

Assessing The Positive Socio-Economic Impact of Flood Disaster on Nigeria Food Security: Study of The Confluence Communities of Numan, Adamawa State Nigeria

Iliya J J¹, Atang I², Maikori B B³, Hussaini A⁴

^{1,3}*Centre for Climate Change, CCCFS, Mubi, Adamawa state*

^{2,4}*Zonal Advance Space Technology Laboratory, ZASTAL, Kashere*

doi.org/10.64643/IJIRT209624

Abstract—This study looks at how flood disaster affects food security in Numan, Adamawa State. Numan is situated at the confluence of River Benue and River Gongola. It is located approximately 50km from Yola and serves as a major regional collecting point for peanuts, cotton, sorghum, millet, cowpeas, fish, goats, sheep, and cattle.

The primary livelihoods in the study area comprise farming, fishing, and cattle rearing. A sample of 200 households was selected from the buffer zones of the two rivers. Data analysis was executed using simple percentages and frequencies to establish straightforward empirical observations without technical software reliance. Results show severe food insecurity and hunger across the households: 74% skip meals due to lack of money, 42% go an entire day without eating, 61% eat less food than required, and 55% cut the portion size of children's meals.

The primary staple foods consumed consist of maize and guinea corn (42.5%). Regarding post-flood recovery, 68% of respondents reported that food intake did not improve after flooding due to crops being washed away (52.9%), high agricultural input costs (23.5%), loss of livestock (14.7%), and physical displacement (8.9%). Only 32% observed slight food security improvements attributed to residual soil moisture and fertile silt deposits left behind by flood waters. A majority (78%) agreed that flooding enhances soil fertility, 62% actively practice flood recession agriculture, and 82% confirmed that floodwaters deposit rich alluvial sediments from upper catchments.

Index Terms—Flooding, Food Security, Numan, Confluence, Disaster

I. INTRODUCTION

Background of the Study:

A flood is broadly defined as an overflow of water onto land that is normally dry. Floods fall into two main physical categories: natural floods resulting from rivers, lakes, oceans, or intense rainfall, and catastrophic floods caused by dam breaches, structural failures, or cyclone storm surges. Specific flood types include flash floods, which develop rapidly with dangerous velocity; coastal floods driven by storm surges and tsunamis; and inland dam failure inundations. Climate change and global warming have significantly amplified flood frequency and intensity globally. The European Union flood directive defines flood as a temporary covering by water of land not normally covered by water (Kundzewick, 2004). The threat to lives and property by flood is now becoming an annual event in many urban and rural areas in Nigeria according to Olanrewaju and Fadiro (2003). Flood occurs when surface water covers land that is normally dry or when water overflows normal confinements. The most widespread of any hazard, floods can arise from abnormally high precipitation, storm surges from tropical storms, dam bursts, and rapid snow melts or even burst water mains. The majorities of floods are harmful to humans (Etuonovbe 2011), and this includes Idoko (2016) in Khatri-Chatri and Maharjan, (2006), household food insecurity has been classified as either persistent or transitory Akpoborie (2021) noted that apart from watershed size, topography, geology, soil characteristics, vegetation cover, and land use patterns, flood

magnitude is heavily determined by rainfall intensity, duration, timing, and spatial distribution. In most instances, two or more of these factors combine to trigger catastrophic inundations, such as extreme flooding as intense seasonal rainfall combined with controlled water releases from the Lagdo Dam in Cameroon.

Flooding directly impacts human lives, rural livelihoods, household food security, and delicate riverine ecosystems. Frequency and severity continue to escalate due to rapid land development, wetland encroachment, and global climate shifts that increase rainfall intensity. Historically, Nigeria as observed by Echendu, (2020) has been more focused on post-disaster flood response than control. In 2019 alone, severe flash floods devastated homes and farmlands across 36 states in Nigeria.

At the national level, the impact of flood disasters is colossal. Reports from NEMA (2018) indicated that major flood events influenced 826,403 individuals, displaced 286,119 residents, and resulted in 199 fatalities. Subsequent heavy rains and elevated river levels along the Niger and Benue systems affected 18,640 households across 54 communities in states including Cross River, Kogi, Niger, Taraba, and Adamawa. This constant destruction worsens food insecurity by ruining standing crops and forcing farming families into physical displacement, effectively rendering them strangers in their own homeland.

Nemine (2015) documented that the 2012 flood disaster was particularly catastrophic. Millions were rendered homeless, extensive farmlands were destroyed, drinking water sources were contaminated, and local economic activities were completely grounded. Transportation was restricted to motorized speedboats and wooden canoes, which dramatically increased travel costs. Additionally, floodwaters carried dangerous aquatic reptiles, including crocodiles and snakes, into human habitations.

