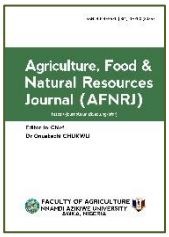
Agr. Foo. Nat. Res. J. Volume 4, Issue 1, Page 9 - 17

e-ISSN: 1597-7153 | p-ISSN: 3043-5420

Agriculture, Food and Natural Resources Journal

The Official Journal of the Faculty of Agriculture, Nnamdi Azikiwe University, Awka, Nigeria

Journal homepage: https://journals.unizik.edu.ng/afnrj



Original Article

Influence of residents' social engagement on forest-based land use strategies for flood mitigation in southwest Nigeria

OPEN ACCESS

Adebayo Samson ADEOYE*[1], Oluwole Olalekan OKE[1] & Adebayo David SAMUEL[2]

[1]*Department of Agricultural Extension and Management, Federal College of Forestry, Ibadan, Nigeria*
[2]*University of Suffolk, United Kingdom.*

DOI: https://www.doi.org/10.5281/zenodo.15028898

Editor: *Dr Onyekachi Chukwu, Nnamdi Azikiwe University, NIGERIA*

Received: *December 5, 2024*
Accepted: *January 23, 2025*
Available online: *March 31, 2025*

Peer-review: *Externally peer-reviewed*

Copyright: © 2025 Author(s)
This is an open access article licensed under Creative Commons Attribution 4.0 International License (https://creativecommons.org/licenses/by/4.0/) which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Conflict of Interest: *The authors have no conflicts of interest to declare*

Financial Disclosure: *The authors declared that this study has received no financial support*

A B S T R A C T

Flood-prone communities in Southwest Nigeria experience immense hardships due to incessant flooding, disrupting social amenities and comfort. Therefore, this study aims to investigate influence of residents' engagement on forest-based land use strategies (FLUS) for mitigation of flooding. Data were collected from a sample size of 250 respondents with a structured questionnaires through multistage sampling procedure and were analysed with frequencies, percentages, mean scores, Chi square statistic and Canonical Correlation Analysis (CCA) at α0.05. The findings showed that residents' engagement in social activities based on associated welfare (mean = 5) ranked 1st, followed by residents' social engagement due to benefits of meeting needs as well as coping with flood hazards (mean = 4.7) which ranked 2nd. Secondly, they employed the use of tree planting (TP) as the most popular FLUS for mitigating flooding (mean = 1.8) ranked 1st, followed by tree conservation (TC) and stream bank stabilization (SBS) (mean = 1.6) ranked 2nd. Chi-square statistic showed a significant relationship between residents' social involvement and FLUS' indicators such sustenance of natural environment (SNE), desilting (DS) and landscaping of the environment (LE). The CCA revealed a significant relationship and positive correlation between social connections enhancement of resilience to environmental and flood hazards and FLUS; both SNE β= 0.310, p = 0.00, R^2 = 0.403) and LE (β= 0.310, p = 0.00, R^2 = 0.355) at α0.005. In conclusion, findings revealed that social involvement of residents in flood-prone communities influenced level of utilization of FLUS for mitigation of flooding in Southwest Nigeria. The study recommends partnership for flood resilience through a collaborative framework for ecosystem organizations and residents of flood-prone communities.

K E Y W O R D S : *Community programs, Forest-based methods, Flood-affected communities, Involvement*

INTRODUCTION

Global disasters are known to have a significant impact on economic growth, incomes, agriculture, and the health and social fabric of society which causes the unexpected events that result in loss of life and injuries (Southard, 2017). Nation Resourced Defense Council, NRDC (2019) defined a flood as a global crisis that occurs when a large volume of water overflows from a river and its floodplain in a short period of time, causing damage to properties and businesses. Floods, like droughts and desertification, are natural hazards that occur when there is an extreme increase in stream flow (runoff) (Onifade *et al*., 2023). They can also be described as the inundation of an area not typically covered by water due to a sudden rise in the level of a stream, river, lake, or sea (National Oceanic and Atmospheric Administration, NOAA, 2024). Extended periods of heavy rainfall are the primary cause of flooding worldwide. Floods are generally considered acute events of excessive water flow that can have catastrophic consequences (Onifade *et al*., 2023).

