

Natural Disasters and Crime Incidence: A Case of 2012 Flooding in Benue State, Nigeria.

Godwin M. Kwanga¹, Terwase Shabu², Emily Mbanengen Adaaku³

¹Department of Geography, Benue State University, Makurdi, Nigeria

²Department of Geography, Benue State University, Makurdi, Nigeria

³PhD Student, Department of Urban and Regional planning, Benue State University, Makurdi, Nigeria.

Abstract: *The study explore whether natural disasters lead to a rise in crime rates and whether crime response to disasters. Areas that were affected by the 2012 flood disaster were selected as the study population. The total population of the affected local government areas is 1,497,707, affected population is 62,303 while the number of affected households is 8,900. A total of 383 heads of affected households were selected using simple random sampling technique. The data collected using questionnaire and records from security agency comprised of socio-economic characteristics of affected households and violent crime rate rise as perceived by affected communities. Also reported cases of violent crime in affected areas were collected from Benue State Police Command, Benue state. Data collected were analysed using percentages, frequency count. Likert scale method was used to measure increase in violent crime during the flood incidence in the affected areas. Using a 'before, during and after' approach, the study revealed that violent crime increased during 2012 flood disaster and decreased significantly after the disaster. Therefore, there is need for disaster prone areas and disaster management agents in the state to incorporate security measures in disaster preparedness, coping and recovery strategies in order to minimize security challenges ensuing from natural disaster in the area during natural disasters.*

Keywords Natural disaster, Flooding, Violent crime, Social order, Security.

1. Introduction

The inter-play between human activities and natural events manifests specifically as man-made hazards. Crime is described as a hazard because of its uncertain probability for most households, communities and organizations as it occurs when a community, organization or households suffers from shocks or stresses of floods, wars and terrorism which not only overwhelms their capacity to cope but also respond and recover. This as well prevents them from attaining sustainable development. Fabusa (2007), assent that crime is the inter-play between space, offences and offenders. Crime as a hazard increases fear, rate of victimization, insecurity and social disorder. The increase in cost of damages in properties, livelihoods, and victimization increases the vulnerability of such societies and prevents it from alleviating poverty as well as attaining sustainable development goals.

The vulnerability of people and property to crime is characterized by pattern of settlement, fabric and related systems which create new risk, vulnerabilities negatively affecting existing response and recovery systems creates opportunities for crime (Satterthwaite, Huq Pelling, Reid and Lankoa, 2009). There is therefore a correlation between natural disasters and crime incidence just as there is a correlation between other human activities which increases the vulnerability of communities to hazards such as flood, heat waves and other shocks and stresses.

The frequency and impacts of floods has increased in the past 20 years, between 1994 and 2013 to a shorter return period between 2004 and 2013 as observed by the Centre for

Research on the Epidemiology of Disasters (CRED, 2015). This is due to anthropogenic activities and climate change extreme. Flood risk in settlements especially in developing countries of Africa, Asia, Pacific Island and South America is escalated by climate change, rapid urbanization, increased population, unplanned urban areas and development into flood prone areas. Accordingly, the intensity and frequency of flood event erodes developing country's capacities from attaining sustainable development goals (SDGs). The damage and loss (in livelihoods, economic, property and health status) from disasters implies that household, communities and institutes will have to invest more in damage and loss reduction mechanism/measures to alleviate loss of lives, properties and livelihoods.

Over the last decades, flooding has occurred in Benue state along river Benue affecting many settlements in 1996, 2000, 2005, 2007 (Shabu and Tyonum, 2012) and in 2012, a flood high magnitude affected human settlements and livelihood the worst to have occurred in the past 40 years (ActionAid, 2012; Post Disaster Needs Assessment, 2013). The 2012 flood along river Benue was attributed primarily to release of water from Lagdo dam in Cameroun (Mayomi, Dami and Maryay, 2013; Post Disaster Needs Assessment, 2013), but also aggravated by urbanization and population growth, poor infrastructure, poor urban land use planning, violated building codes, blockade of drainage channels with refuse, elimination of drainage facilities, and encroachment on wetlands and flood plains (Ojanuga and Ekwoanya, 2002;

Abah, 2012; Tyubee and Ayadike, 2012; Hembra, 2012; Odemerho, 2015).

