International Academic Journal of Agriculture & Agribusiness Research
ISSN: 5280-5269 | Volume 8, Issue 6 | May, 2024 | pages 12 – 24
DOI: 22294-428314-25227-862
Double Blind Peer Reviewed International Research Journal
https://www.arcnjournals.org
journals@arcnjournals.org

Effects of Coastal Flooding on Crop Farmers, and Artisanal Fisher Folks in South-South Nigeria

Emerhirhi, E[1], Nnadi, F.N.[2] , Ukpongson, M.A.[2], Ajaero, J.O. [2] and Okoroma, E.O.[3]

[1]Department of Agricultural Education, Federal College of Education (Technical) Omoku, Rivers State
[2]Department of Agricultural Extension, Federal University of Technology, Owerri Imo State, Nigeria
[3]Department of Agricultural Extension and Rural Development, University of Uyo, Uyo, AkwaIbom State, Nigeria

Abstract: *This study considered the perceived effects ofcoastal flooding and the constraints to the use of coping strategies by the crop farmers, and artisanal fishermen in South-South Nigeria. The study among others aimed at the perceived effects of coastal flooding on the livelihood activities of crop farmers and artisanal fisher folks in the area, as well as constraints to the use of coping strategies by the crop farmers, and artisanal fishermen. Data were collected from 450 crop farmers and artisanal fishermen with a set of structured questionnaire. Data analysis was done with percentage count, mean score, standard deviation and Analysis of Variance. Results show that Artisanal fisher folks in Bayelsa experience the highest mean loss of livelihood (M = 3.70, SD = 1.24) compared to those in Rivers (M = 2.97, SD = 0.62) and Delta (M = 3.19, SD = 0.47), while for crop farmers the effects manifested in increased farm expenses had the highest Mean score of 3.27; SD = 0.77), followed by destruction of crops ($\bar{x}$ – 3.19; SD – 0.85), food scarcity ($\bar{x}$ = 3.19; SD = 0.77), and loss of lives ($\bar{x}$ = 3.15; SD = 0.74).that poor government policies (91.7%), poor access to information (80%), poor knowledge of better strategies (91.7%), cultural belief (78.8%), poor capital base (96.2%), poor access to improved varieties/species (80.2%), poor care and information about IDPs (88.4%), and sickness and health disorder (72.4%) were constraints to the use of coping strategies. It was concluded that coastal flooding had unprecedented negative impacts on the livelihoods of crop farmers and fishermen in the South-South zone of Nigeria. It occasioned death, loss of livelihood, increased cost of production, food scarcity, poor storage, among others. The people had diversified means of survival, however they did not escape the rage of coastal flooding. It was recommended that Agricultural Research Institutes should evolve suiting technologies that would stand the test of time during periods of coastal flooding – flood resistant crop varieties, early maturing species, floating ponds, etc. to sustain the people on their livelihoods during flooding and enlightenment campaign should be amplified in the South-South zone of Nigeria.*

Keywords: *Coping strategies, climate change, Coastal flood, livelihood, crop farmers, artisanal fisher folks*

INTRODUCTION

Events of increase in greenhouse gas emissions have contributed to several variability including higher temperatures and altered precipitation patterns, leading to more intense and erratic rainfall (IPCC, 2021). In Nigeria, studies have reported noticeable increase in the frequency and intensity of heavy rainfall events, especially during the peak rainy seasons, exacerbating flooding in many parts of the country, particularly in areas with poor drainage systems and geographical vulnerability.In the past decade, rainfall trends in Nigeria have witnessed increase in both the intensity and frequency of extreme rainfall events from 2000 to 2013 (Akinsanola and Ogunjobi, 2014). This trend has continued in subsequent years, contributing to higher flood risks and

impacting agriculture and livelihoods. The South-South region of Nigeria, in particular, has faced severe impacts due to increased rainfall intensity, leading to recurrent coastal flooding and affecting the socio-economic activities of the local population (Nkwunonwo, Whitworth, and Baily, 2020). The urban poor are particularly vulnerable, often unable to recover without external aid (Blaikie, 2014)

The menace of flooding in Nigeria has become a persistent issue due to factors, such as rapid population growth, poor governance, inadequate drainage facilities, decaying infrastructure, lack of proper environmental planning and management strategies, irresponsible waste disposal practices, climate change, and insufficient preparedness (Ogunrinde, Oguntunde, Akinwumiju *et* al., 2022). It is an environmental challenge typically occurring when flowing water submerges land areas not usually subjected to inundation (Alves, Angnuureng, Morand, *et al.,* 2020). Virtually every Nigerian is vulnerable to disasters, whether natural or man-made. During the rainy season, wind gusts from tropical storms frequently claim lives and cause property damage worth millions of naira (Hussaini, 2022). Torrential rains lead to flash floods that wash away thousands of hectares of farmland, and dam bursts are common during such events. For instance, in August 1988, the collapse of the Baguada Dam resulted in the deaths of 142 people, the destruction of 18,000 houses, and the sweeping away of 14,000 farms. Urban flooding incidents, such as the Ogunpa disaster in Ibadan which claimed over 200 lives and caused property damage worth millions of naira, are also frequent occurrences (Etuonovbe, 2011)..