*Corresponding Author: samalaba77@gmail.com

Flooding is a significant environmental challenge in Nigeria (Onwuka *et al*., 2015). The challenges of flooding are exacerbated by rising sea levels and storm surges, posing a significant threat to life, property, livelihoods, and infrastructure in flood-prone areas (Ezirim, 2010). According to Mfon *et al*. (2022), flooding is one of the most destructive natural disasters in the country, claiming many lives and causing extensive damage to properties, particularly homes and farmland, as well as infrastructure. The 2012 flood in Lagos State affected a large area of land and a significant number of people in the community (Lawanson *et al*., 2023). Numerous studies have shown that the impacts of flooding are widespread throughout the city (Ndimele *et al*., 2024; Umar & Gray, 2023). Flood events are not new to residents of Lagos, as they have been living in areas prone to drought for centuries. Like many urban areas in developing countries, Lagos State has experienced rapid population growth, leading to changes in land use patterns. Approximately 44% of the population of Lagos State resides in flood-prone coastal areas (United Nation, UN Atlas, 2016). Likewise, same occurrence are experienced among residents in Oyo and Ogun States respectively.

Floods have been a common occurrence in Ibadan since 1951 till date, with official records showing a history of such events. However, these records are often incomplete and lacking in detail (Agbola *et al*., 2012). There is a significant lack of data on the risks associated with flooding, particularly in terms of consistent, comparable, accessible, and high-quality information on deaths, injuries, and damage caused by natural disasters, including floods (Adekola *et al*., 2020). By gathering data from various sources, such as newspaper articles, Adekola *et al*. (2020) estimated that between 2000 and 2015, 129 people lost their lives, 9,112 houses were damaged, and 3,102 houses were destroyed as a result of flooding in Ibadan. Many of the floods in Ogun State, especially in the Abeokuta area, are caused by inadequate drainage systems, poor urban planning, and indiscriminate dumping of refuse into waterways. This has resulted in a deluge of flooding that has caused loss of lives and properties over the years (Nkwuononwo *et al*., 2024).

According to Adefisoye & Arum (2021), the subject of flood management has enjoyed sufficient attention in the literature, the primacy of inter-agency collaboration in managing the effects of flood emergencies and in implementing flood management-related policies remain less explored. However, past studies showed that despite the appreciable level of collaboration among the government institutions/agencies in managing floods in the country, such collaboration is yet to translate into improved service delivery with identified causes comprising low institutional capacity, inadequate funding and bureaucratic corruption.

Besides the absence of well-planned mitigation framework as highlighted in the past, it was revealed that the level of interaction between government agencies and citizens as it relates to flood management is low in Nigeria (Adefisoye, 2017). Ogun State had the highest figure of non-awareness, while Lagos had the highest figure of awareness which might be due to the fact that Ogun Sate has no statutorily-recognized State Emergency Management Authority, SEMA and Lagos has a vibrant emergency management agency (Lagos State Emergency Management Authority, LASEMA) (Obete, 2014). According Adefisoye (2017) residents' perception of government's involvement in flood hazard management in the South-west region. Generally, responses show that government's involvement has been minimal and poor particularly by both state and local governments. Conversely, shows that there was low involvement of residents in flood planning-related activities like mitigation and preparedness which implied citizens' involvement was very poor and erratic (Adefisoye, 2017). Hence, based on the evidences from past studies, this study examines residents' engagement in forest-based land use strategies for Mitigating flooding in Southwest Nigeria with the aim to assess residents' social involvement in the community, and to examine the level of utilization of forest-based land use strategies in the study area.

METHODOLOGY

Study Area

The study was conducted in the selected Southwest States of Nigeria with focus on household dwellers in flood prone areas. Southwest region of Nigeria has six (6) States which are Oyo, Osun, Ogun, Lagos, Ondo and Ekiti respectively. The major tribe of this geopolitical zone is Yoruba with several dialects coupled with other ethnicity in Nigeria like Hausa, Igbo and so on. The geographical coordinates of this region lies within latitude 9.081999°N and longitude 8.675277°E with a total land area of 77,818Km^2 and a total population of 28,767,752 (Oni and Odekunle 2019). The typical tropical climate in the region is average temperature and high humidity. The temperature is about 33°C in dry season and about during 24°C in rainy season. The distribution of rainfall varies between 1000mm and 2000mm. The Southwestern Nigeria comprises three main vegetation which are mangrove forest, tropical rain forest, and the guinea savannah with natural resources being land, water, minerals, forest, and agricultural resources.

Sampling Procedure and Sample Size

A multistage random sampling method was employed to select the household population in the study area. In the initial phase, Oyo, Ogun, and Lagos States were purposively selected due to the regular flood events and flood volume in these three states. In the second stage, Local Government Areas (LGAs) along with their wards that contain water bodies and experience frequent and significant flooding in the selected States were also purposively selected. Consequently, Ido and Oluyole were selected in Oyo State, Obafemi Owode and Abeokuta South were chosen in Ogun State, whereas Alimosho and Ikorodu were selected in Lagos State. The total number of wards from the chosen LGAs are: Ido consists of 10 wards, Oluyole consists of 10 wards, Obafemi Owode has 12 wards, Abeokuta South contains 15 wards, Alimosho has 11 wards, and Ikorodu