Atanga and Tankpa (2021) highlighted that Agriculture in developing nations, which serves as the primary employer and livelihood foundation, faces an existential threat from these climate-induced disasters, particularly across sub-Saharan Africa where historical poverty and food insecurity are already pronounced.

In Nigeria, as observed by Kwari, Paul, and Shekarau (2015), flooding is experienced annually in both urban

and rural areas. In Adamawa State, riverine communities along the Benue and Gongola channels face severe annual flooding. Bitrus et al. (2018) noted that Numan and Demsa LGAs have experienced devastating flood events almost annually since 1991 due to uncontrolled floodplain settlement and rapid urbanization. Controlled and uncontrolled releases from the Lagdo Dam upstream in Cameroon remain a primary trigger for severe inundations in the Numan confluence zone.

Despite these severe negative impacts, flooding also brings essential ecological and agricultural benefits. Periodic inundation delivers nutrient-rich alluvial sediments to depleted topsoil, enhancing long-term agricultural productivity. Floodwaters recharge depleted groundwater aquifers, replenish riverine fish stocks, nourish wetland ecosystems, and flush out stagnant organic wastes and toxic compounds. Zachariah (2011) emphasized that flooding is an integral component of the natural ecological renewal cycle.

Statement of the Problem

In 2010, approximately 1,550 deaths and 258,000 displaced persons were recorded across 19 major flood events in Nigeria. The benchmark 2012 flood disaster claimed 361 lives, displaced 3.8 million people, and inflicted estimated total economic losses of US\$6.5 billion. NEMA reported that the 2012 losses represented 4.1% of Nigeria's Gross Domestic Product (GDP), equivalent to 18.7 billion USD. The ripple effects devastated rural livelihoods, destroyed physical infrastructure, and disrupted local trade.

Recurring flood disasters have hit major Nigerian cities and agricultural basins, including Ibadan (1985, 1987, 1990), Yobe (2000), and Akure (1996, 2000, 2002, 2004, 2006). The 2012 flood was widely recognized as the worst in four decades, causing widespread damage across Benue, Bayelsa, Delta, Borno, Cross River, Ebonyi, Bauchi, Gombe, Katsina, Kebbi, Kaduna, Plateau, Taraba, and Adamawa states. (Mazawaje, Tsenbeya, and Ismaila, 2014).

Khobe et al. (2009) identified Numan LGA as one of the most flood-prone regions in Adamawa State due to its strategic position at the confluence of the Benue and Gongola rivers. During the 2012 disaster, Numan was among 10 LGAs severely submerged, displacing over 10,000 residents and destroying hundreds of homes, farms, and livestock herds. The flood hit

suddenly in the early hours of Saturday, 11 September 2003 and repeated in subsequent years following heavy releases from the Lagdo Dam.

Despite the significant body of research on flood hazards in Nigeria, existing literature on Numan has overwhelmingly focused on physical destruction and emergency relief, giving virtually no attention to the positive agricultural and ecological impacts of flood recession processes. This study addresses this empirical gap by examining both the severe negative socio-economic disruptions and the beneficial agricultural opportunities presented by annual flood events.

Objectives of the Study

The main objective is to evaluate the impact of flood disasters on food security in Numan confluence communities. Specific objectives are to:

1. Assess the severity of flood impacts on household food consumption and security status.

2. Identify socio-economic coping strategies adopted by affected households.

3. Identify beneficial flood recession agricultural practices and soil fertility gains.

Scope and Significance of the Study

This study focuses geographically on Numan LGA, located at the Benue and Gongola River confluence in Adamawa State. Contextually, it covers household food security, agricultural losses, socio-economic coping mechanisms, climate perceptions, environmental transformations, and flood recession agriculture benefits. The findings provide actionable insights for disaster management agencies (NEMA, ADSEMA), policy makers, and community organizations to shift from reactive emergency response to proactive, community-based flood risk management.

