



Vulnerability and Adaptation: Analyzing the Effects of Flood on Agrarian Communities in Ibaji Local Government Area, Kogi State, Nigeria

ABSTRACT

This study analyzes the effects of flood on agricultural practices in Ibaji Local Government Area, Kogi State, Nigeria. The research examines the frequency, severity, and impacts of flooding on agricultural production within the region. Utilizing a mixed-method approach involving 200 respondents, findings indicate that flood is a recurrent and escalating phenomenon, with 58% of respondents experiencing annual flood events and 51% classifying recent floods as very severe. Approximately 47.5% of farmers reported an increase in both the frequency and severity of floods over the past five years. The impacts on agricultural production are profound, with staple crops such as rice (74.5%), maize (58.5%), and vegetables (47.5%) most affected. Crop losses were substantial; 36% of respondents reported losses between 51–75%, resulting in significant declines in household income (74%) and widespread soil degradation through waterlogging and erosion. Although adaptive strategies such as crop diversification and early planting are employed, their effectiveness is limited, and institutional support remains inadequate (73.5% reported no external support). The study underscores the urgent need for comprehensive flood management interventions, policy reforms, and infrastructural development to build resilience and ensure agricultural sustainability.

Keywords: Flood Vulnerability, Agricultural Production, Food Security, Ibaji LGA, Climate Change Adaptation.

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1. Introduction

Background to the Study

Floods are environmental hazards often induced by meteorological phenomena and exacerbated by human alteration of the physical environment. Defined as a general temporary condition of partial or complete inundation of normally dry areas (Jeb & Aggarwal, 2008), floods are among the most dramatic interactions between humans and their environment. In Nigeria, flood events have become increasingly frequent, causing devastation to life, property, and agricultural systems.

Ibaji Local Government Area (LGA) in Kogi State is a predominantly agrarian community situated in the Niger-Benue floodplain. This geographical location makes it highly prone to overflow from the Niger and Benue rivers. The agricultural sector in Ibaji is characterized by small-scale, rain-fed farming, which is highly susceptible to hydrological extremes. The recurrence of floods in this region has devastating effects, including crop destruction, soil degradation, displacement of farmers, and reduced income (Oyedele et al., 2022).

Statement of the Problem

Despite the critical role agriculture plays in the local economy of Ibaji LGA, persistent flooding has led to significant yield reductions, particularly for staple crops such as cassava, maize,

and rice. Farmers often face heightened vulnerability and reduced adaptive capacity due to financial inability to recover after flood events (Adeleke et al., 2020). Furthermore, the lack of effective flood management strategies exacerbates the impact, as many farmers are ill-equipped to implement adaptive practices. The consequences extend beyond immediate crop loss to threaten food security, increase poverty levels, and disrupt the socio-economic fabric of the community (Buba et al., 2021). There remains a need for a comprehensive understanding of these effects to develop effective mitigation strategies.

Objectives of the Study

The primary aim of this study is to investigate the effects of flood on agricultural practices in Ibaji LGA and identify strategies for mitigation. The specific objectives are to:

Assess the frequency and severity of flood in Ibaji LGA.

Determine the effects of flood on crop production.

Examine farmers' perceptions of flood impacts.

Determine strategies to overcome the impact of flood on agricultural practices.

2. Literature Review

Scholarly discourse identifies flooding as a critical environmental hazard that severely undermines food security and rural livelihoods, a position reinforced by UNDRR (2020) and FAO (2021), which highlight the disruptive capacity of hydrological extremes on agricultural supply chains and the displacement of farming communities. Dottori et al. (2018) further attribute escalating economic losses in riverine areas to anthropogenic warming, while Kumar et al. (2018) and Akukwe et al. (2018) provide empirical evidence that these events disproportionately affect staple crop yields during critical growth phases in Nigeria. The impact of such inundation extends to long-term environmental degradation; Ojo et al. (2019) and Rihi et al. (2022) document significant declines in soil fertility and structure following flood recession, which compromises future harvest potential. In response to these vulnerabilities, Adger (2003) emphasizes the role of social capital in resilience, while studies by Enete et al. (2016), Alhassan (2020), and Rahut et al. (2020) identify indigenous adaptation strategies—such as crop diversification and early planting as common coping mechanisms among smallholder farmers. However, the efficacy of these local interventions is often limited by a lack of institutional backing, as Akinwumi et al. (2021) and Ogunjimi et al. (2021) argue that external support systems and financial aid remain inadequate for sustainable flood risk management in agrarian regions.