has 19 wards, respectively. In the 3rd stage, communities at high risk of flooding in each selected ward were intentionally sampled. The selected communities included Apete/Awotan, Omi-Adio, and Idi-Iya in Ido; Odo-ona Elewe/Ikereku, Odo-Ona Kekere, and Odo-Ona Nla in the Oluyole LGA of Oyo State; Ofada/Mokoloki, Mowe, Ibafo, and Asese in Obafemi Owode; Obantoko, Igbore/Itori/Ago-Oba, and Ago-Ijesha/Ijeun Titun in Abeokuta South LGA of Ogun State; along with Shasha/Akowonjo, Egbe/Agodo, and Ikotun/Ijegun in Alimosho; and Ijede II, Ibeshe, Odogunyan, Agura/Iponmi, Isiu, and Ipakodo in Ikorodu LGA of Lagos State. In the 4th stage, a household listing was conducted in the selected communities to gather a sample population. The sample size was selected with a systematic random sampling method in which every 5th household was picked from the selected communities. Finally, a sample size of 250 respondents was chosen (Table 1).

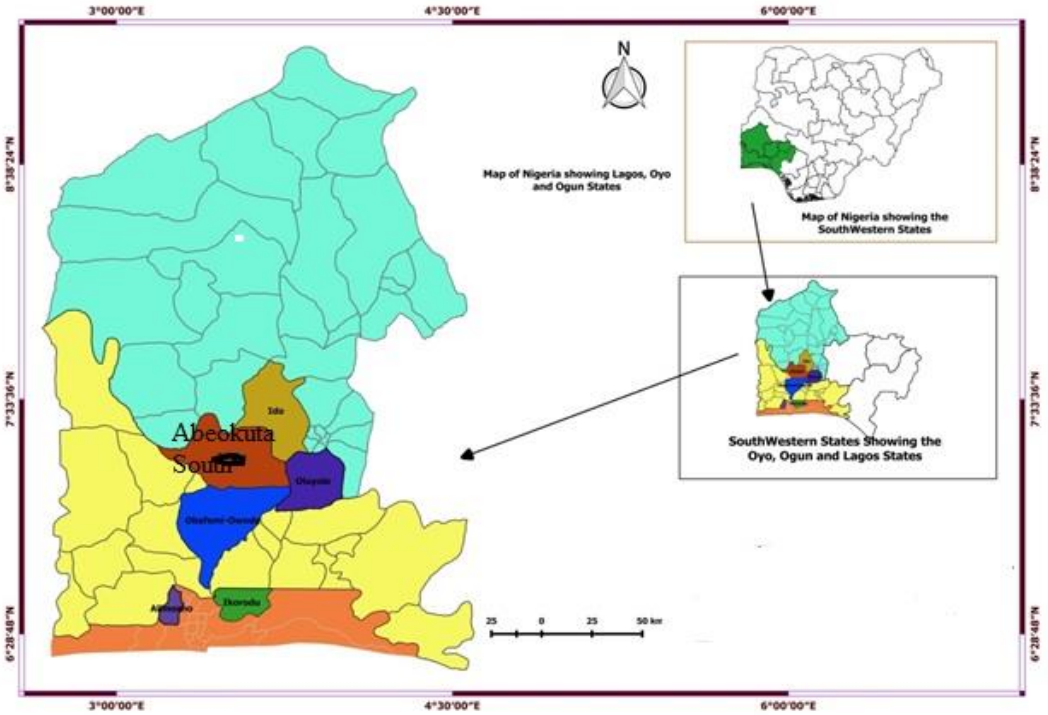


Figure 1. Map of the Study Area; Southwest Nigeria

Source: Adeoye (2024).

Data Analyses

Data were analysed with descriptive statistics such as frequency and percentages, Chi-square, and forestry land use strategies were analysed with mean scores in the form of a Likert scale. Also, Canonical correlation analysis (CCA) was used for test of relationship between two sets of multivariates data of residents' access to flood management interventions and sustainable forestry land use practices in the studied area.

Operationalisation of Likert Scale and Mean Scores

The residents' social involvements was operationalised with a 5-point likert scale of "HI = Highly Involved, MI = Moderately Involved, U = Uncertain, RI = Rarely Involved NI = Not Involved". For the statements, HI = 5, MI = 4, U = 3, RI = 2, and NI = 1. The benchmark for the likert scale were obtained thus; 5+4+3+2+1 = 15 divided by 5 equals 3.0. Hence, a cut-off mean point of 3.0 and above implies high involvement of residents in the study area; while mean below 3.0 implies low involvement of residents in the study area. Further, FLUS was operationalized on a 4-point likert scale of "Never Used", "Used but stopped", "Partially in Use", and "Fully in Use". Never Used = 0, Used but Stopped = 1, Partially in Use = 2, and Fully in Use = 3 respectively. The benchmark for the likert scale was obtained thus; 0+1+2+3 = 6 divided by 4 equals 1.5. Hence, the following decision rule applies; < 1.5 = Low forestry land use strategies, and ≥ 1.5 = High forestry land use strategies.