II. STUDY AREA AND RESEARCH METHODOLOGY

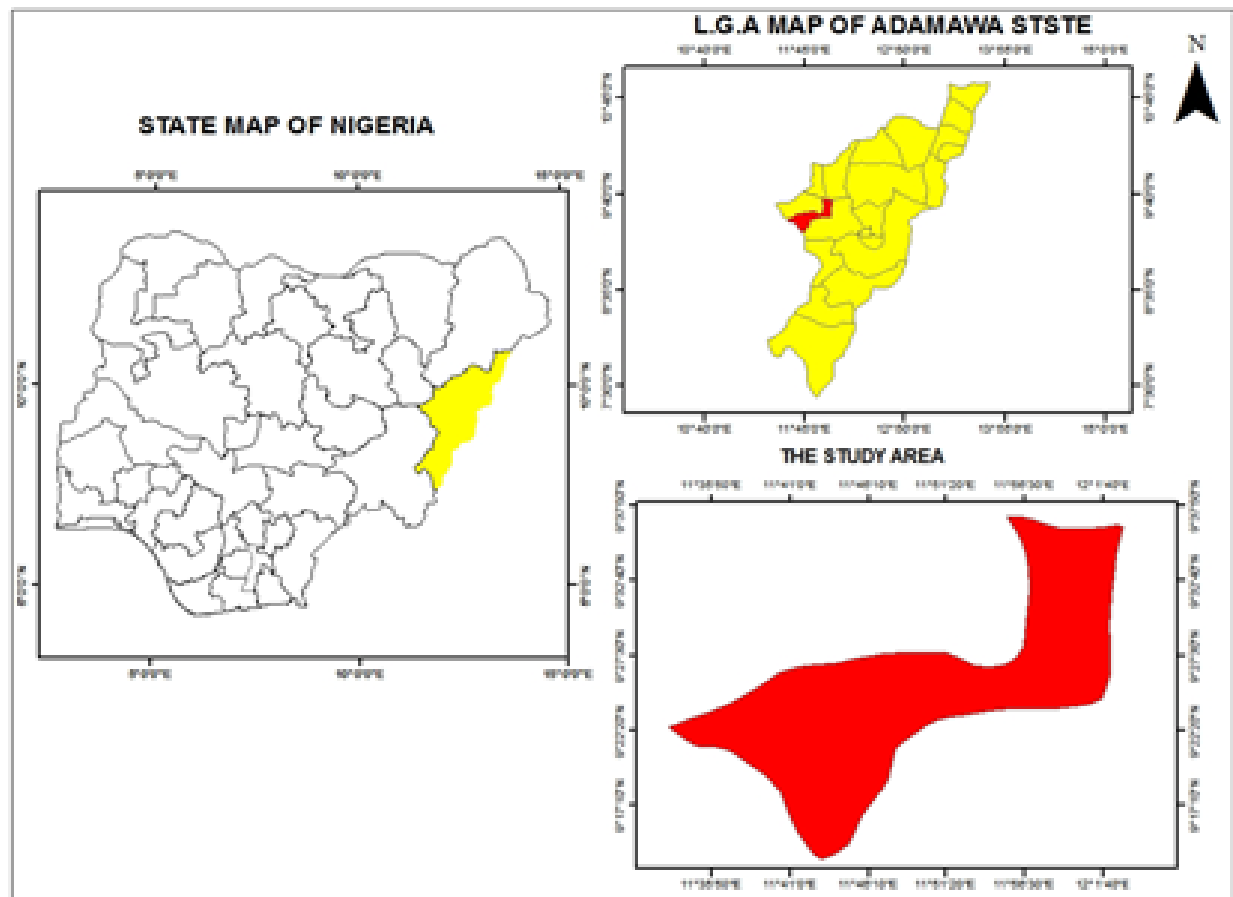


Figure 1. Study Area

Study Area

Location, Position and Size

Numan town is located in the tropical region of Africa and lies between latitude $9^{\circ}18'N$ and longitude $12^{\circ}28'E$ of the equator. It is located in the Benue trough at the confluence of River Benue and River Gongola (Fig. 2). The town generally lies about 186 meters ASL (above sea level). The settlement is influenced by the tropical maritime air mass which ushers in the rainy season from April to November and the tropical continental air mass which brings the dry season, from November to March. Average annual rainfall is 947.6 mm. (Mazawaje, Tsenbeya, and Ismaila, 2014). According to the Federal Official Gazette of Nigeria (2009) Numan occupies about 746.38 square kilometers.

Geology

The geology of the study area is predominantly igneous rocks of the Nigerian Basement complex consisting of granites, with outcrop at different section. The topography is highly undulating and varied in heights. Isolated hills of over 600m are common while valley in between can get as low as 400m, the undulating hills are made up of terrains that dominated by schist and gneiss. (Mazawaje, Tsenbeya, and Ismaila, 2014).