The effect of flood impact on infrastructure was estimated at a value of 1,697,204,100 (Naira), this includes damage to 4,295 houses; and 1,469 plant and machinery fittings. In addition, agricultural related losses valued at 1,697,310,100 of farmland and economic trees (BENSEMA, 2013) affecting livelihoods, environmental and socio-economic activities as well as health status of 300,000 Internally Displaced Persons (IDPs). It is evident that communities within Benue state have limited or lack the capacities (lack resilience) to cope with flood events, manifesting in the unsustainable conventional coping mechanism where each successive event diminishes the capacity of a group or an individual to withstand or recover from later event.

Flood hazards have affected millions of people in negative ways, the extent and severity will increase in coming decades based on available information and prevailing trend. According to Wisner, Blaikie, Davis, Canon (2003); Wamsler and Brink (2015) natural disasters are influenced by failed development and economic policies, rapid urbanization, high population growth, poor urban planning, lack of affordable space these factors influence erosion of family structures, social cohesion, sense of community and social order. In corroboration Cozens and Glasson (2010) perceived crime as a form of externality from development. It is argued that poor land use regulation and design result in social costs which are borne by individuals and the community. These effects on livelihoods, health, economic and social development have clear implications on social order and crime (Agnew, 2011). However, crimes committed after a hazard are considered as expensive and costly as hazards (Glasson and Cozens, 2011). These crimes include individual acts of violence, thefts, others include corporate crime such as environmental pollution and acts of aggression as well as outcrop of certain vices against women and children. Hence the risk of an individual, community and businesses during floods and its relationship to crime is a function of hazard (in terms of probability and intensity), vulnerability (susceptibility of building or contents damage), exposure (value of assets that can be damaged by a natural disaster) as well as capacities (skills, technologies and resources) forming the sides risk triangle (Chricton's 1999) used or unused to minimize vulnerability and increase security. In overcrowded conditions these issues generate competition and conflicts between neighbours, leading insecurity of residents and social disorder. Taylor and Shumarker (1990) assent that victimization experiences of residents is defined by decay of social and physical conditions such as wide spread illegal activity in public dilapidated and defacement buildings, amongst other requirement.

Flood risk assessment here is described as a process of evaluating the potential losses from a hazard (Fabusa, 2007). Thus crime risk assessment takes into considerations information from historic crime data and socio-economic variables to determine current trends in crime related natural disasters. The empirical link between disaster and crime is limited to case studies of single events, small sample

description or statistical account of behaviour in location (Taylor and Shumarker, 1990). In Nigeria, studies have focused on the causes (Abah, 2012) effects as well as the consequences of flood on urban areas in loss of lives (Shabu and Musa, 2015) properties, health status and ecosystems (Ogwuche and Mngutyo, 2012). However, Zaharan, Shelley, Peek and Broody (2009) assent that natural hazards not only cause human casualties and property damage but also disrupt social order and community which cannot be valued in monetary terms.

The effects a hazard event impacts on level of crime incidences in any society according to Fabusa (2007) needs a comprehensive assessment to understand flood risk and associated crime incidences which pivots on the interplay between crime, space and society through risk analysis of offences, offenders and effects of the crime. Furthermore, flood disasters have exposed large numbers of people to a range of strains and stressors conducive to crime. These strains consist of negative emotions such as anger, frustration and fear thereby creating pressure. These strains may reduce social control, foster belief favourable to crime and lead to criminogenic traits. Residents' responses to flood risk are diverse these include responses protection of self, property and avoidance of dangerous areas or collective community anticrime efforts. This relationship in disaster risk reduction considers the degree to which post -flood crime negates expected trends in flood hot spot areas characterized by different socio-economic profiles. However, how a victim (individual, household) respond to chaotic disaster to minimize vulnerability and reduce insecurity has not been evaluated. It is therefore pertinent to investigate what relationship exists between natural disasters and crime in disaster risk reduction?