Table 1. Analyses of Sampling Procedures and Sample Size of Residents

Selected Southwestern States	Selected LGAs	Communities from Selected LGAs	Households Listing from Communities	Systematic Households Selection
Oyo	Ido	Apete/Awotan	110	22
		Omi-Adio	75	15
		Idi-Iya	55	11
	Oluyole	Odo-ona Nla	66	13
		Odo-ona Elewe/Ikereku	70	14
		Odo-ona Kekere	60	12
Ogun	Obafemi-Owode	Ofada/Mokoloki	80	16
		Mowe	45	9
		Ibafo	40	8
		Asese	35	7
	Abeokuta South	Igbore/Itori / Ago Oba	45	9
		Obantoko	55	11
		Ago Ijesha/Ijeun Titun	65	13
Lagos	Alimosho	Shasha/Akowonjo	50	10
		Ikotun/Ijegun	65	13
		Egbe/Agodo	40	8
	Ikorodu	Odogunyan	80	16
		Ipakodo	50	10
		Ijede II	45	9
		Ibeshe	40	8
		Isiu	35	7
		Agura/Iponmi	45	9
Total				**250**

Analytical Tools

Chi-square model

This can be expressed as,

$$\chi^2 = \sum\left[\frac{(f_o - f_2)^2}{f_o}\right] \quad (1)$$

Where: χ^2 = Chi-Square, Σ = Total, f_O = frequencies of observed nominal variables, that is the selected flood management parameters, f_e = expected frequencies of occurrence determined from response categories.

Canonical correlation analysis

The canonical correlation analysis (CCA) was adopted for analysis of sustainable forest-based land use strategies for flood management in flood-ravaged communities of Southwest Nigeria. CCA is a statistical method that extracts the information common to two data tables measuring quantitative variables on the same set of observations (Abdi *et al*., 2018). CCA generalizes many standard statistical techniques (e.g. multiple regression, analysis of variance, discriminant analysis) and can also be declined in several related methods that address slightly different types of problems (e.g., different normalization conditions, different types of data). "A canonical variate is a new variable formed by making a linear combination of two or more variates (variables) from a data set". For multiple X and Y, the canonical correlation analysis constructs two variates;

$$CV_{X1} = A_1X_1 + A_2X_2 + A_3X_3 + \ldots + a_nx_n \quad (2)$$

$$CVy_1 = B_1Y_1 + B_2Y_2 + B_3Y_3 + \ldots + b_ny_n \quad (3)$$

Where Y_i = the six selected (6) Forest-based land use strategies, X_i = Residents' social involvement in community activities were used as independent variables.

RESULTS AND DISCUSSION

Residents Social Involvement in Southwest Nigeria

The results in Table 2 revealed that residents engaged in social activities due to associated welfare benefits (mean= 5.0) ranked 1st.This indicates that residents were highly involved in community development programs because of the welfare support it gives to vulnerable community dwellers in flood-prone area of Southwest Nigeria. This contradicts Wahab and Falola (2022) who submitted that most flood-prone population could not access recovery and welfare package in Ibadan, Southwest Nigeria.

Also, the result shows that social involvement of residents was perceived helpful engagements in meeting needs of residents sometimes as well as giving them the ability to cope with flood hazards (mean= 4.7) ranked 2nd. This indicates that residents' participation in social activities of community association could enforce motivation and adaptability to flood and

ecosystem threats. This corroborates Sawaneh *et al*. (2024) who elucidated that self-efficacy and more robust community-based bonds of residents lead to increased participation in flood mitigation efforts.

Further, the findings show that residents' engagement in social functions supports self-help and funding sources for environmental development (mean= 4.0) ranked 3rd. This indicates that community association among residents in the vulnerable communities to flooding would encourage partnership and community efforts in sourcing for finance to manage environmental challenges. This concurs with Harifuddin *et al*. (2024) that social capital supports flood mitigation as a result of necessity to strengthen the collaboration between community stakeholders and government institutions on flood management.

In addition, social functions provide valuable information to residents on environmental issues (mean= 2.0) ranked 4th. This implies that the process of residents' formation of development association to mitigate flooding, information collection becomes necessary to ensure adequate control from forest-based land use agencies for mitigation of flooding. This suggests that social involvement could help synergize residents' resources for forest-based land use strategies, FLUS in Southwest Nigeria. This is in tandem with the submission of the World Bank Group (2017) who elucidates that reduction of underlying causes of flooding can enforce development gains through prioritization of risk-based land use planning and influence of community behavior from communication and participatory methods for flood mitigation.