Flooding is caused by both natural and human factors (Nwigwe & Emberga, 2014), with human activities such as agricultural practices, deforestation, and poor urban drainage systems contributing significantly to flooding. Other causes include burst water pipes, dam failures, population pressure, unplanned urbanization, poor sewage management, ignoring warnings from hydrological data, and lack of flood control measures (Efobi & Anierobi, 2013). The type of flooding that occurs depends on the location. Coastal areas, especially those along the plains, are susceptible to coastal flooding, which results from the overflow of rivers in low-lying belts of mangrove and freshwater swamps (Croitoru, Miranda, Khattabi, *et al.,*2020). In Nigeria, coastal flooding predominantly affects the Niger Delta areas, impacting states such as Rivers, Akwa Ibom, Cross River, Bayelsa, Delta, and Edo. Urban flooding occurs in towns situated on flat or low-lying terrain due to heavy rainfall or poor drainage systems. This is often due to inadequate or poorly maintained stormwater drains, improper urban planning, encroachment on water drains, and occupation of low-lying areas (NIUA, 2016).

Statement of Problem

The South-South region of Nigeria, encompassing states such as Rivers, Akwa Ibom, Cross River, Bayelsa, Delta, and Edo, is critically vulnerable to the adverse effects of coastal flooding due to its low-lying coastal plains and extensive river systems, frequently experiencing severe flooding events that disrupt the livelihoods of its inhabitants. Among the most affected are crop farmers and artisanal fishermen, whose livelihoods are directly dependent on the land and water resources that are increasingly compromised by flooding.Crop farmers face soil erosion, nutrient loss, and destruction of farmlands, leading to reduced crop yields and economic instability, while artisanal fishermen contend with disrupted fishing patterns, damaged fishing equipment, and loss of fish habitats, threatening their primary source of income.

Unfortunately, not much is known about coastal flooding in South-South several studies on flooding neither focused on coastal flooding in South-South region of Nigeria nor on its effects on crop farmers and artisanal fisher folks in the area. For instance, studies by Nkwunonwo (2016) focused on limitations in Nigeria's efforts to adopt global best practices for flood mitigation; Cirella and Iyalomhe (2018) undertook a comprehensive evaluation of locations at high risk of flood disasters in Nigeria, suggesting targeted strategies to mitigate these threats; Nkwunonwo *et al*. (2020) reviewed various urban flood models applicable to developing countries, including Nigeria; and Echendu (2022) explores the critical link between flooding in Nigeria and its implications for food security and the achievement of Sustainable Development Goals (SDGs) without focus on South-South region or the effects on crop farmers and artisanal fisher folks. The resultant information gap is capable of undermining the coping strategies and intervention efforts of crop farmers and artisanal fisher folks. Hence, the study is designed to fill the information gap by underscoring the effects of coastal flooding on the livelihood activities of crop farmers and artisanal fisher forks in the study area.

Objectives of the Study

Specifically, the objectives of the study include to:

i. assess the perceived effects of coastal flooding on crop farmers livelihood activities in the area;
ii. examine the perceived effects of coastal flooding on artisanal fisher folks' livelihood activities in the area;
iii. determine the constraints to the use of coping strategies by the crop farmers, and artisanal fishermen; and to
iv. ascertain if crop farmers differ from artisanal fisher folks in their perceived effects of coastal flooding on their livelihood activities in the three selected States of South-South, Nigeria.

METHODOLOGY

The study was conducted in Nigeria's South-South Zone, an area characterized by extensive river systems, creeks, estuaries, and stagnant swamps, covering approximately 2,370 square kilometers and 8,600 square kilometers respectively (Nigerian Meteorological Agency, 2020). The zone encompasses the states of Edo, Delta, Bayelsa, Rivers, AkwaIbom, and Cross River, which support diverse ecosystems rich in terrestrial and aquatic flora and fauna crucial for human livelihoods (Uyigue&Agho, 2007). With a total population of 25,692,842 and annual rainfall exceeding 4,000 mm (NBS, 2023), the region's wetlands are vital for providing food, water, and livelihood security for the local poor. However, activities such as tree felling and bush burning by rural households exacerbate the region's vulnerability to flooding.