2. Methodology

Study Area

Benue State, with a land area of 30,955 sq. km is located between Latitudes 6⁰25' and 8⁰08'N, and Longitudes 7⁰47' and 10⁰00' E, on the eastern side of the Middle Belt of Nigeria. It is surrounded by five states, namely Nassarawa to the north, Taraba to the northeast. Cross River to the south, Enugu to the south-west and Kogi to the west. There is also a short international boundary between the state and the Republic of Cameroun along Nigeria's southeast border (Figure 1).

The main rivers are the Benue and Katsina-Ala. River katsina-Ala is the largest tributary, while there are a number of smaller rivers. Extensive flood plains along these rivers are characterised by widespread swamps and ponds which are utilized for dry season irrigated farming. Elsewhere, surface drainage is generally good. Though Benue state has high drainage density, many of the streams are seasonal. The permanent water table in many parts of the state is also very low and there is an acute water shortage in the dry season in some LGAs. The numerous rivers and streams provide a great potential for irrigated agriculture, a source for fresh water fish and hydroelectric power and transport.



Fig. 1: Benue State Showing Flood Affected LGAs

The state has a population four million, two hundred and fifty three thousand, six hundred and forty one (4,253,641) (NPC, 2006). Over 75% of the population lives in the rural areas. By declaration, about 52 settlements are now treated as towns, but in reality only about 23 of these settlements have developed to a status of anything more than big villages. Makurdi, Gboko and Otuokpo stand out as the biggest towns in the state. Ethnic groups consist of The Tiv (the largest group), the Idomas followed by the Igedes. Other minority groups include the Nyifon, the Ufia, the Etulos and the Abakwa who are indigenous to the state as well as other Nigerian Tribes. Employment proportions are as follows: 75% are farmers, 10% traders, 6% civil servants, 9% other occupations. In the rural areas, peasant agriculture is the dominant occupation, although trading, hunting, fishing, carving and weaving also engage a good percentage of people. A handful of people are now exploring for precious stones in the rural areas. In the urban areas the civil service is the predominant employment followed by petty trading and handcraft or vocational jobs.

Materials and Methods

The study examined the relationship that exists between natural disaster especially flooding and crime incidence in Benue State, Nigeria. Areas that were affected by the 2012 flood disaster were selected as the study population. Benue state is made up of twenty three (23) Local Government Areas out which six (6) Local Government Areas along river Benue and Katsina-Ala were affected namely: Makurdi, Guma,

Logo, Gwer-west, Agatu and Buruku LGAs. The total population of the affected Local Government Areas is

1,497,707, affected population is 62,303 while the number of affected households is 8,900. Taro Yamane formula for sample size was used in order to get appropriate copies of questionnaire. The formula is expressed as (Yamene, 1973):

$$n = \frac{N}{1 + N(E^2)} \dots 1$$

E = expected (0.05 confidence level)

N = known population

n = sample size

Using the formula, sample size for Benue state is determined as shown below:

$$N = \frac{8,900}{1 + 8,900(0.05^2)}$$

$$n = \frac{8,900}{23.25} = 383$$

A total of 383 heads of affected households were selected for the study using simple random sampling technique. The data collected using questionnaire and records from security agencies comprised of socio-economic characteristics of households and violent crime rate perception by affected communities. Also reported cases of violent crime in affected

areas were collected from Benue State Police Command, Benue state. Data collected were analysed using percentages, frequency count. Likert scale method was used to measure increase in violent crime during the flood incidence in the affected areas.

3. Results and Discussion

3.1 Socio-Demographic Characteristics

The study analysed the socio-economic characteristics of people affected by flooding in the Benue state, Nigeria using specific variables such as sex, age, marital status, household size and period settled in the area.