Relief and Drainage

The general relief is an undulating plain at an elevation of between 582m to 640m above sea level. Numan is located along the downstream of River Benue, one of the principal tributaries. Its source is from the Lagdo dam upstream River Benue in the Republic of Cameroun. The regime of the river is characterized by the occurrence of wet and dry seasons. River Benue, Lagdo dam are the major tributaries in the vicinity of the study area according to Mazawaje, Tsenbeya, and Ismaila (2014).

Climate

The climate of the study area is characterized by distinct seasonal regimes oscillating between cool to hot dry and humid to wet. These two seasons as reflected by Chinda and Silas (2013) reflect the influences of tropical continental and equatorial maritime air masses, which cover the entire country. Numan experiences four distinct seasons; a hot dry season from February to May followed by a rainy

season from April to August, then heavy rainfall (peaks fall) from August to September; lastly, the Harmattan season from October to February. The town being under the influence of the North Easterlies has a mean monthly minimum and a mean monthly maximum temperature of about $17^{\circ}C$ and $37.5^{\circ}C$ respectively with the range being about $20.5^{\circ}C$ (Adamawa Hydrological Station, 2010). The spatial and temporal distribution of the rain varies between 1100mm in the north to 1600mm in the southern part of the area; annual rainfall averages about 1,350mm, occurring seasonally between May and September. (Mazawaje, Tsenbeya, and Ismaila, 2014).

Soils and Vegetation

The soils of Numan catchment areas derived its name from the pre-existing Precambrian basement complex rock consisting of gneiss, granite, amphiboles and schist. (Chinda and Silas, 2013), a combination of Eutric pelluster (USDA) pellic Vertisol. (FAO, 2010). The vegetation of the study area lies within Northern Guinea Savannah with patches of few types of woodland mainly trees with shrubs and tall grasses. The trees are short, broad leaved with height up to 16.5m while the grasses are between 1.5m-3.5m high. The trees shed their leaves during the dry season in order to minimize water loss by perspiration. The grasses have durable rooting systems which remain underground even when the shoots (tops) have been burnt after dry season fires. They regenerate again after the onset of the first rain the following year (Chinda and Silas, 2013).

Land Use and Human Activities

The village communities living on the banks of the rivers engage in fishing while the Fulanis are cattle rearers. Numan has a network of roads linking all parts of the country. Bitrus et al, (2018) research revealed that their cash crops are cotton and groundnuts while food crops include maize, yam, cassava, guinea corn, millet and rice.

Methodology

This chapter presents the research methodology used in this study. The population size used was a purposive framework from Numan Adamawa State Nigeria, the design employed will be as well as qualitative descriptive survey, through the administration of field questionnaire.

Population of the Study

The research population will consist of the people of Numan Local Government Area, environs in Adamawa State, Nigeria which will be 116,440 (based on projected NPC data, 2016). The population of the riverine is dispersed over a wide geographic area and residing in a variety of accommodation types, it was vital to choose a methodology and sampling strategy that could provide a baseline of useful information at both an operational and a programmatic level. The sample to be representative of 116,440 households would have been too large to cover and collecting a useful and representative sample in each of these LGAs would have required an immense logistical and financial operation which raised practical concern.

Sample Size

Sample Size of the Study

The method of data collections will be purely primary and secondary. The researcher also employed the three steps of evaluation procedure that gave satisfactory and confirmatory analysis of stage C. (Kane, Harper and Row 1969) thus,

In the thought of Taro Yamane (1965),

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

Where,

n = Sample Size

N = Total Target Population

E = Level of Error Tolerance

Therefore, substituting in the formula, where Nigeria Total population of 122,300, we have

$$n = N / 1 + N(e)^2$$

Where,

n = Sample Size

N = Total Target Population

e = Level of Error Tolerance

Therefore, substituting in the formula, where the total population of Numan according to the 2016 projected figure is 122,300, we have;

$$n = 122,300 / 1 + 122,300(0.05)^2$$

$$= 122,300 / 1 + 305.75$$

$$= 122,300 / 306.75$$

Therefore, n =

$$398.37133550488599348534201954397$$

Therefore, the sample is supposed to be approximated to 400. Since the study will only cover the buffer zones of Rivers Benue and Gongola (not the whole Local government area), half of the sample size, 200, will be administered.

Sampling Techniques

Quantitative data collection was utilized. The sampling technique to used is random sampling of 200 households living along the confluence of River Gongola and Benue. The data was analyzed through the use of descriptive statistics, comprising of frequencies, simple percentages and tables supported with charts and graphs where necessary for further clarity to show the impact of flood. The researcher also ascertained the confidence interval of the respondents' views at 95% confidence level.