To select the sample for the study, a multi-stage sampling procedure was employed. In the first stage, three states, namely: Bayelsa, Rivers, and Delta States were purposively selected due to the relative severity of flooding in the States. In the second stage, the two most flood-affected Local Government Areas (LGAs) in each state were chosen, namely: Yenagoa and Brass in Bayelsa; Ughelli South and Udu in Delta; and OgbaEgbemaNdoni and Ahoada East in Rivers. The third stage involved purposively selecting the most flood-prone communities within these LGAs. These included Delta State: Effuru-Otor, Olomu, and Ekrokpe in Ughelli South; Ubogo, Egini, and OgbeUdu in Udu. Rivers State: Omoku, Ebocha, and Ndoni in OgbaEgbemaNdoni; Ahoada,

Mbiama, and Okobe in Ahoada East. Bayelsa State: Swali, Igbogene, and Tombia in Yenagoa; Fatua, Brass, and Akasa in Brass. This selection process resulted in a total of 18 communities. In the final stage, the list of all coastal flood-affected household heads involved in crop farming and artisanal fishing as shown in Table 1 was obtained from community leaders and extension officers to select the respondents. From the sampling frame, 10% of the total population of 4500 to give a total sample size of 450. Data for the study were collected from primary sources using a structured questionnaire. Descriptive and inferential statistical tools were used to analyze the study data. Precisely, objectives I and II were analyzed using mean score analysis. Objective III was addressed using frequency distribution and percentage score. While objective IV was analyzed using Analysis of Variance (Anova).

Table 1: Sampled States, LGAs and Communities for the study

States	LGAS	Communities	Affected Population	Total Sample Size
Bayelsa	Yenagoa	Swali	360	36
		Igbogene	240	24
		Tombia	300	30
	Brass	Fantua	250	25
		Brass	350	35
		Akasa	300	30
				180
Rivers	OgbaEgbema	Omoku	190	19
	Ndoni	Ebocha	183	18
		Ndoni	160	16
	Ahoada East	Ahoada	202	20
		Mbiama	200	20
		Okobe	120	12
				106
Delta	Ughelli South	Effurun- Otor	300	30
		Olomu	260	26
		Ekropke	350	35
	Udu	ubogo	210	21
		Egini	270	27
		OgbeUdu	250	25
				164
TOTAL			**4500**	**450**

Source: States NIMET offices, 2021, community leaders and household heads in crop farming and artisanal fishing.

RESULTS AND DISCUSSION

Perceived Effects of Coastal Flooding on the livelihood activities of Artisanal fisher folks

Using a discriminating index of Mean ≥ 2.50 for "effect" and Mean < 2.50 for "no effect" the results in Table 2 reveals that Artisanal fisher folks in Bayelsa experience the highest mean loss of livelihood (M = 3.70, SD = 1.24) compared to those in Rivers (M = 2.97, SD = 0.62) and Delta (M = 3.19, SD = 0.47). This suggests that coastal flooding more severely impacts the primary source of income for fisher folks in Bayelsa. This is likely because of greater reliance on fishing activities and perhaps more extensive flood events or less adaptive infrastructure (Alves*et al.,* 2020). Similarly, the loss of river embankment is most acutely felt in Bayelsa (M = 3.71, SD = 0.22) relative to Rivers (M = 2.96, SD = 0.92) and Delta (M = 3.23, SD = 0.54). This indicates severe erosion and destabilization of the riverbanks in Bayelsa, possibly due to its geographical and climatic conditions which according to Nkwunonwo*et al* (2020) exacerbate the effects of flooding. Fish scarcity and loss are perceived more significantly in Bayelsa (M = 3.25, SD = 1.29) than in Rivers (M = 2.70, SD = 0.43) and Delta (M = 2.88, SD = 1.34), indicating that fish populations are likely more adversely affected by flooding in Bayelsa, which could result from overfishing, pollution, and habitat disruption.The perceived destruction of fish and potential extinction of species shows relatively lower but notable impacts in Delta (M = 2.83, SD = 1.36) compared to Rivers (M = 2.65, SD = 1.74) and Bayelsa (M = 2.58, SD = 1.25). This points to a critical environmental concern where flooding contributes to the decline in biodiversity (Nkwunonwo, 2016).