Table 2. Residents' Social Involvement in the Study Area (n=250)

Statements	HI	MI	U	RI	NI	Mean	Rank
Residents engage in social activities as a result of associated welfare benefits	239(95.6)	11(4.4)	-	-	-	5.0	1st
Social functions can be beneficial in meeting others' needs	169(67.6)	81(32.4)	-	-	-	4.7	2nd
Social connections enhance resilience to environmental and flood hazards	169(67.6)	81(32.4)	-	-	-	4.7	2nd
Social functions provides opportunities to meet influential people	169(67.6)	81(32.4)	-	-	-	4.7	2nd
Social functions serve as means of self-help and funding sources for environmental development	169(67.6)	-	-	81(32.4)	-	4.0	3rd
Social functions provide valuable information to residents on environmental issues	-	81(32.4)	-	-	169(67.6)	2.0	4th

***NB*: HI** = Highly Involved, **MI** = Moderately Involved, **U** = Uncertain, **RI** = Rarely Involved **NI** = Not Involved . Figures in parentheses are in percentages*

Level of Forest-Based Land Use Strategies in Southwest Nigeria

The results in Table 3 shows distribution of the six (6) selected forest-based land use strategies utilized in the study area. Tree planting (mean= 1.8) was the most utilized forestry land use strategies and it ranked 1st most popular FLUS for mitigating flooding. It further showcased that about 98.4 % of residents partially engaged tree planting for ecosystem forest-based flood control in Southwest Nigeria. Thus, it implies that the most popular perceived approach among the FLUS is the tree planting with highest proportions in Lagos, followed by Oyo and Ogun States respectively but partially utilized. This corroborates Kareem (2023) who reported that tree planting is one of the three projects deployed by Nigerian States affected by floods in 2022, based on 2022 Budget Implementation Reports (BIRs).

In addition, tree conservation of in the upland area (mean=1.6) ranked 2nd most popular FLUS which revealed that 78.0% of residents in Southwest Nigeria were also partial users of FLUS. It indicates that tree conservation in upland area is highly effective in mitigating flooding among partial users with highest proportion of users in Oyo State, Ogun and the lowest in Lagos States respectively. This concurs with Matthews (no date) who established that trees planted in upland areas or hillsides can slow water flow into valleys and preventing downstream flooding. According to Srivastava *et al*. (2023) conservation practices are found to effectively control peak flows and improve water quality at the field and watershed which helps mitigate flooding. More so, stream banks stabilization through re-vegetation (mean= 1.6) which also ranked 2nd most popular FLUS and attracted 78.0% were also partial users. It implies that stream bank stabilization was perceived at the same level of use as conservation for mitigating flooding with Oyo State still having the highest proportion of partial users, followed by Ogun and Lagos States being the least user. This corroborates Russell *et al*. (2021) that stabilization projects are increasingly used to mitigate flooding from the effects of anthropogenic activities, yet the effectiveness of stabilization measured has been insufficient.

Furthermore, Desilting of streams and rivers (mean= 1.0) was ranked 3rd most popular FLUS and pooled 50.4% popularity as

partial user of forestry land use strategy. It also indicates that desilting of streams in mitigating flooding pooled highest partial users in Oyo State followed by Ogun State and the least users in Lagos State. This concurs with Environment Agency (no date) who submits that desilting contributes to reducing flooding in some locations but it can be an extremely inefficient and ineffective way to mitigating flooding. In the overall, this finding implies that tree planting, tree conservation and stream bank stabilization were the most partially used forest-based land use strategies, whereas other approaches; desilting of streams, sustenance of natural environment and landscaping of environment had least partially used FLUS in Southwest Nigeria. This finding suggests that FLUS has sparsely level of utilization in mitigating flooding residents in Southwest Nigeria.

Table 3. Residents' Level of Utilization of Forest-Based Land Use Strategies (FLUS) (n=250)

	Level of Utilization					
Forest-Based Land Use Strategies	NU	US	PU	FU	Mean	Rank
Tree planting (TP)	4(1.6)	-	246(98.4)	-	1.8	1st
Conservation of trees and shrubs in the upland areas and floodplains (TC)	55(22.0)	-	195(78.0)	-	1.6	2nd
Stream and river bank stabilization in water courses (SBS)	56(22.4)	-	194(77.6)	-	1.6	2nd
De-silting of streams and rivers in the floodplain areas (DS)	123(49.2)	-	126(50.4)	1(0.4)	1.0	3rd
Sustenance of the natural environment (SNE)	162(64.8)	-	82(35.2)	-	0.7	4th
Landscaping of the environment and beautification (LE)	164(65.6)	-	86(34.4)	-	0.7	4th

