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Flood Vulnerability Assessment of Communities in Hadejia Valley Irrigation Project (H.V.I.P) Jigawa State Nigeria

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ABSTRACT

The aim of this study is to assess vulnerability to flood disaster of communities in the completed sectors of Hadejia Valley Irrigation Project (H.V.I.P). This research is specific in applying digital elevation model to create vulnerability map, identify the causes of flooding and identify some traditional methods of flood mitigation in the area. All the farmers in the sectors were taken into recognition, and simple random sampling was used in selecting the farmers for interview. Modelling method was employed to analyze the data as in assessing vulnerability, and simple random technique was employed to select respondents from each sector. The data were analyzed using both descriptive and inferential statistics. Chi square was used to test level of significance between the causes of flooding in the study area. A symp significance value of 0.832 was found, and because it is higher than 0.5 the hypothesis is accepted (Ho) accepted, that the cause of flooding in the study area are homogeneous in nature. The communities were mapped in to different vulnerability levels, and it was observed that factors like heavy and prolong rainfall, act of God, deforestation, opening of Tiga and Challawa dams, and flood embankment were the major causes of flood. The consequences of flooding on the residents of the study area are blockage and destruction of roads networks, washing away of farmlands and death of human and animal life. Moreover, it was revealed that the measures adopted by the residents to mitigate the consequences of the flood disaster are construction of flood walls, planting early maturing crops and evacuation of persons and properties to places unreachable to flood. The residents ranked opening of Tiga and Challawa dams, heavy and prolonged rainfall and act of God, deforestation and breakage flood embankment as the major causes of flooding. There is an urgent need for the completion and standardization of the dams upstream, and dredging of Hadejia River downstream. Government at different levels should provide basic infrastructures as good roads, bridges, and electricity to the study area.

Keywords: Flood, Vulnerability, Assessment, Communities, Valley Irrigation.

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Introduction

River and coastal flooding are most frequently natural hazard disasters and are increasing in occurrence more rapidly than any other natural disaster (Abiodun, 2015). Analysis made by the World Bank shows that flooding is not only the most frequent natural hazard, it is also the disaster with the greatest economic and humanitarian impact in terms of number of people affected and in terms of economic asset exposure such as buildings, transport infrastructure, utility infrastructure and other asset. (Takemoto, 2011). However, scientific evidence also indicates that weather related hazards are becoming more frequent and intense due to the impact of climate change. Over two decades (1988 – 2007), 76% of all disasters were hydro-meteorological in nature. Widely reported examples include the Katrina (2005, USA); the European heat wave (2003); and severe floods in Mozambique (2000) and northern India (2008), (Oriola, 2010). The Hadejia Valley Irrigation Project (H.V.I.P) is a triangular shaped plain sloping in undulating fashion and crossing the South-Western Basement Complex area towards the Sedimentary formation of the Chad Basin to

the North-East. The bedrock geology is overlain by old weathered rocks and in many areas sand dunes ridges separated by depression. In the South-Western portion of the study area are low dissected hills and the rolling plains which emerged with those of Kazaure, Geidam and Gumel (Essiet, 1993). The main aim of this paper is to provide a report on the causes of flood in the completed sectors of Hadejia Valley Irrigation Project (H.V.I. P).

CAUSES OF FLOOD IN THE COMMUNITIES

The situation of communities in the completed sectors of the project and virtually all communities in the downstream of Hadejia River makes it open to flood having two Dams i.e. Tiga and Challawa and a topography and soil type that are prone to flood. The causes of flood in the area are grouped into two primary causes and secondary causes. The primary cause include rainfall and its variables (amount, duration and intensity) topography and soil while the secondary cause are land use type, construction along flood plains, and reservation operations (upstream). The primary causes are defined as natural

phenomena that have little or no human contributions to make them happen and cannot be changed.

METHODOLOGY

STUDY AREA

The study area is within the Chad formation of the former Kano State and now falls within Jigawa State. It is made up of unconsolidated sediments of Chad formation which are of tertiary terrestrial origin. Vast accumulation of this is found in form of sand plains and interfluvies, recent accumulation in channels complexes as well as on depression. In terms of relief the area falls within low Chad plains that is developed on the sedimentary rock. On the average relief is 40m above mean sea level. The H.V.I.P covers about 6, 175 hectares and is located approximately between latitude 10° and 13° 20'N and longitude 7° 25' E and 11° E. (Consolint International, 1975) in Tanko, (1999).