Methods of Data Analysis

In the process of this study, standard scientific technique was employed in the determination of sample size, process of data collections, as well as data presentation coupled with the analysis of data collected.

The information from the questionnaires was analysed using different statistical techniques. These included both descriptive and inferential statistics. Descriptive statistics used included the use of simple percentages and measures of central tendencies in analyzing the data. Statistical Software for Social Sciences (SPSS) was be utilized for the analysis.

Methods of Data Collection

Community retrieved administered questionnaires will be compiled using an excel data entry form.

III. DATA PRESENTATION AND ANALYSIS

Introduction and Socio-Demographic Profile

Data were gathered using 200 structured questionnaires administered across household heads residing in the riverine buffer zones of Numan.

A 100% response and retrieval rate were achieved. Empirical findings are presented using standard descriptive frequencies and percentages.

Table 1. Socio-Demographics Characteristics of the Respondents

Average Age of Respondents	Freq.	Level of Education	Freq	Average Annual Income (N000)	Freq.	Number of years living the area	Freq.
<20	80	Primary School	20	<250	25	<20	80
21-40	20	Secondary School	80	>250 – 500	76	21-40	88
41-60	72	Tertiary	65	>501 – 1000	64	41-60	20
>60	28	Others	35	>1000	35	>60	12

The socio-demographic analysis shows that formal education levels are generally low. Most farmers fall within the active working age range of 25 to 55 years. Annual household incomes remain below N350, 000 for the vast majority. Farm size distribution reveals that 35% cultivate less than 1 ha, 42% farm 1–2 ha, and 23% operate farms greater than 2 ha. Smallholders operating under 2 ha thus account for 77% of the total farming population. While 62% possess over 10 years of active farming experience, high experience has not translated into reduced vulnerability to severe flood disasters.

Assessment of Household Food Security

Tables 1 through 17 present empirical data regarding food requirements, meal skipping patterns, dietary reductions, price inflation, and livestock holdings.

Table 2. Basic Daily Food Requirement

Basic Daily Food Requirement	Frequency	%
Any food that satisfies one's daily needs	33	16.5
Complete 3 square meals	66	33
Tuwo and vegetable soup	33	16.5
Any available Tuwo, vegetable soup and meat or fish	68	34

The staple diet is dominated by maize and guinea corn (42.5%), followed by rice and cassava (27.0%). These cereal crops are highly vulnerable to prolonged waterlogging during flood events.

Regarding post-flood food intake, 68% of respondents reported no improvement (Table 4.8), while 32% reported slight improvements. For those experiencing no improvement, the primary reasons cited were crops washed away (52.9%), high input costs (23.5%), livestock losses (14.7%), and physical displacement (8.9%) (Table 4.10). The 32% observing slight improvements attributed this to residual soil moisture and fertile silt deposits.

Table 3: Household Food Deficit and Hunger Indicators

Food Deficit Indicator	Yes (%)	No (%)	Primary Demographics Impacted
Skip meals due to lack of money	74.0%	26.0%	Normalized across all households
Go an entire day without eating	42.0%	58.0%	Female-headed households (>7 members)
Eat less food than required	61.0%	39.0%	Adults reducing intake for children
Cut size of children's meals	55.0%	45.0%	Sustained 2-3 months post-flood

Flood is a natural disaster that affects lives, livelihoods, household food security and natural ecosystems (Atu and Okon, 2018). As shown above, meal skipping is widespread (74%), and 55% of households cut children's portion sizes for 2–3 months following a flood event, leading to child malnutrition and wasting cope with severe food shortages, (Table 2), households rely on borrowing (31.5%), selling livestock at distress prices (24.0%), casual labor (18.5%), and temporary migration to Yola/Jimeta (12.5%), and gathering wild foods or fishing (8.5%). Only 5.0% received formal aid from ADSEMA and NEMA, highlighting weak

Table 4. Increment in General Price Due to the Yearly Flood

How you deal with increment in general price increment due to the yearly flood	Frequency	%
Savings	59	29.5
Food storage	91	45.5
Dry season Farming	50	25

Food price inflation during flood periods was severe. The price of a bag of maize rose from N15, 000 to N28,000, an 86.7% increase. To absorb price spikes

(Table 3), households reduced purchase quantities (38%), shifted to cheaper foods (29%), bought on credit (19%), or went without (14%).

Farm holdings rely overwhelmingly on local seed varieties (82%) rather than improved seeds (18%), representing a low-yielding but flood-tolerant indigenous strategy. Mixed farming is practiced by 85% of households. Average livestock holdings per household consist of 5 goats, 4 sheep, 12 poultry, and 10 cattle. Fishing activities are 100% split between domestic consumption and commercial sales, serving as a key adaptive buffer during flood events.