Table 4.1: Scio-Demographic Characteristics of Household heads

Socio-Demographic characteristics	Frequency	Percentage (%)
Sex		
Male	243	70.8
Female	100	29.2
Age		
1 – 20 yrs	42	12.2
21 – 40 yrs	163	47.5
41 – 60yrs	97	28.3
61 – 80yrs	41	12.0
Marital Status		
Single	60	17.5
Married	221	64.4
Divorced	19	5.5
Widowed	14	4.1
Separated	29	8.5
Household size		
1 – 5	124	36.2
6 – 10	134	39.1
11 – 15	49	14.3
16 – 20	13	3.8
21 – 25	23	6.7
Length of Stay		
1 – 20 yrs	149	43.4
21 – 40 yrs	131	38.2
41 – 60yrs	45	13.1
61 – 80yrs	18	5.2
Total	343	100

Source: Fieldwork, 2015

Table 1 show that sex distribution of the affected household were 70.8% male and 29.2% female. The percentage of female household affected by flooding is relatively high. Women heading households are highly vulnerable to natural disasters especially flood events. This is because most of them are widows and frail elderly women. They are disproportionately employed in unpaid, underpaid and non-formal sectors of the economy. Inheritance laws and traditional marriage arrangements, social patterns that reinforce women's dependence on fathers, husbands and sons all contribute both to their unfavourable access to resources and their lack of power to change things. Women heading households create social conditions which leave women in substandard housing, socially marginalized, impoverished or economically insecure, overburdened with care giving responsibilities and lacking social power and political voice. These conditions subject women heading households to a state where they are less able to receive and/or act on disaster warnings or recovery

information. This increases their level of vulnerability to flood disaster implications such as exposure to violent crime.

Age distribution shows that, 49.7% of the sampled affected household heads are between the ages of 21 – 40 years. The age structure of affected households in the area is made up of young and/or pre-middle age households. Most of the affected households are headed by youths who are active economically and socially. This implies that most of the affected households were more vulnerable economically and socially to flooding in the area and this resulting to more youth involvement in violent crime. Of the affected households, 64.4% are married. It is an indication that most of the affected household's heads are married and are likely to have more social capital or relations that could render assistance during or after flood disaster. On the other hand, married household heads could mean larger household size and may create higher liabilities in distress situations due to flood disaster.

The information reveals that, 39.1% of the sampled households in Benue state have between 6 and 10 persons with mean household size of 8 persons. It is an indication that the area has a high household size and the likelihood to experience severe flood impact/effect is eminent. Majority of the affected community members have stayed in the area between 1 and 20years, closely followed by 38.2% of the affected household who have stayed between 21 and 40 years. The average period of stay of affected households in the area is 27years. This is an indication that majority of the affected households in the area have stayed for a period of time enough to have experienced at least 3 – 5 flood events in the area.

3.2 Flood disaster and violent crime

Flood disaster does not only cause human economic activities and property loss, but also disrupt social order within and around affected communities. According to Zahran, Shelley and Peek (2009), flood disaster and other natural disasters weaken agencies of formal and informal social order, giving rise to criminal opportunities and behaviors. The availability of suitable targets (i.e property to steal or individuals to victimize), the absence of guidance (police, neighbours, or surveillance), and the presence of motivated offenders are basic situation that permit crime to occur. Studies have established increase in during and post disaster violent crime (Siman, 1977 and Roy, 2010). We observed that there was slight increase in violent crime in affected areas, especially areas that were housing displaced persons (camps). Information on increase in violent crime due to flooding is presented on Table 2.

