*Disaster risk reduction and vulnerable populations in Jamaica: Protecting children within the comprehensive disaster management framework”*. Children, Youth and Environments.Vol. 18 No. 1, Pp. 389-407.

National Population Commission(NPC), (2006). “*The Nigerian national population censusresults”*.

Nott, J. (2006). “*Extreme Events: A Physical Reconstruction and Risk Assessment”*.

Cambridge University Press. New York.

Nxumalo, S. (1984). “*Economy takes Battering on Swaziland*”. Rand Daily Mail, Vol.2, 27 February.

Nwilo, P.C. (2013). “*Geospatial Information in Flooding and Disaster Management inNigeria”*.7th Annual lecture of Faculty of Environmental Sciences, NnamdiAzikiwe University, *Awka*. June, 6, 2013.

Olaniran,J. O. (1983).*Journal of Geography,*Vol.7 No.3, Pp. 271-277.

Parker,J.D. (2000). “*Floods”*.Tangler and Francis, National Academy Press, Asian Disaster Preparedness Centre, Thailand.

ISSN 2053-4108(Print), ISSN 2053-4116(Online)

Powell, W.G., (2009). "*Identifying Land Use/Land Cover (LULC) Using National Agriculture Imagery Program (NAIP) Data as a Hydrologic Model Input for Local Flood PlainManagement*". Applied Research Project, Texas State University-San Marcos, and Retrieved from: http://ecommons.txstate.edu/arp/296/.

Rosenberg, D.M. and Snor, N.B.(1975). "*Ecological Studies of Aquatic Organisms in the Mackenzie and Procupine, River Drainages in Relation to Sedimentation"*, Environment Canada, Fisheries and Marine Service Technological Report No. 547, Pp.86.

SabineLandau and Brian S. Everitt, (2004)."*A Handbook of Statistical AnalysisUsing SPSS*".
A CRC press company Boca Raton New York Washington, D.C.Pp.40-42.

Sinclair, S. and Pegram, G. 2003. "*A Flood Now-casting System for the eThekwini Metro"*.:*Urgent Now-casting using Radar-An Integrated Pilot Study*". Water ResearchCommission (WCR).Silowa Printers, South Africa, Vol.1

Smith, K.and Ward, R.(1998). "*Floods*:*Physical processes and Human Impacts"*.
John Wiley and son, England.

Snoussi, M., Ouchani, T. and Niazi, S. (2008)."*Vulnerability Assessment of the Impact of sea-level rise and flooding on the Moroccan coast: The case of the Mediterranean East Zone"*. *Journal*.Vol.77, No. 2, Pp.206-213.

Thompson, M.T., (1964). "*Historical Floods in New England"*. Geological Survey Water-Supply Paper 1779-M, United States Government Printing Office, Washington, D.C.

Uchegbu, S. N. (2002). Issues in Environmental Management(second edition). Spot lite Publishers, Enugu.

United States Environmental Protection Agency (USEPA), (2002). "*Water Quality Monitoring forCoffeeCreek (Porter County, Indiana"*.RetrievedFrom: http/www.usepa/research.htm.modecode = 62-28-00-00, (Accessed on: September 29, 2006)

Welch, H.E.,Symons, P.E.K. and Narver,D.W. (1977). "*Some Effects of Potato Farming andForest Clear Cutting on New Brunswick Streams, Fisheries andMarine Service"*. Environment Canada Technical Report, No. 745, St. Andrew's New Brunswick.

ISSN 2053-4108(Print), ISSN 2053-4116(Online)