Socio-Economic Infrastructure and Losses

Infrastructure coverage across Numan riverine communities is severely inadequate: functional primary schools (30%), health centers (20%), motorable access roads (25%), structured market stalls (15%), and culverts/drainage channels (10%).

All respondents (100%) confirmed that flooding occurs every year. The worst flood years were identified as 2012 (58%) and 2019 (32%). Agricultural losses per household average N150, 000 to N350, 000, while direct structural property damage averages N350, 000. Because average annual income is approximately N350, 000, a single flood event completely wipes out one full year of household income. Overall, 72% of farmers reported declining crop yields over time.

Table 5. Method of Preparing Land

Method of farmland preparation	Frequency	%
By bush burning	140	70
By clearing vegetation with hand tool i) hoes ii) cutlass iii) matchet	48	24
By using tractor: i) plough ii) harrow iii) ridger iv) animal traction	12	6

Table 6. Farming Implements

Farming Implements	Frequency	%
Local/Existing tool (matchet, rake, hoe)	180	90
Modern/Improved tool (Tractor, harrow, animal tracking)	20	10

Table 7. Comparison of Present Yields with Those at the Time You Started Farming

Crops	Better	Same	Worse	Reasons
Maize	3	136	61	More farmland, increased funding, application of modern farming tools
Sorghum	17	95	88	High cost of fertilizer
Rice	200	0	0	application of modern herbicides and farming tools

Table 8. Rating of Possible Problems or Constraints in the Area

Possible constraints	Rating			
	Very Severe	Severe	Little Problem	No Problem
Drought	10	23	25	52
Erosion		25	41	134
Low yield	22	128	50	
Pest infestation	22	44	40	98
Food Scarcity	43	36	121	
Poverty	188	4	8	
Health problem	24	136	40	
Access to health care facility	34	126	40	
Fertilizer availability	200			
Fertilizer cost	137	63		
Market outlet availability	106	48	46	
Market outlet reliability	30	78	102	
Access to credit facility	200			
Access to farm machinery	200			
Access to extension services	78	122		
Labour availability	83	117		
Access to land		22	48	130

Table 9. Destruction of River Banks and Natural Levees Due to Flooding

Destruction of river banks and natural leaves due to flooding	Frequency	%
Yes	200	100
No	0	0

Table 10. Widening and Deposition Downstream Increase

Widening and deposition increasing downstream?	Frequency	%
Yes	200	100
No	0	0

Table 11. Your Opinion about Positive Aspects of Flooding

Your opinion about positive aspects of flooding	Frequency	%
Fertilizes the soil	88	44
Increases fish production	44	44
Good grass for grazing	45	22.5
No benefits but loses	23	11.5

Socio economic activities and flood advantages
Despite severe negative impacts, respondents identified significant agricultural benefits from annual flooding. A majority (78%) agreed that flooding enhances soil fertility, 62% actively practice flood recession agriculture, and 82% confirmed that floodwaters deposit rich alluvial sediments from upper catchments (table 12).

Table 12: Flood Recession Practices and Benefits

Recession Farming Type	Share (%)	Observed Agricultural Benefit	Share (%)
Floodplain Recession	45.0%	Increased dry-season crop yield	48.0%
Spate Irrigation	20.0%	Eliminated fertilizer requirement	28.0%
Inundation Canals	18.0%	Improved dry-season livestock grazing	14.0%
Depression Farming	17.0%	Fish breeding and groundwater recharge	10.0%

Floodplain recession farming (45%) and spate irrigation (20%) leverage residual soil moisture and nutrient-rich silt, allowing farmers to achieve high dry-season yields without commercial fertilizers.

Table 13: Summary Matrix - Negative Impacts vs. Positive Opportunities

Negative Socio-Economic Impacts	Positive Agricultural & Ecological Benefits
74% skip meals; 42% go whole day without eating	78% agree flooding increases soil fertility
77% smallholders (<2ha); yield decreasing for 72%	62% practice flood recession agriculture
N350,000 property loss equals full annual income	82% confirm annual fertile sediment deposition
Maize price increased by 86.7% (N15k to N28k)	48% achieve increased dry-season yields
Only 5% receive formal relief from NEMA/ADSEMA	28% save costs by eliminating commercial fertilizer

The matrix highlights the central paradox of Numan confluence communities: while annual flooding provides essential soil fertility and dry-season agricultural benefits that keep farmers on the land, severe structural damages and asset losses lock households into a persistent poverty trap.