The submergence of water bodies is slightly more of an issue in Delta (M = 2.54, SD = 1.49) than in Rivers (M = 2.44, SD = 1.73) and Bayelsa (M = 2.39, SD = 1.19), reflecting the flooding extent's variability and its direct impact on accessible fishing areas (IPCC, 2021). Increased fish diseases are particularly problematic in Rivers (M = 2.62, SD = 1.72), more so than in Delta (M = 2.29, SD = 1.44) and significantly less so in Bayelsa (M = 1.86, SD = 1.21). This suggests that water quality and the health of aquatic life are more compromised in Rivers, possibly due to pollution exacerbated by flooding.Both poor fishing environment and destruction of infrastructure are more pronounced in Rivers (M = 2.75, SD = 1.70; M = 2.81, SD = 1.66) compared to Bayelsa and Delta, indicating that Rivers faces substantial degradation in the fishing environment and critical infrastructure due to flooding (Akinsanola and Ogunjobi, 2014). The risk of death due to flooding is highest in Bayelsa (M = 3.11, SD = 1.24), suggesting higher immediate dangers and potentially inadequate safety measures or emergency response systems in this region compared to Rivers (M = 2.65, SD = 0.40) and Delta (M = 2.73, SD = 0.39).Flooding significantly reduces income for fisher folks in Bayelsa (M = 3.61, SD = 0.25), while Delta (M = 2.42, SD = 1.48) shows less impact, indicating economic vulnerability in Bayelsa. Moreover, the number of fishermen is perceived to decrease more in Rivers (M = 2.48, SD = 0.66) than in Bayelsa (M = 2.13, SD = 0.76) and Delta (M = 2.29, SD = 0.49), reflecting demographic shifts due to adverse conditions (Salami and Fenta, 2022).

In terms of poor quality of life is more prominent in Delta (M = 2.51, SD = 1.51), while predisposing poor storage is perceived less in Bayelsa (M = 0.84, SD = 1.27) compared to Delta (M = 2.30, SD = 1.60) and Rivers (M = 2.22, SD = 1.51), indicating challenges in maintaining fish quality post-harvest.Impaired transportation is least concerning in Bayelsa (M = 0.73, SD = 1.17) compared to

Delta (M = 2.07, SD = 1.70) and Rivers (M = 2.48, SD = 1.41). The loss of market for harvest is most felt in Bayelsa (M = 3.16, SD = 1.17), underscoring market access issues likely due to infrastructure damage (Ogunrinde*et al.,* 2022).The introduction of new species due to flooding is most problematic in Bayelsa (M = 2.78, SD = 1.10), while loss of breeding grounds is significant in Rivers (M = 2.87, SD = 0.50). This could indicate ecological changes and habitat disruptions impacting the local biodiversity.Rich alluvial deposits are least noted in Bayelsa (M = 0.70, SD = 1.34), suggesting that flooding may not contribute positively to soil fertility in this region as compared to Rivers (M = 2.29, SD = 1.42) and Delta (M = 2.25, SD = 1.51). Water availability is critically low in Bayelsa (M = 0.16, SD = 1.00), reflecting severe water management issues post-flooding. Meanwhile, the SD values which ranged from 0.2 to 1.8 indicated the farmers were of different opinions regarding how coastal flooding affects their livelihood.

Table 2: Distribution of respondents by Perceived effects of coastal flooding on artisanal fisher folks

		Bayelsa		River		Delta	
Effects		**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
i.	Loss of livelihood	3.70	1.24	2.97	0.62	3.19	0.47
ii.	Loss of river embankment	3.71	0.22	2.96	0.92	3.23	0.54
iii.	Fish scarcity and loss	3.25	1.29	2.70	0.43	2.88	1.34
iv.	Destruction of fish/extinction	2.58	1.25	2.65	1.74	2.83	1.36
v.	Submergence of water bodies	2.39	1.19	2.44	1.73	2.54	1.49
vi.	Increased fish diseases	1.86	1.21	2.62	1.72	2.29	1.44
vii.	Poor fishing environment	2.07	1.25	2.75	1.70	2.39	1.54
viii.	Destruction of infrastructure	1.91	0.22	2.81	1.66	2.89	0.39
ix.	Death	3.11	1.24	2.65	0.40	2.73	0.39
x.	Reduction in income	3.61	0.25	2.99	0.57	2.42	1.48
xi.	Reduction of numbers of fishermen	2.13	0..76	2.48	0.66	2.29	0.49
xii.	Poor quality of life	1.70	1.30	2.48	1.74	2.51	1.51
xiii.	Predisposing poor storage	0.84	1.27	2.22	1.51	2.30	1.60
xiv.	Impaired transportation	0.73	1.17	2.48	1.41	2.07	1.70
xv.	Loss of fishes	2.12	1.26	2.66	0.91	2.39	0.59
xvi.	Lack of market for harvest	3.16	1.17	2.50	0.51	2.82	1.44
xvii.	Introduction of new species	2.78	1.10	2.06	0.68	2.73	0.49
xviii.	Loss of breeding ground	2.29	0.87	2.87	0.50	2.61	0.69
xix.	Rich alluvial deposit	0.70	1.34	2.29	1.42	2.25	1.51
xx.	Water availability	0.16	1.00	2.00	0.71	2.09	1.55
xxi.	Recharging water table	0.20	1.14	1.73	0.82	2.11	1.65
xxii.	Emergence of reptile/deadly	3.69	1.26	2.08	0.97	2.80	0.45