Note: NU = never used, US = used but stopped, PU = partially in use, FU = fully in use, Figures outside parentheses are frequencies; Figures in parentheses are in percentages

Influence of Residents' Social Involvement on the Use of FLUS in Mitigating Flooding

The results of Chi-square statistic in Table 4 showcased no significant relationship between residents' social involvement and tree planting, tree conservation in upland area, stream bank stabilisation (FLUS). However, residents' social involvement have significant relationship with sustenance of natural environment, desilting of streams and rivers as well as landscaping of the environment (FLUS) for mitigation of flooding. Therefore, it could be inferred that social involvement influence level of utilisation of FLUS in Southwest Nigeria. According to Fasona *et al*. (2019), an inclusive and collaborative forest governance arrangement will incentivize local communities to assume greater responsibilities and make stronger commitments to managing flooding with forests and woodlands.

Level and Direction of the Influence of Residents' Social Involvement on the Use of FLUS

The results in Table 5 showed that residents' social involvement was captured by social functions serving as means of self-help and source of funding for environmental development which bears a significant relationship and negative correlation with (FLUS); SNE (β= -0.432, p = 0.00, R^2 = 0.403) and LE (β= -1.403, p = 0.00, R^2 = 0.355). This implies that the likelihood of FLUS decreases by 40.3% and 35.5% as the interest of residents rises in self-help and sourcing for funds for environmental development. It suggests that as residents have access to funds for environment development and self-help, the less likely they are motivated to use forest-based land use strategies.

Further, Table 5 showcased a significant relationship and positive correlation between social connections enhancement of resilience to environmental and flood hazards and (FLUS); both SNE β= 0.310, p = 0.00, R^2 = 0.403) and LE (β= 0.310, p = 0.00, R^2 = 0.355). This indicates that the chances of using FLUS for mitigating flooding by residents increases by 40.3% and 35.5% as undivided attention of residents rises in self-help and sourcing for funds for environmental development. This suggests that as inhabitants of flood-prone communities have access to funds for environment development and self-help, the more they are prompted to employ and initiate forest-based land use strategies. In the overall, social involvement of residents in flood-prone communities could impress a great use of forest-based land use strategies to mitigate flooding in Southwest Nigeria. This corroborates Oranye (2020) who submitted that shared duties among community population imply a social responsibility of stakeholders and inhabitants of flood-prone areas to engage in sustainable management of flooding.

Table 4. Chi-Square Statistics of Influence of Residents' Social Involvement on the Use of FLUS in Mitigating Flooding

	Forest-Based Land Use Strategies					
Social Involvement	**TP**	**TC**	**SNE**	**SBS**	**DS**	**LE**
Social functions serve as means of self-help and funding sources for environmental development	0.10 (0.75)ns	0.07 (0.78)ns	100.84 (0.00)*	0.14 (0.71)ns	122.31 (0.00)*	88.86 (0.00)*
Social functions can be beneficial in meeting others' needs	0.10 (0.75)ns	0.07 (0.78)ns	100.84 (0.00)*	0.14 (0.71)ns	122.31 (0.00)*	88.86 (0.00)*
Social connections enhance resilience to environmental and flood hazards	0.10 (0.75)ns	0.07 (0.78)ns	100.84 (0.00)*	0.14 (0.71)ns	122.31 (0.00)*	88.86 (0.00)*
Social functions provide valuable information to residents on environmental issues	0.10 (0.75)ns	0.07 (0.78)ns	100.84 (0.00)*	0.14 (0.71)ns	122.31 (0.00)*	88.86 (0.00)*
Social functions provides opportunities to meet influential people	0.10 (0.75)ns	0.07 (0.78)ns	100.84 (0.00)*	0.14 (0.71)ns	122.31 (0.00)*	88.86 (0.00)*

N.B: χ^2 - values outside parentheses, p-values are in parentheses, ns= not significant, *= significant

Table 5. Level and Direction of the Influence of Residents' Social Involvement on Use of FLUS

Social Involvement	**Forest-Based Land Use Strategies (FLUS)**					
	TP	TC	SNE	SBS	DS	LE
Social functions serve as means of self-help and funding sources for environmental development	-0.044 (0.75)	-0.010 (0.79)	-0.432 (0.00*)	-0.014 (0.71)	0.485 (0.00*)	-0.403 (0.00*)
Social connections enhance resilience to environmental and flood hazards	0.024 (0.15)	0.082 (0.14)	0.310 (0.00*)	0.082 (0.14)	0.071 (0.18)	0.310 (0.00*)
Social functions provide valuable information to residents on environmental issues	0.419 (0.06)	0.732 (0.32)	2.461 (0.00*)	0.728 (0.32)	-3.770 (0.00*)	2.321 (0.00*)
R^2	**0.000**	**0.000**	**0.403**	**0.001**	**0.458**	**0.355**