Table 2: Increase in violent crime

Crime	Crime Incidence Rating					
	4	3	2	1	TWV	CI
Murder	64	82	74	123	773	2.25
Rape	69	84	66	124	784	2.29
Kidnapping	51	88	75	129	747	2.18
Robbery	103	102	59	79	915	2.67
Battery	74	115	54	100	849	2.48
Assault	87	116	56	84	892	2.60

Source: Fieldwork, 2015

Table 2 shows that 49.5% of the affected households with crime increase index (CI) of 2.48 agreed that battery is one of the violent crimes that increased during and after the flood disaster. Although, the link between natural disaster and crime appears particularly salient for domestic and family violence

(Enarson, Fothergill and Peek, 2006; fothergill 1996), the finding however, supports the observations of Adams and Adams (1984) that following the eruption of Mount Saint Helens, incidents of domestic violence reported to the police increased by 46%. Also, Curtis and colleagues (2000) noted that reports of child abuse increase following Hugo in South Carolina and the Loma Prieta earthquake in California. Natural disasters generally impose significant stress on households and families, thereby increasing the likelihood to observe rise in counts of domestic violence.

Another violent crime that increased as a result of flooding is assault. With a crime increase index of 2.60 it shows that 53.1% of the affected households agreed that assaults increased during and after the flood disaster. This is because, disaster events are said to aggravate social conditions that cause social disorganization and assault crime. Disaster can fracture community cohesion, impairing a community's ability to respond to and impose sanction on antisocial conducts or assault crimes.

Robbery is another violent crime that increased seriously due to flooding in Benue state. With a crime increase index of 2.67 shows that 53.7% of the affected households agreed that robbery increased in the area during and after the flood events. The finding agreed with the views of Siman (1977) who noted that there was a 40% rise in reported robbery crime and a 14% increase in drinking related offenses following a flood disaster in Wilkes Barre, Pennsylvania. This situation can be attributed to the increasing vulnerability of both persons and places to victimization and thereby rendering guardians less capable.

Table 3: Crime records in flood affected areas for 2011, 2012 and 2013

S/N	Offences	Year		
		2011	2012	2013
1	Murder	126	239	39
2	Robbery	223	191	43
3	Grievous harm and wounding	200	340	163
4	Assaults	342	425	123
5	Rape and indecent assaults	6	8	5
6	Theft and other stealing	109	116	142
7	Burglary	40	44	17
8	House breaking	289	287	51
9	Store breaking	191	285	1
10	False pretence and cheating	347	444	33
11	Offence against liquor acts	4	6	4
12	Unlawful possession	78	99	66

Source: Crime statistics 2012 to 2013, Benue State Police Command, 2016

Table 3 shows information on reported cases of crime incidence in flood affected areas of Benue state for 'before' 'during' and 'after' situations. All the selected offences increased during the flood incidence of 2012 except robbery and house breaking. Apart from number of deaths observed during 2012 flood disaster, murder cases increased from 126 in 2011 to 239 in 2012 with percentage increase of 89.7%. During the flood incidence, grievous harm and wounding increase by 70% from 2011 (before situation) to 2012 during the flood incidence. Offence against liquor (50%), store breaking (49.2), rape (33.3%), unlawful possession (26.9%), assaults (24.3%) and false pretence and cheating (21.9%) all increased during the flood disaster (see Fig 2). This can be attributed to chaos created and break down in social order

leading to more people involving themselves in crime related activities in the area.