Source: Field Survey data, 2024**; SD = Standard Deviation**

Perceived Effect of Coastal Flooding on Crop Production

The perceived effects of coastal flooding on crop production were presented in Table 4.6. All the 19 items had mean scores above the discriminating index and ranged from 2.53 to 3.27, and the Standard Deviation ranged from 0.74 to 1.10.
Specifically, increased farm expenses had the highest mean score of 3.27 and Standard Deviation of 0.77. This was followed by destruction of crops ($\bar{x}$ – 3.19; SD – 0.85), food scarcity ($\bar{x}$ = 3.19; SD = 0.77), and loss of lives ($\bar{x}$ = 3.15; SD = 0.74). Others included pest and diseases infestation ($\bar{x}$ = 3.01; SD = 0.83), flooding farmland with wild animals ($\bar{x}$ = 2.99, SD = 0.77); poor storage ($\bar{x}$ = 2.95; SD = 1.06), recharging water table ($\bar{x}$ = 2.94; SD = 0.85), no market for sales ($\bar{x}$ = 2.92; SD = 0.84), and relocation of farmers ($\bar{x}$ = 2.92; = 1.08). Also included were damage of infrastructure ($\bar{x}$ = 2.88; SD = 0.91), poor sanitation ($\bar{x}$ = 2.77; SD = 1.08), submerging farmland ($\bar{x}$ = 2.73; SD = 0.86), leaching ($\bar{x}$ = 2.64; SD = 0.96), emergency harvest ($\bar{x}$ = 2.63; SD = 0.96), and water availability ($\bar{x}$ = 2.53; SD = 1.03).

While there are slight variations in the responses as shown by the varying SD values, the perceived loss of lives due to coastal flooding is consistently high across all three states, indicating the severe human toll of these events as predicted by Etuonovbe2011; UN-Water (2011).. Rivers state stands out with the highest perceived food scarcity, indicating a severe impact on food availability for both farmers and communities. This could result from crop damage, disrupted supply chains, and reduced agricultural productivity (Ogunrinde, *et al.,* 2022). Farmers in Rivers state report the highest level of crop destruction, suggesting that the region's agriculture sector is particularly vulnerable to the adverse effects of coastal flooding (Echendu, 2022).

The perceived need for farmers to relocate is highest in Bayelsa, indicating significant disruption to livelihoods and agricultural practices. This may reflect the loss of arable land or increased vulnerability to recurrent flooding as noted in IPCC (2021). Delta state reports the highest perceived poor sanitation, indicating challenges in maintaining hygiene standards amidst flooding, which can lead to health risks and further complicate recovery efforts. Farmers across all three states report impaired transportation and a lack of markets for sales, highlighting the broader economic impact of flooding on agricultural livelihoods and local economies. Bayelsa state perceives a higher level of rich alluvial deposit, suggesting potential benefits of flooding in enhancing soil fertility. However, this is coupled with concerns about water availability, indicating a complex relationship between flooding impacts and agricultural outcomes. Bayelsa perceives the highest recharging of the water table, which could have implications for groundwater availability and long-term agricultural sustainability (Dube*et al.,* 2021). Finally, Delta state reports the highest incidence of pest and disease infestation, indicating challenges in pest management and crop health exacerbated by flooding, which is capable of declining productivity.

Furthermore, the various effects of coastal flood are in line with the findings of previous researchers. Whereas, Abosede (2017) reported increase in zoonosis, Gbogo (2021) reported sweeping away of farmland, schools, markets, roads, collapse of farm structures and infrastructure, just as Fitzgerald (2010) listed threat to health, occasioning death, harm, diseases, environmental degradation, soil infertility, poverty among others. However, on the positive side, though minimal, Ahmed and Rahaman (2017) noted deposition on natural fertilizer as Ajana et al. (2003) indicated a good supply of groundwater