***Note**: β = Beta Coefficient values outside parentheses, p-values Significant @ $\alpha_{0.05}$ level in parentheses, **FLUS**: **TP** = Tree planting, **TCU** = Tree conservation upland, **SNE** = Sustenance of natural environment, **SBS** = Stream bank stabilization, **DS** = De-silting streams, **LE** = Landscaping the environment*

CONCLUSION AND RECOMMENDATIONS

Community social programs saw significant involvement from residents' provision to vulnerable people living in flood-prone areas of Southwest Nigeria. Also, their participation in social activities strengthen their motivation and ability to adapt to flood and ecosystem challenges. The most popular among the indicators of FLUS was tree planting, which had the largest proportions but was partially utilized, followed by tree conservation in the upland area. The results further revealed that the social engagement of residents was significantly related to SNE, DS, and LE (FLUS) for flood mitigation. Hence, it was concluded that community engagement impacts the extent of FLUS adoption in Southwest Nigeria Based on the findings, it was recommended that residents of flood-prone areas should be empowered with funding from non-profit organizations and government in combating flooding with forest-based land use practices. It was further recommended that a support framework from community-based organizations and ecosystem-focused institutions should provide strategies and form partnership with residents to mitigating flooding as well as alleviating its impacts in the flood-prone communities of Southwest Nigeria.

Acknowledgment

We acknowledge the contribution of the respondents for providing us with data.

Authors' Contribution

ASA and OOK managed data collection, interpretation of data, data analysis, and writing of manuscript was conducted by ASA, while ADS conducted proof-reading.

Ethical Statement

Not applicable.

REFERENCES

Abdi, H., Guillemot, V., Estami, A. & Beaton, D. (2018). Canonical Correlation Analysis. Springer Science (2018) www.doi.org/10.007/978-1-4614-

Adefisoye, T.O. (2017). Citizen's participation and flood management: Lessons for public policy implementation in Nigeria. *Public Administration and Res*earch 7(8): 56-68 https://core.ac.uk

Adefisoye, T.O. & Arum, I. (2021). Interagency collaboration and the dilemma of flood management and policy implementation in Nigeria. *Ikenga Jounal of African Stud*ies 22(3): 1-26 https://doi.org/10.53836/ijia/2021/22/3/007

Adekola, O., Lamond, J., Adelekan, I., & Eze, E. B. (2020). Evaluating flood adaptation governance in the city of Calabar, Nigeria. *Climate Development Journal* 12(9), 840–853. https://doi.org/10.1080/17565529.2019.1700771

Adeoye, A.S. (2024). Forestry land use strategies for flood management in vulnerable communities of Southwestern Nigeria. PhD Thesis submitted to the Faculty of Renewable Resources, University of Ibadan, Nigeria.

Agbola, B. S., Ajayi, O., Taiwo, O. J., & Wahab, B. W. (2012). The August 2011 flood in Ibadan, Nigeria: Anthropogenic causes and consequences. *International Journal of Disaster Risk Science* 3(4), 207-217. https://doi.org/10.1007/s13753-012-0021-3

Environment Agency (no date).Desilting: Creating a better place for people and wildlife. 2pages. https://consult.environment-agency.gov.uk>desilt...

Ezirim, G.E. (2010). Climate change and national security: Exploring the conceptual and empirical connections in Nigeria. *Journal of Sustainable Development in Africa* 12 (4) 2010. https://jsd-africa.com>article12_04

Fasona, M., Adeonipekun, P.A., Agboola, O., Akintuyi, A., Bello, A., Ogundipe, O., Soneye, A., & Omojola, A. (2019). Incentives for collaborative governance of natural resources: A case study of forest management in Southeast Nigeria. *Journal of Environmental Development* 30(1): 76-88, June 2019. https://doi.org/10.1016/j.envdev.2019.04.001

Harifuddin, H., Azaz, F., Apriningsih, A, Hayat, A.N., Yuldashev, A.A., & Kuraesin, A.D. (2024). Flood risk reduction: A government and community collaboration perspective in urban communities. *Journal of Technology Society* 16(1): 54-65 https://publisher.uthm.edu.my/ojs/index.php-/jts

Kareem, A. (2023). Nigerian States prioritise tree planting to curb flooding. *Dataphyte reports* https://dataphyte.com>

Lawanson, O.I., Proverbs, D. & Ibrahim, R.L. (2023). The impact of flooding on poor communities in Lagos State, Nigeria: The case of the Makoko urban settlement. 16(1): e12838 https://onlinelibrary.wiley.com>