3. Methodology

Study Area

Ibaji LGA is located in the southern part of Kogi State, covering a land mass of about 1,377 square kilometers (see Figure 1). It lies within the flood plains of the Rivers Niger and Benue valleys, characterized by hydromorphic soils containing alluvial deposits (Oriola, 1994) see Figure 2. The climate is tropical savanna with distinct wet (April–October) and dry seasons. The topography includes the Okpolo Plain and extensive floodplains ranging from 300m to 490m above sea level, making the area naturally susceptible to inundation (Abdulsamad, 2018).

Figure 1: Map of Study Area

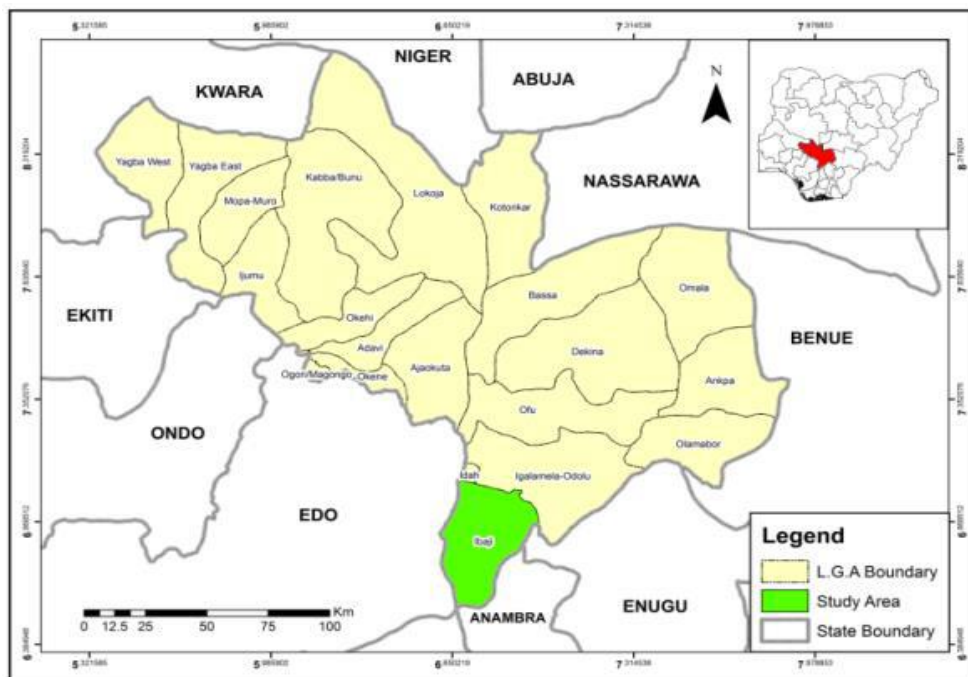
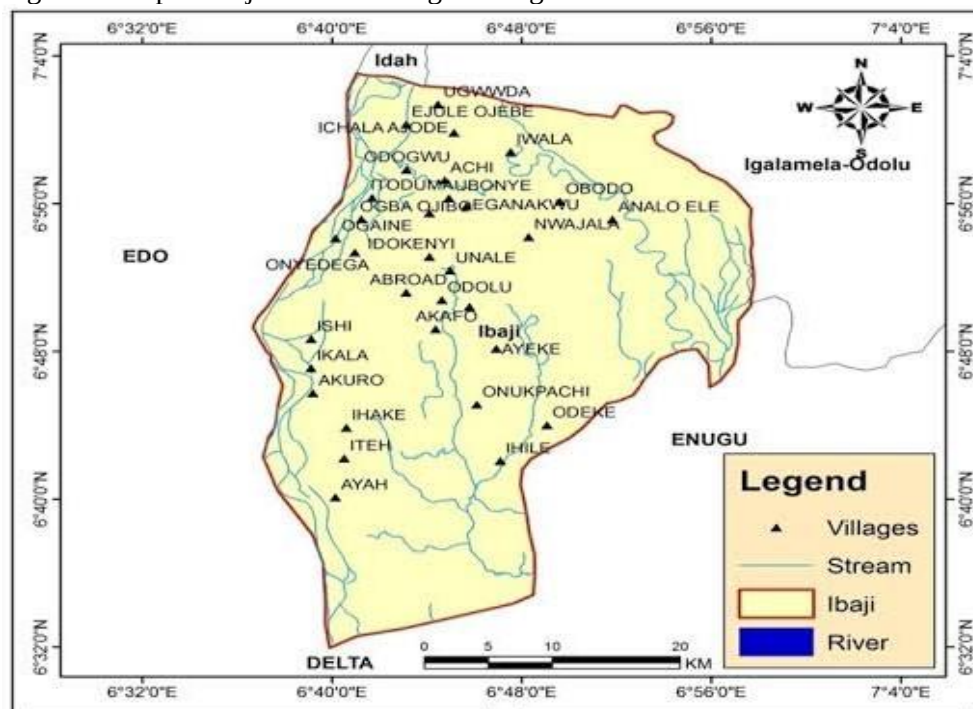