RESULT AND DISCUSSION

Perception of Respondents on the Causes of Flooding

Table 1 Indicates the major causes of flooding in the communities were opening of Tiga and Challawa Dams with 49.32% of the respondents, they always suffer such disaster emanating from discharge of flood water from Tiga and Challawa Dams. Based on these the researcher sought the view of the residents on causes of flooding in their communities from the data obtained in table 1, the major causes of flooding in area in the ranking order are: Opening of Tiga and Challawa Dams 49.32% and act of God 9.46%, heavy and prolonged rainfall 28.72%, flood embankment 6.76% and deforestation 5.74%. The finding concluded that, the main cause of flood in the study area is opening of Tiga and Challawa Dams.

Table 1 Causes of flooding in the communities

COMMUNITIE S	HEAVY AND PROLONGED RAINFALL		ACT OF GOD		DEFORESTATI ON		OPENING OF TIGA AND CHALLAWA DAMS		FLOOD EMBARKMENT	
	NO. OF RES.	PERCE NTAGE (%)	NO OF RES.	PERCE NTAG E (%)	NO. OF RES	PERCE NTAGE (%)	NO. OF RES	PERCENT AGE (%)	NO. OF RES	PERC ENTA GE (%)
GAMSARKA	9	30	3	10	2	6.67	14	46.67	2	6.66
ZAMONI	8	25.81	4	12.90	2	6.45	16	51.61	1	3.23
AYAMA	8	25	4	12.5	3	9.37	15	46.88	2	6.25
YAMDI	9	3.33	3	11.11	1	3.70	12	44.45	2	7.41
ADAHA	7	23.33	2	6.67	1	3.33	17	56.67	3	10
MARINA	10	32.26	2	6.45	1	3.23	16	51.61	2	6.25
AUYO	7	22.58	3	9.68	2	6.45	15	48.39	4	12.90
AGUZA	9	32.14	2	7.14	2	7.14	13	46.43	2	7.15
MADO	6	23.07	3	11.54	2	7.69	14	53.85	1	3.85
FURAWA	12	40	2	6.67	1	3.33	14	46.67	1	3.33
TOTAL	85	28.72	28	9.46	17	5.74	146	49.32	20	6.76

Chi square was used to test the level of significance between the causes of flooding in the study area, and on subjecting the frequencies of the causes of flooding it was found that the Asymp sig value (two sided of 0.832 was found, and because it is higher than 0.5, the hypothesis is accepted, that the areas are homogeneous in nature and there is no significant difference.

Table 2 Chi-Square Test

	Value	df	Asymp. Sig (2- sided)
Person C	11.61286	36	1
Livelihood	11.49391	36	1
Linear-by- L	0.045068	1	0.832

Source: field work, 2016

CONCLUSION

The development could be attributed to the following reasons:

Majority of the residents fall within the low income group which means that little or nothing could be done by them regarding an environmental problem that is capital intensive and there is low environmental awareness amongst the residents as majority perceives flood management as a sole responsibility of government.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations are offered for a better flood management system in the communities.

1. Educating people living in flood area should be embarked upon, because the perception of flood for

most of them makes them see flood as part of day-day living and they do nothing about it,

2. Risk assessment of upstream catchment of Bagauda and Challawa should include downstream catchment, these is because if any area located in upper part of a catchment area is classified as being risk, all area in this catchment also has to be classified as being at risk, especially through operational floods.
3. The flood vulnerability map of the study area developed in this research should be adopted, and steps should be taken to make proactive decisions in the fight against flood in the study area.
4. Other researchers conduct an assessment of flood plain utilization which place an important role in modeling the socio- economic living of the people in the study area.
5. Secondly, there is also low environmental awareness campaign by the government agencies to educate the public on the causes of flooding and its abatement measures and warning notice normally released from NIMET or NEMA is not given at the right time.

6. Finally, for the reduction of losses incurred during the extremes weather events for better standard of living since flooding have been re-occurrence events in the study area and low community efforts towards flood management. There is need for improvement towards resident's participation in the management of flood and to be actively involved in the control and mitigation of the impacts of environmental flood disasters.

To actualize such dreams all government agencies should be jointly involved in the enrichment and mobilization of the resident in the communities who are the victims of the flood disasters.

The exercise should focus on letting the people appreciate that their communities have an environmental problem which need to be tackle and that government cannot tackle it alone and they need to make sacrifices and offered assistance.

Risk assessment of upstream catchment of Challawa and Tiga dams should include downstream catchments, this is because if any area located in the upper part of a catchment area is classified as being at risk, especially through operational floods.

Flood forecasting and early flood warning systems should be improved for the study area, and upstream area either by NEMA or NIMET.

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