Table 3: Perceived Effects of Coastal Flooding on Crop Production

Effects	Bayelsa		River		Delta	
	Mean	SD	Mean	SD	Mean	SD
Loss of lives	3.16	0.62	3.31	0.86	2.98	0.75
Increased farm expenses	3.16	0.65	3.38	0.82	3.17	0.83
Food scarcity	2.85	0.85	3.93	0.53	2.73	0.95
Destruction of crops	3.05	0.91	3.71	0.51	2.81	1.12
Submerging of farmland	2.75	1.00	2.75	0.89	2.68	0.68
Pest and disease	3.02	0.89	2.90	0.73	3.11	0.92
Poor sanitation	2.45	1.23	2.65	1.12	3.20	0.89
Damage of infrastructure	2.93	0.78	2.86	0.95	2.84	0.77
Leaching	2.48	1.11	2.94	0.56	2.51	1.21
Reduction fertility (Washing)	3.33	0.75	2.68	1.10	2.43	1.45
Relocation of farmers	3.21	1.21	2.71	0.92	2.85	1.12
Predisposing poor storage	3.05	1.10	2.89	0.77	2.91	1.32
Impaired transportation	2.33	1.05	2.96	0.95	3.01	0.74
No markets for sales	3.28	0.97	2.75	1.03	2.72	0.63
Flooding farmland with wildlife	3.24	0.68	3.11	1.10	2.63	0.53
Emergency harvest	3.48	0.85	2.35	1.08	2.05	0.97
Rich alluvial deposit	3.06	0.92	2.42	0.76	3.00	1.45
Water availability	3.27	0.85	2.10	0.93	2.21	1.32
Recharging water able	3.45	0.39	3.21	1.13	2.05	1.01
Loss of lives	3.16	0.62	3.31	0.86	2.98	0.75
Increased farm expenses	3.16	0.65	3.38	0.82	3.17	0.83
Food scarcity	2.85	0.85	3.93	0.53	2.73	0.95

Source: Field survey data, 2024; Std Dev. = Standard Deviation

Constraints to the use of coping strategies

The constraints to the use of the coping strategies are shown in Table 3.1. The following constraints were identified: poor government policies (91.7%), poor access to information (80%), poor knowledge of better strategies (91.7%), cultural belief (78.8%), poor capital base (96.2%), poor access to improved varieties/species (80.2%), poor care and information about IDPs (88.4%), and sickness and health disorder (72.4%).

Other constraints included poor extension support (87.3%), poor education (64.8%), high labour cost (91.3%) and poor infrastructure environment (91.7%). However, in Bayelsa State, 92.7% indicated for poor knowledge of many existing strategy, is low capital base (97.2%), poor government policies (81.3%), poor infrastructure base (94.4%), inadequate extension (91.1%), high labour cost (96.6%), among others. The use of coping strategies in Delta, had similar responses. Majority agreed that poor knowledge of many existing strategies (90.8%), low capital base (93.9%), poor infrastructure (88.4%), inadequate extension support (81.7%), and cultural belief (96.3%), among others, constrained the use of coping strategies. In Rivers State, the results were similar to the other two states: poor knowledge of strategies (91.5%), poor education (83%), low capital base

(98.1%), poor government policies (85.6%), poor infrastructure (92.4%), and health disorder (80%), among other constraints.

The activities of the government are central in bids to bring succor to displaced people or people whose livelihood activities are threatened by natural disaster. To achieve this, strong institutions backed with apt policies are inevitable, but where government activities are lack luster, automatically victims of natural disaster may not overcome the shock. The policies would affect education, access to capital, extension system, and information, among others. It is pertinent to note that information is key to ensure resilience after coastal flooding. Therefore, extension agency, National Orientation Agency, National Emergency Management Agency, Nigeria Meteorological Agency (NIMET) should strive for adequate information dissemination to coastal flood victims. These would cushion their indisposition and encourage their resilience.

The work of Adegboye (2011) reported that inadequacy of fund is a serious constraint to using coping strategies during flood. Also, Lawal (2011) enumerated inadequate government support, insufficient capital, etc. as the major problems faced by farmers in adopting flood control measures as well as adapting.

Table 4: Constraints to the use of coping strategies by crop farmers and artisanal fishermen

Constraints	Bayelsa		Delta		Rivers	
	F	%	F	%	F	%
Poor knowledge of other good Strategies	167	92.7	149	90.8	97	91.5
Poor Education	110	61.1	94	57.3	88	83.0
Low Capital Base	175	97.2	154	93.9	104	98.1
Poor Government Policies	145	80.5	99	60.3	94	88.6
Poor Infrastructure Environment	170	94.4	145	88.4	98	92.4
Inadequate Extension Support	164	91.1	134	81.7	95	89.6
Cultural Belief	111	61.6	158	96.3	86	81.1
Poor Care and Information on IDPs	102	85.5	146	89.0	98	92.4
Increases Health Disorder	135	75.0	106	64.6	85	80.0
Poor Access to Improved Var and Species	142	78.8	126	70.0	93	87.7
Poor Access to Information	103	57.2	151	92.1	89	83.9
High Labour Cost	174	96.6	159	96.9	78	73.5