Figure 2: Map of Ibaji LGA Showing Drainage Pattern



Research Design and Sampling

The study adopted a mixed-methods approach, combining quantitative surveys with qualitative interviews. The population comprises approximately 127,500 people. A stratified random sampling technique was utilized to select 200 farmers across various wards and villages. The sample size was determined using the Krejcie and Morgan (1970) table.

Data Collection and Analysis

Data were collected using structured questionnaires, In-Depth Interviews (IDI), and Focus Group Discussions (FGD). Quantitative data were analyzed using descriptive statistics (frequency distribution and percentages) via SPSS, while qualitative data were transcribed and categorized into

themes.

4. Results and Discussion

Demographic Characteristics

The demographic analysis reveals an active labour force, with 69.5% of respondents aged between 21 and 50 years. Farming in Ibaji is predominantly male-dominated (63.5%) and characterized by smallholder operations, with 53% of respondents cultivating between 1 to 3 hectares. Most farmers (66.5%) possess over five years of experience, suggesting a community with significant traditional knowledge yet vulnerable to changing climate dynamics.

Frequency and Severity of Floods

The study established that flooding in Ibaji LGA is a regular occurrence (see Table 1).

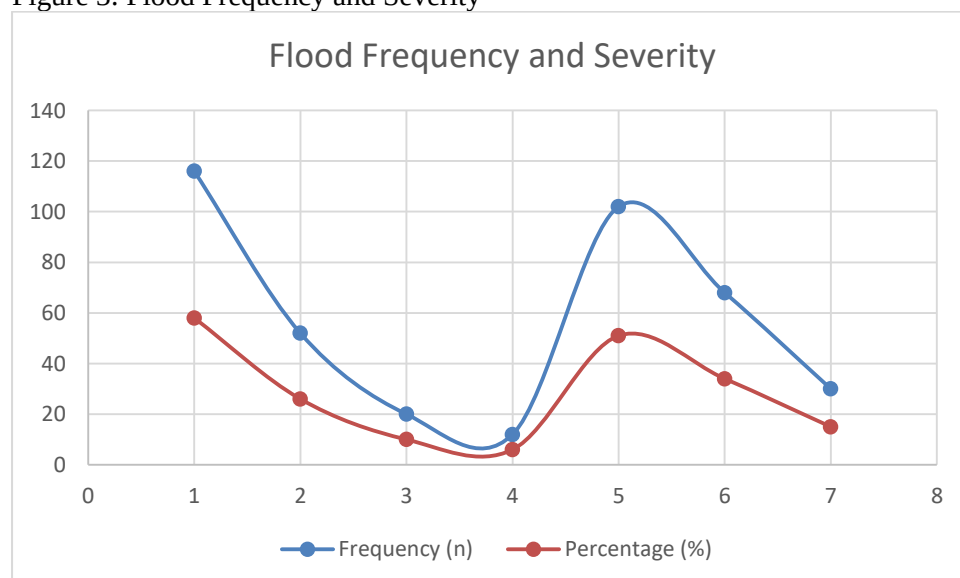
Table 1: Flood Frequency and Severity

Flood Dimension	Category	Frequency (n)	Percentage (%)
Flood Occurrence	Annually	116	58.0
	Once every 2–3 years	52	26.0
	Rarely	20	10.0
	Never	12	6.0
Flood Severity	Very severe	102	51.0
	Moderate	68	34.0
	Slight	30	15.0