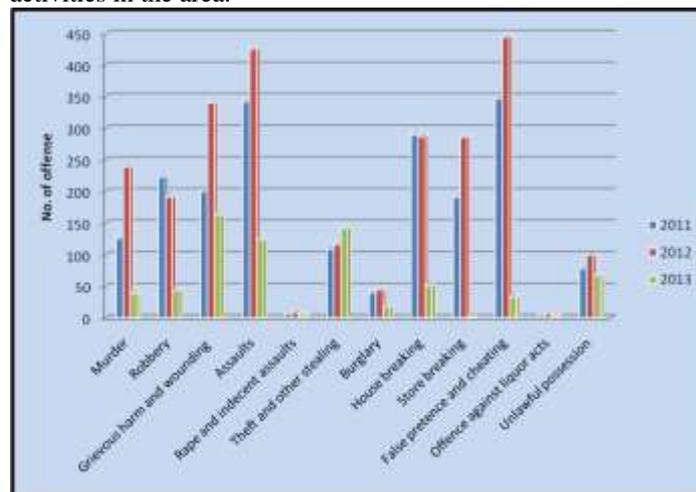


Fig 2: Reported case of crime incidence in Flood affected LGAs in Benue State

4. Conclusion

Natural disasters impose tremendous influence on social order in the affected communities. Damage and loses on infrastructure usually shift the attention of formal and informal security institutions from maintaining social order to coping and recovery measures. This increases the vulnerability of affected communities to criminal activities. The 2012 flood disaster was accompanied by increased crime incidence in virtually all the offenses except arm robbery. However, after the disaster, crime incidence decreased significantly as result of recovery measures adapted to overcome the impact and implications of the natural disaster. There is need for flood prone areas to incorporate security measures in flood preparedness, coping and recovery measures in other to minimize security challenges ensuing from flood disaster effects.

References

- [1] ActionAid (2012) Floods in Nigeria. Re-revisiting states accountability on emergency response /preparedness and disaster risk reduction in Nigeria policy brief.
- [2] www.actionaid.org/nigeria Pp.1-4
Abah,R.C., (2012) Causes of seasonal flooding in flood plains;A case study of Makurdi, Northern Nigeria. International Journal of Environmental Studies. 69:6;94-912 DOI: 10.1.080/00207233.2012.730668
- [3] Angew, R., (2011) Dire forecast: A theoretical model of the impact of climate change on crime change on crime. Theoretical criminology. Sagepub.co.uk/journalsPermissions.nav DOI:10.11177/1362480611416843 tcr.sagepub.com Pp.21-38
- [4] Benue State Emergency Management Agency (2013) Overview of the 2012 flood in Nigeria: The Benue experience. Benue State Emergency Management Agency Makurdi.
- [5] Centre for Research on Epidemiology of Disaster (CRED,2015). The human cost of natural disaster 2015. A global perspective Pp9-17
- [6] Clarke, R.V.,(1997) Situational crime prevention, Successful case studies school of criminal justice. Second edition. Rutgers University. Harrow and Heston Publishers. Guilderland. New York Pp.5-47