Source: Field Survey data (2024)

Measure of differences in the perceived effects of coastal flooding on the livelihood activities of crop farmers and artisanal fishermen across the three selected States in South-South, Nigeria

The ANOVA result in Table 5shows that a significant difference exist in the perceived effect of flooding on artisanal fishing across the three selected states in South-South Nigeria ($F_{(2,448)} = 15.50$; $p = 0.000$) at 0.05 level. It was not surprising that differences existed in the 3 States' perception of the effect of coastal flooding on crop farming and artisanal fishing. The States were varied on their levels of education, years of enterprise experience, membership of social organization as well as in the application of the various coping mechanisms. With the differences are to be associated differential perception as the variables ordinarily should expose the respondents to greater understanding analysis and decisions. Using the coping mechanisms timely and adequately could obliterate or reduce the effects on the people. The perceived effect here could be less.

Source	SS	Df	MS	F	p-value
Between different location (SSB)	4942.52	2	2471.26	15.50	0.000
Within different location (SSW)	71422.57	448	159.42		
Total	76365.09	450	2630.68		

Table 5: Analysis of Variance in the perceived effects of coastal flooding on crop farmers and Artisanalfisher folks across the three selected States in South-South Nigeria

Source: SPSS Analysis on field survey data (2024)

CONCLUSION AND RECOMMENDATIONS

Conclusively, coastal flooding has unprecedented negative impacts on the livelihoods of crop farmers and fishermen in the South-South zone of Nigeria. It occasioned death, loss of livelihood, increased cost of production, food scarcity, poor storage, among others. The people had diversified means of survival, however they did not escape the rage of coastal flooding.

Hence, the following recommendations are hereby made:

- Agricultural Research Institutes should evolve suiting technologies that would stand the test of time during periods of coastal flooding, such as flood resistant crop varieties, early maturing species, floating ponds and others to sustain the people on their livelihoods during flooding, enlightenment campaign should be amplified in the South-South zone of Nigeria at the onset of the rain to alert the people and prepare them for eventful flood incidence by Extension Unit of the States' Agricultural Development Programs, Nigeria.
- Emergency and the resilience-driven efforts of the farmers and fishermen should be complemented by the government through institutional reforms that will give them leverage – Extension agency, banks, insurance, etc in addition to the establishment of befitting dams.
- Comprehensive vulnerability assessments in coastal communities should conducted periodically by the government to identify the factors that exacerbate the impacts of flooding on artisanal fisher

folks and agricultural production. This should include socio-economic factors, infrastructure resilience, and ecological vulnerabilities.

- Interventionist organizations and government should engage in participatory action research with coastal communities to co-produce knowledge and develop context-specific solutions. This approach ensures that research outcomes are relevant, inclusive, and tailored to the needs of affected communities.
- There is need for governments at all levels to develop integrated assessment models that capture the interconnectedness of coastal ecosystems, socio-economic systems, and climate change impacts. These models can help policymakers and stakeholders better understand the complex dynamics of coastal flooding and identify effective adaptation pathways.
- Stakeholders in agriculture should explore the potential of ecosystem-based adaptation strategies to enhance the resilience of coastal communities. This includes restoring mangrove forests, implementing sustainable fisheries management practices, and promoting climate-resilient agricultural techniques.
- Government at all levels should put in place e**arly warning systems** for coastal flooding to enhance preparedness and reduce vulnerability. This includes investing in meteorological monitoring, flood forecasting, and community-based early warning systems tailored to the needs of coastal communities.

REFERENCE

Abosede A. I, (2017). Biomass Volarization Agriculture Waste in environmental Projection, Phylomedicine and biofuel production; Biomass Volume Estimating and Volarizations for energy.

Adeloye, A.J., and Rostum R (2011), – Flooding and influence of Urban planning. Proceedings of the institution of Civil Engineers-Urban Design and planning 164 (3): 175-187.

Ahmad M. R, Rahama K. R, (2017). Remote sensing-based qualification of the impact of flash flooding on rice production: A case study over Northeastern Bangladesh International Journal of disaster risk reduction 31, 478 - 488.

Ajana A. M, Ezenwa B. I, Onyinla O. A, (2003). Aquaculture research; technology transfer for rural development in Nigeria; Nigeria Institute for Oceanography and Marine Research (aqua docs.org)

Akinsanola, A. A., &Ogunjobi, K. O. (2014). Analysis of rainfall and temperature variability over Nigeria. *Global Journal of Human-Social Science: B Geography, Geo-Sciences, Environmental Disaster Management*, *14*(3), 1-17.