Source: Field Survey, 2025

Table 1 shows that flooding is a frequent occurrence among the respondents, with more than half (58.0%, $n = 116$) reporting annual flood events, while a further 26.0% ($n = 52$) experience flooding once every two to three years. A smaller proportion reported rare flooding (10.0%, $n = 20$), and only 6.0% ($n = 12$) indicated that they have never experienced flooding. With respect to flood severity, the majority of respondents perceived recent flood events as very severe (51.0%, $n = 102$), followed by those who described the floods as moderate (34.0%, $n = 68$). Only a relatively small share (15.0%, $n = 30$) considered flood impacts to be slight (see Figure 3). Overall, these findings underscore the recurrent and predominantly severe nature of flooding in the study area, highlighting its growing threat to livelihoods and local resilience.

Figure 3: Flood Frequency and Severity



These findings align with Okunlola and Adeoye (2021), who noted that seasonal flooding in the Middle Belt has shifted from intermittent to near-annual events due to rising water levels in the River Niger and climate change factors.

Impact on Agricultural Production

The agricultural damage in Ibaji LGA is extensive, affecting both staple food security and economic stability (see Table 2).

Table 2: Impacts of Flooding on Crop Production, Income, and Soil Conditions

Impact Dimension	Indicator / Category	Percentage (%)
Crop Vulnerability	Rice	74.5
	Maize	58.5
	Vegetables	47.5
Crop Loss Level	Losses of 51–75%	36.0
	Losses of 76–100%	12.0
Income Impact	Significant reduction in farm income	74.0
Soil Degradation	Waterlogging	48.0
	Soil erosion	44.0
	Decline in soil fertility	35.0

Source: Field Analysis, 2025

Table 2 shows that there is a pronounced agricultural vulnerability to flooding, with rice most affected (74.5%), followed by maize (58.5%) and vegetables (47.5%), reflecting exposure of low-lying farmlands. Substantial crop losses were reported, as 36% of farmers lost 51–75% of yields and 12% suffered near-total losses. Consequently, 74% experienced significant income reductions. Flooding also degraded soils through waterlogging, erosion, and fertility decline, undermining long-term productivity.

Coping Strategies and Institutional Support

Farmers have adopted various coping mechanisms, though their effectiveness varies.

Strategies: The most common strategies include crop diversification (51%), early planting (42%), and the use of flood-resistant varieties (40.5%).

Effectiveness: Only 23% of farmers termed these strategies "very effective," while 50% termed them "effective."

External Support: A critical finding is the lack of institutional aid; 73.5% of respondents reported receiving no external support. Among the few who did, assistance was primarily financial (37.7%) or related to early warning systems (28.3%).

5. Conclusion

The study concludes that flooding in Ibaji Local Government Area is a persistent and escalating environmental threat that severely disrupts agricultural livelihoods. The high frequency of annual flooding, coupled with severe crop losses in rice and maize, threatens food security and exacerbates rural poverty. While farmers employ indigenous adaptation strategies like crop diversification, the scale of the disaster often overwhelms these local measures. The profound lack of external support and infrastructure highlights a significant gap in disaster management and agricultural resilience planning for the region.

6. Recommendations

Based on the findings, the following recommendations are proposed to ensure sustainable agricultural productivity in Ibaji LGA:

Infrastructural Development: There is an urgent need for the construction of dykes, embankments, and functional drainage channels to manage water overflow from the River Niger.

Flood-Resistant Agriculture: Government and research institutes should prioritize the distribution of flood-tolerant crop varieties (specifically rice and maize) and promote early-maturing species that can be harvested before peak flood seasons.

Financial and Insurance Support: The establishment of accessible agricultural insurance schemes is vital to cushion farmers against catastrophic losses. Additionally, low-interest credit facilities should be provided for post-flood recovery.

Early Warning Systems: Investment in accessible, community-based early warning systems is necessary to allow farmers to take proactive measures before floodwaters arrive.

Dry Season Farming: Resources should be directed toward irrigation infrastructure to encourage dry-season farming, allowing farmers to recover wet-season losses.

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