Table 14. Does Flooding Make Soil More Fertile.

Does flooding make soil more fertile?	Frequency	%
Yes	135	67.5
No	65	32.5

Floodplain agriculture, which is the most common type of flood-based farming in sub-Saharan Africa, and where either receding or rising floodwaters provide water for crop cultivation. Spate irrigation, in which floodwater from mountain catchments is diverted from normally dry riverbeds and spread over large areas for irrigation, improvement of grazing areas, filling of drinking water ponds and groundwater recharge. Inundation canals, which are situated next to rivers or floodplains and are fed by water when rivers rise. The canals are then used to divert the water to nearby farmland.

Depression agriculture, in which shallow depressions are filled when the groundwater level rises on a

seasonal basis. They can provide enough moisture to support grazing in the dry season and crops grown without irrigation.

Table 15 Flood Recession/Flood-Based Agriculture I

Have you been practicing flood recession/flood-based agriculture?	Frequency	%
Yes	133	66.5
No	67	33.5

Table 16. Flood Recession/Flood-Based Agriculture II

Type of flood recession/flood-based agriculture practiced	Frequency	%
Floodplain agriculture	154	77
Spate irrigation	0	0
Inundation canals	0	0
Depression agriculture	46	23

Table 17. Floods Bring Fertile Sediments

Floods bring fertile sediments	Frequency	%
Yes	200	100
No	0	0

Table 18. Benefits from Flood Sediments

Benefits from flood sediments	Frequency	%
Increase in soil fertility	77	38.5
More fish for food and earning	46	23
Flood plains do not easily dry; more fresh grass for grazing	46	23
No benefits	27	13.5

IV. SUMMARY AND CONCLUSION

Summary

Flooding occurs annually (100% frequency), with the worst flood events recorded in 2012 (58%) and 2019 (32%). Estimated agricultural losses per household range between N150, 000 and N500,000, while direct structural property losses average N350, 000—a figure equivalent to the entire annual household income. Consequently, a single flood event completely wipes out a full year of household income, leading to declining agricultural yields for 72% of farmers. On the positive dimension, 78% of respondents noted that flooding enhances soil fertility, 62% practice flood recession agriculture, and 82% agree that annual

floods bring fertile sediments from upper catchments. Flood recession types include floodplain (45%), spate irrigation (20%), inundation canals (18%), and depression farming (17%). Observed benefits comprise increased dry-season crop yield (48%), eliminated need for commercial fertilizer (28%), improved livestock grazing (14%), fish breeding enhancement (10%), and groundwater recharge (15%).

Conclusion

The study has assessed the positive socio-economic impact of flood disaster on Nigeria food security with emphasis on the confluence communities of Numan, Adamawa state and discovered the worst flood events recorded in 2012 (58%) and 2019 (32%) impact. Estimated agricultural losses per household range between N150, 000 and N1,000, 000, while direct structural property losses average N350, 000—a figure equivalent to the entire annual household income. These forces households into extreme coping measures, including skipping meals (74%), due to lack of money, cutting children's portion sizes (93.5%), selling of assets at distress prices (6. %5). These factors all lead to food insecurity in the community

REFERENCE

- [1] T. Akpoborie, "A year of raging floods," 2012. [Online]. Available: <http://westafricainsight.org>. [Accessed: Jan. 5, 2021].
- [2] R. A. Atanga and V. Tankpa, "Climate change, flood disaster risk and food security nexus in Northern Ghana," 2021, doi: 10.3389/fsufs.2021.706721. [Accessed: Dec. 30, 2021].
- [3] E. A. Atu and E. O. Edet, "Flood effects on agricultural productivity: Implications for mangrove forest ecosystem in Akpabuyo, Cross River State, Nigeria," *Global J. Human-Social Sci.: Geography, Geo-Sciences, Environ. Sci. Disaster Manage.*, vol. 18, 2018.
- [4] C. Bitrus, M. I. Nasiru, A. S. Halilu, and B. E. Lynda, "Assessing the effect of flood along the riverine communities of Numan and Demsa Local Government Areas of Adamawa State," *Int. J. Agric., Environ. Res.*, vol. 3, no. 6, 2018.
- [5] P. A. Chinda and I. B. Silas, "Application of geo-information techniques in flood vulnerability