Alves, B., Angnuureng, D.B., Morand, P., and Almar, R. (2020). A review on coastal erosion and flooding risks and best management practices in West Africa: What has been done and should be done. *Journal of Coastal Conservation*24(3), 38. doi:10.1007/s11852-020-00755-7.

Blaikie, P., Wisner B., Cannon T and Davies I. (2014). At risk: natural hazards, people vulnerability and disaster www.taylorfrancis.com

Cirella, G.T. and Iyalomhe, F.O. (2018), Flooding conceptual review: Sustainability-focalized best practices in Nigeria. *Applied Sciences*8(9), 1558. doi:10.3390/app8091558.

Croitoru, L., Miranda, J.J., Khattabi, A. and Lee, J.J. (2020). The cost of coastal zone degradation in Nigeria: Cross River, Delta and Lagos States. World Bank and Global Progamme on Sustainability, World Bank

Dube, K., Nhamo, G., and Chikodzi, D. (2021). Flooding trends and their impacts on coastal communities of Western Cape Province, South Africa. *GeoJournal*, 2021. doi:10.1007/s10708-021-10460-z.

Echendu, A.J. (2022). Flooding, food security and the sustainable development goals in Nigeria: An assemblage and systems thinking approach. *Social Sciences* 11(2), 59. doi:10.3390/socsci11020059.

Efobi, K and Anierobi, C. (2013). Impact of Flooding on Riverine Communities: The Experiences of Omambala and other areas in Anambra State, Nigeria. Journal of Economics and Sustainable Development 4 (18); 58-63.

Etuonovbe, A.K. (2011). *The Devastating Effect of Flooding in Nigeria*.

Fitzgerald G. J, Du, W. Hou, X. Y (2010) Health impacts of floods; prehospital and disaster medicine 25(3), 265-272.

Glago F.J (2021). Natural Hazards-impacts Adjustment and Resilience, edited by Elsan Noroozimejad Farsangi books.google.com.

Glago, F.J. (2021). Flood Disaster Hazards; Causes and management-State-of-the-art Renew Gla

Hussaini, A. (2022). Improvement of Meteorological Services for Food Security in the Drylands of Nigeria. *Prevention and Treatment of Natural Disasters*, *1*(1), 50-56.

IPCC. (2021). Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press.

National Institute of Urban Affairs. (2016). Urban flooding. India – Urban climate change fact sheets, Asian Centre for Change Resilience Network, India.

Nigeria Census (2021). Nigeria Data Portal". Nigeria.opendataforafrica.org. Retrieved 2021-07-08

Nkwunonwo, U. C., Whitworth, M., & Baily, B. (2020). A review of the current status of flood modelling for urban flood risk management in the developing countries. Scientific African, 7, e00269.

Nkwunonwo, U.C. (2016), A review of flooding and flood risk reduction in Nigeria. *Global Journal of Human Social Science: B Geography, Geo-Sciences, Environmental Science & Disaster Management* 16(2), 23–42.

Nkwunonwo, U.C., Whitworth, M., and Baily, B. (2020). A review of the current status of flood modelling for urban flood risk management in the developing countries. *Scientific African*7, e00269. doi: 10.1016/j.sciaf.2020.e00269

Nwigwe, C., and Emberga, T (2014). An Assessment of Causes and Effects of Flood in Nigeria. Standard Scientific Research and Essays,2 (7): 307–315.

Ogunrinde, A. T., Oguntunde, P. G., Akinwumiju, A. S., Fasinmirin, J. T., Olasehinde, D. A., Pham, Q. B., &Anh, D. T. (2022). Impact of climate change and drought attributes in Nigeria. *Atmosphere*, *13*(11), 1874.

Phillips, E. D, Bayllis, A, Posthumus, H. Duncan, N. (2009). Impacts of the summer 2007 floods on Agriculture, Journal of Flow Risk Management 2(3), 182-189

Salami, A., &Fenta, A. A. (2022). Spatio-temporal evaluation of open access precipitation products with rain gauge observations in Nigeria. *Arabian Journal of Geosciences*, *15*(24), 1785.

Umar, N., & Gray, A. (2022). Flooding in Nigeria: a review of its occurrence and impacts and approaches to modelling flood data. *International Journal of Environmental Studies*, *80*(3), 1–22.https://doi.org/10.1080/00207233.2022.2081471

UN, (Water 2011). http:// www.unwater,org An Annual UN water report.

UN-Water. (2011). Cities coping with water uncertainties. Media Brief, UN-Water Decade.

Uwaegbute K.I, (2011), Implications of Religion on Decision Making in Rural Development .Nsukka Journal of Religion and Cultural Studies 4(12),50-69

World Bank report on Disaster rate (2020)