- [7] Cozens, P., and Glasson, J., (2010) Making communities safer for crime: An undervalued element in impact assessment. *Environmental Impact Assessment Review* 31(2011)www.elsevier.com/locate/eiar doi 10.1016/j.eiar.2010-03-007 Pp. 25-34
- [8] Curtis, T. and Colleagues, E. (2000). Changes in Reports and Incidence of Child Abuse Following Natural Disasters. *Child Abuse and Neglect*, 24: 1151-1162
- [9] Enarson, E., Fothergill, A. and Peek, L. (2006). Gender and Disaster: Foundations and Directions, 130-146 in *Handbook of Disaster Research* (ed) by H. Rodriguez, E. L. Quarantalli, and R.R. Dynes. New York: Springer
- [10] Fabusa, K., (2007) Crime and risk mapping from historic count data in Leicester City. Thesis submitted for the Degree of Masters of Philosophy at University of Leicester . Department of Geography Leicester. UMI Dissertation Publishing. UMI number U224166. Published by ProQuest LLC 2013. Copyright in Dissertation held by Author. Microform Edition c ProQuest LLC Pp.8-137
- [11] Fothergill, A. (1996). Gender, Risk and Disaster, *International Journal of Mass Emergencies and Disasters* 4(1): 33-56. Hembra, S., (2012) Impact of urban growth and development on wetlands distribution in Makurdi town from 1976-2006. Dissertation submitted to Post Graduate school, Benue state university Makurdi. In partial fulfillment for the degree on Master of Science in Geography. Pp.1-50
- [12] Glasson, J., and Cozen P., (2011) Making communities safer for crimes: An undervalued element in Impact assessment. *Environmental Impact Assessment Review*. doi:10.1016/j.eiar.2010.03.007 www.elsevier.com/locate/eiar Pp.1-12
- [13] Mayomi, I., Dami, A., and Maryah, U.M., (2013) GIS based assessment of flood risk and vulnerability of communities in Benue floodplains, Adamawa state Nigeria. *Journal of Geography and Geology* Vol5, No.4; 2013 ISSN 1916-9779 doi:10.5539/jggv54p1488
- [14] www.ccsenet.org/jgg Pp.148-159
- [15] Odemerho, F. O., (2015) Building climate change resilience through bottom-up adaptation to flood risk in Warri, Nigeria. *Environment and Urbanization* Copyright c 2014 International Institute for Environment and Development (IIED) vol.27(11):139-160 DOI:10.1177/095624781455194
- [16] www.sagepublications.com Pp.139-158
- [17] Ogwuche, J., and Mngutyo, I.D., (2013) Comparative analysis of the effects annual flooding on maternal health of women in flood plain and non-floodplain dwellers in Makurdi urban area of Benue state Nigeria. *Herald Journal of Geography and Regional Planning* <http://www.heraldjournal.org/hjgrp/archive.htm> ISSN2350-21855 Pp.115-116
- [18] Ojanuga, A.G., and Ekwoanya, M.A., (1999) temporal changes in land use pattern in Benue River flood plain and adjoining uplands at Makurdi, Nigeria Pp. 417-424
- [19] PDNA, (2013). Nigeria Post-Disaster Needs Assessment 2012 Floods, A Report by the Federal Government of Nigeria with Technical Support from the World Bank, EU, UN, and other Partners.
- [20] Roy, S. (2010). *The Impact of Natural Disasters on violent Crime*, University of Canterbury.
- [21] Satherthwaite, D., Huq, S., Pelling, M., Reid, H., and Lankao, P.R., (2009) Adaptation to climate change in urban areas. The possibilities and constraint in –low and middle- income nations. <http://www.iied.org/HS/topics/acc.html> Pp.1-91
- [22] Shabu, T. and Musa, S. D (2015). Downstream Socio-Economic Impact of Dam Failure: A Case Study of 2012 River Flooding in Benue State, Nigeria, *Journal of Environmental Issues and Agriculture in Developing Countries, Volume 7, Number 3*
- [23] Shabu, T. and Tyonum E. T., (2013). Residents Coping Measures in Flood Prone Areas of Makurdi Town, Benue State. *Applied Ecology and Environmental Sciences, Vol. 1, No. 6, , 120-125.*
- [24] Taylor, R.B., and Shumaker, S.A., (1990) Local crime as a natural hazard: implications for understanding the relationship between disorder and fear of crime. *American Journal of Community Psychology*, vol.18.No. 5
- [25] Taylor, R.B., and Schumaker, S.A., (1990) Local crime as a natural hazard: Implications for understanding the relationship between disorder and fear of crime. *American Journal of community Psychology* vol.18, No.5 1990 Environmental/ Ecological Psychology 0091-0562/90/1000-0619\$06.00/0 ©1990. Plenum Publishing Corporation Pp. 619-639
- [26] Tyubee, B. T., and Anyadike, R.C., (2012) Analysis of surface urban heat island in Makurdi, Nigeria Wisner B, Blaikie P, Cannon T and Davis, I. (2004). *Wisner B, Blaikie P, Cannon T and Davis I*. London: Routledge.
- [27] Wamsler, C., and Brink, E., (2014) Moving beyond short-term coping and adaptation. *Environment and Urbanization*. Vol26:1 Pp.86-111 <http://dx.doi.org/10.1177/0956247813516061>
- [28] Wisner, C., Blaikie, P., Cannon, T., and Davis I., (2003) *At risk: Natural hazards, peoples vulnerability and disasters*. Second Edition
- [29] Zahran, S., Shelly O.T., Peek, L., and Brody S.D., (2009) Natural disaster and social order : Modelling crime outcomes and disasters in Florida. *International Journal of Mass Emergencies and Disasters* Vol.27. No.1 Pp.26-52 <http://pdfs.semanticscholar.org>