- analysis for Numan Local Government Area of Adamawa State, Nigeria,” *Int. J. Adv. Sci. Tech. Res.*, vol. 4, Jul.–Aug. 2017. [Online]. Available: <http://www.rspublication.com/ijst/index>. [Accessed: Dec. 2, 2021].
- [6] A. J. Echendu, “The impact of flooding on Nigeria’s sustainable development goals (SDGs),” vol. 6, no. 1, 2020, doi: 10.1080/20964129.2020.1791735. [Accessed: Aug. 2, 2021].
- [7] A. K. Etuonovbe, “Devastating effect of flooding in Nigeria,” in *Proc. FIG Working Week*, 2011. [Online]. Available: <http://www.fig.net>. [Accessed: Feb. 4, 2021].
- [8] A. Fischlin, G. F. Midgley, J. T. Price, et al., “Ecosystems, their properties, goods and services,” in *Climate Change 2007: Impacts, Adaptation and Vulnerability*, M. L. Parry, O. F. Canziani, J. P. Palutikof, et al., Eds. Cambridge, U.K.: Cambridge University Press, 2007, pp. 211–272.
- [9] Food and Agriculture Organization of the United Nations (FAO), “Climate change implications for agricultural development and natural resources conservation in Africa,” *Nature & Faune*, vol. 25, no. 1, 2010. [Online]. Available: <http://www.fao.org/africa/publications/nature-and-faune-magazine/>. [Accessed: Aug. 12, 2021].
- [10] J. Gardiner, “Environmental impact of floods,” in *Coping with Floods*, G. Rossi, N. Harmancioglu, and V. Yevjevich, Eds., NATO ASI Series, Series E: Applied Sciences, vol. 257. Dordrecht, The Netherlands: Springer, 1994, doi: 10.1007/978-94-011-1098-3_31.
- [11] I. D. Idoko, “An impact assessment of flooding on food security among rural farmers in Dagiri Community of Gwagwalada Area Council, Abuja, Nigeria,” *Agricultural Development*, vol. 1, pp. 6–13, 2016, doi: 10.20448/journal.523/2016.1.1/523.1.6.13.
- [12] D. Khobe, B. J. Readison, K. M. Sanu, and P. G. Dish-Khobe, “Conserving agricultural biodiversity at Imburu Ward of Numan Local Government Area, Adamawa, Nigeria,” *Int. J. Agric. Food Syst.*, vol. 3, no. 4, 2009.
- [13] J. W. Kwari, M. K. Paul, and L. B. Shekarau, “The impacts of flooding on socio-economic development and agriculture in Northern Nigeria: A case study of 2012 flooding in Yola and Numan areas of Adamawa State, Nigeria,” *Int. J. Sci. Eng. Res.*, vol. 6, no. 7, p. 1433, 2015. [Online]. Available: <http://www.ijser.org>. [Accessed: Feb. 5, 2021].
- [14] Z. W. Kundzewicz, “Floods and flood protection: Business-as-usual?” in *The Basis of Civilization—Water Science? Proc. UNESCO/IAHS/IWHA Symp.*, Rome, Italy, Dec. 2003, IAHS Publ. 286, 2004.
- [15] W. R. Katunzi, “The impacts of climate change on food security and community-based adaptation options: The case of Magu District in Mwanza, Tanzania,” M.S. thesis, Open University of Tanzania, 2013. [Online]. Available: <http://reositiry.out.ac.tz>. [Accessed: Jun. 23, 2021].
- [16] D. F. Mazawaje, I. H. Tsenbeya, and A. B. Ismaila, “Analysis of the determinants of floods in Numan Town, Nigeria,” *J. Environ. Sci. Eng. B*, vol. 3, pp. 264–273, 2014, doi: 10.17265/2162-5263/2014.05.005.
- [17] National Emergency Management Agency (NEMA), “Flood: More than 25,000 is placed in Benue as many communities remain adamant,” 2012. [Online]. Available: <http://www.nema.gov.ng/emergencyzones/floods.aspx>. Accessed May 2014.
- [18] E. I. Nemine, “Flood disasters in Nigeria: Farmers and governments’ mitigation efforts,” *J. Biol. Agric. Healthcare*, vol. 5, no. 14, 2015. ISSN: 2224-3208 (print), 2225-093X (online).
- [19] D. O. Olanrewaju and G. Fadairo, “Flooding as an induced environmental problem,” *J. Nigerian Inst. Town Planners*, vol. XVI, no. 1, pp. 85–95, 2003.
- [20] M. Zachariah, “Flood: Some positive effects,” *The Daily Star*, 2011. [Online]. Available: <https://assetsdscdnedgebluemixnet.cdn.ampproject.org>. [Accessed: Jun. 30, 2021].