Matthews, F.P. (no date). The roles of trees in preventing and managing flooding. https://www.frankpmatthews.com

Mfon, I.E., Oguike, M.K., Eteng, S.U., & Etim, N.M. (2022). Causes and effect of flooding in Nigeria: A review. *East Asian Journal of Multidisciplinary Research* 1(9): 1777-1792 https://journal.formosapublisher.org>

Ndimele, P.E., Ojewole, A.M., Mekuleyi, G.O., Badmos, L.A., & Agosu, C.M. (2024). Vulnerability, resilience and adaptation to Lagos coastal communities to flooding. *Earth Science Systems and Society Review* 16 July, 2024. www.doi.org/10.3389/eSSS.2024.10087

Nkwuononwo, U.C., Tobore, A. & Nwaka, O.C. (2024). Ecosystem-based approach to local flood risk management in Ogun State, Nigeria: Knowledge and pathway to actualisation. *Nature Hazards Research* 4(3): 357-373 https://www.sciencedirect.com>science

National Oceanic and Atmospheric Administration, NOAA (2024). Understanding storm-water inundation. https://coast.noaa.gov.>stormwater-floods>

Nation Resourced Defense Council, NRDC (2019). Flooding and climate change: Everything you need to know: Flood Consequences. https://www.nrdc.org

Obete, M.C. (2014): Institutional Approach to Flood Disaster Management in Nigeria: Need for a Preparedness Plan. *British Journal of Applied Science and Technology* 4(33): 4575-4590 www.doi.org/10.99734/BJAST/2014/11844

Oni, F. & Odekunle, T.O. (2019). Assessment of climate change impacts on maize (Zea mays) yield in Southwestern Nigeria. https://www.researchgate.net>Ma...

Onifade, V.A., Yoade, A.O., Olatunji, S.A., & Husseni, M.A. (2023). Effects of flooding on urban lives and properties in Lagos, Nigeria. *International Journal of Infrastructural Research and Management* 11(2): 46-62 https://iukl.edu.my>...

Onwuka, S.U., Ikekpeazu, F.O. & Onuoha, D.C. (2015). Assessment of the causes of 2012 floods in Aguleri and Umuleri in Anambra East Local Government Area of Anambra State, Nigeria. *British Journal of Environmental Science* 3(1): 43-57 www.eajournals.org

Oranye, R.O. (2020). Social responsibility perceptions of community resilience in Nigeria. Doctoral Dissertation submitted to the Department of Public Policy and Administration, Walden University, United Kingdom. November 2020. https://scholarworks.waldenu.edu>...

Russell, M., Mittelstet, A.R., Messer, T.L., Korus, J.T., & Joeckel, R.M. (2021). Evolution of three streambanks before and after stabilisation and record flooding. *Ecological Engineering Journal* 170 (1). November 2021. https://doi.org/10.1016/jecoleng.2021.106357

Sawenah, I.A., Fan, L. & Sesay, B. (2024). Investigating the influence of residents' attitudes, perceptions of risk and subjective norms on their willingness to engage in flood prevention efforts in Freetown, Sierra Leone. *Nature Based Solutions* 6(1)2024: 100143. https://doi.org/10.1016/j.nbsj.2024.100143

Southard, N. (2017). The socio-political and economic causes of natural disasters. CMC Theses.1720 http://scholarship.claremont.edu/cmc_theses/1720

Srivastava, S., Basche, A., Traylor, E. & Roy, T. (2023). The efficacy of conservation practices in reducing floods and improving water quality. *Front. Env. Sci*. 11(1): 2023. https://doi.org/10.3389/fenvs.2023.1136989

Umar, N. & Gray, A. (2023). Flooding in Nigeria: a review of its occurrence, impacts and approaches to modelling flood data. *Int. Journal of Environmental Studies* 80 (3):

540-561
https://doi.org/10.1080/00207233.2022.2081471

United Nation, UN Atlas (2016). Human settlements on the coast: The ever more popular coasts. https://www.oceansatlas.org>subtop...

Wahab, B. & Falola, O. (2022). Vulnerable households in flood-prone communities in Ibadan: Measures to improve their Status within the Inclusive Ibadan City Framework. Conference Proceedings for International Symposium on Inclusive-Cities: Achieving Inclusive Cities through a Multidisciplinary Approach, 2021: 28-30 June. *Journal of Inclusive Cities and Built Environment* 2 (1): 21-27. University of KwaZulu-Natal https://journals.ukzn.ac.za/index.php/JICBE

World Bank Group (2017). Urban floods Community of Practice (UFCOP): Land use planning for urban flood risk management. April, 2017; 28 pages. https://www.gfdrr.org>UFCOP