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RESIDENTS' AWARENESS OF FORESTRY KNOWLEDGE AND PRACTICES FOR FLOOD MITIGATION (A Case in South West Nigeria)

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ABSTRACT

The combination of environmental degradation and inadequate engineering solutions has exacerbated flooding in Nigeria. Consequently, the study examined residents' awareness of forestry knowledge and practices. A 4-stage random sampling procedure was used, resulting in 250 participants selected via systematic sampling. Data were gathered through a structured questionnaire on residents' demographic characteristics, awareness of environmental practices, and utilization of forestry land-use practices. The analysis of data involved frequencies, percentages, mean values, rankings, and inferential statistics using the Chi-square test. The results showed that 68.0% of respondents were female, with a significant proportion (78.0%) aged 21-50 years. Additionally, 74.0% were married, 40.0% were civil servants, and 22.0% were involved in trading. The residents' knowledge revealed that the prohibition on disposing of refuse into drainage and rivers had a mean score of 1.6 and ranked 1st, while the government's advisories on relocation from flood-prone areas had a mean of 1.1, ranking 2nd in awareness. Chi-square analysis showed significant relationships between tree planting and flood experiences ($\chi^2 = 8.18$, p = 4×10^-3) and between tree conservation and marital status ($\chi^2 = 10.61$, p = 0.01). Furthermore, there was a significant association between other demographics, such as marital status (χ^2=7.99, p = 0.05) and years of residence (χ^2=16.03, p = $3^{\times}10^{-3}$), and forestry land use practices (FLUP). Key findings emphasized the critical role of tree planting, conservation, and environmental education in enhancing ecosystem resilience and mitigating climate-related disasters, such as floods, in southwest Nigeria.

Keywords: flooding; flood-stressed communities; forestry; knowledge; residents.

INTRODUCTION

Managing floods in developing nations remains a complex challenge due to sparse information and poor understanding among residents of flood-affected communities, as highlighted by Nkwunonwo *et al*. (2016). A related concern is the lack of knowledge about the relationship between the topology of waterway networks and the hydraulic conditions that influence flows upstream and downstream (Ogie *et al*., 2019). For example, in most cities like Jakarta and Shanghai, residents regularly receive updates on the construction of man-made canals around interconnected rivers to help control flooding (Kuan, 2015).

Moreover, it is noteworthy that residents near low-lying flood-prone areas are aware of flood warning messages, including alerts about heavy rainfall, environmental sanitation, and evacuation directives from risk areas. Another area of concern is the government's dissemination of information regarding flood risks and management, which often relies on limited conventional structural methods, and provision of relief to affected communities, as reported by Nkwunonwo *et al*. (2016).

However, Okayo et al. (2015) noted that public sensitization to flood management remains significantly low regarding education on environmental hazards. Furthermore, ineffective government mitigation efforts, primarily temporary solutions such as river dredging, bridge construction, and

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drainage systems, have resulted in minimal impact from flood awareness campaigns in the streets of Ibadan and Osogbo (Sunday Guardian, 2018). Additionally, Nemine (2015) found that many residents of rural coastal and wetland communities of Ondo state were aware of the benefits of planting resistant trees for flood prevention.

Furthermore, Carrick et al. (2019) suggested that a more proactive flood risk awareness and self-help initiatives for communities should be encouraged in areas that frequently experience flooding. This notion is echoed by Dixon et al. (2016), who noted a shift towards enhancing awareness education to bolster existing mitigation measures and defenses. Arum (2019) also emphasized that governments at all levels should promote public awareness of tree planting to ensure an erosion-free environment and reduce flooding across vulnerable communities in Nigeria.

Historically, Nigeria's flood mitigation efforts relied heavily on structural engineering approaches, which proved unsustainable, contributing to the recent surge in flood events and underscoring the need for more holistic and adaptive strategies (Nkwunonwo et al., 2016). The necessity of accommodating fundamental human needs and the core values and functions of the natural environment underscores the value of an ecosystem-based approach to flood risk management in flood-prone communities with many vulnerable people (Nkwunonwo *et al*., 2024). Moreover, to sustainably mitigate flood risks, it is necessary to incorporate indigenous knowledge and practices rooted in the planting of certain trees and mangroves, and to develop forest reservation areas in both rural and urban communities to enhance environmental resilience against flood hazards (Echendu, 2024).

Consequently, forestry significantly contributes to flooding mitigation by absorbing excess rainfall, regulating water flow, preventing erosion, and managing groundwater, thereby reducing the risk and impact of flooding (Ellison *et al*., 2017). In addition, key forestry practices that mitigate flood risk include reforestation, floodplain forest reforestation, and sustainable forest management, all of which play a vital role in mitigating flood risk (Yimer *et al*., 2024). However, despite these benefits, uncertainties surrounding the effect of forests on flood risks, including quantifying their effectiveness, optimal forest management strategies, and the interplay with land use and infrastructure, persist, which require research and consideration (Ashrafizadeh & Yousefpour, 2025). Hence, this study identified the utilization of some forestry land use practices, which include tree planting, tree conservation, sustenance of the natural environment, stream bank stabilization, desilting of culverts, drainages, and rivers in floodplains, and proper landscaping of the environment, as well as how forestry knowledge interplay with the forestry practices among the selected three states in southwest Nigeria.

Therefore, the study aims at assessing the residents' awareness of forestry knowledge and practices in south west Nigeria with the following specific objectives: i. to identify how residents' demographic characteristics contribute to flood control in the study area; ii. to examine residents' awareness of environmental practices in the study area; and iii. to understand the utilization of forestry land use practices such as tree planting, tree conservation, streambank stabilization, desilting of drainages and streams, sustenance of natural environment, and landscaping of the environment in the study area. This research paper hinges on the SDGs 13 and 15, which responsively establish that "urgent action should be taken to combat climate change and its impact" and to protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss" (United Nations, 2025).

MATERIALS AND METHODS

Study Area

The study focused on Southwestern Nigeria, a geopolitical region primarily inhabited by the Yoruba people, covering an area of 191,843 square kilometers, located between latitudes 9° 4'55.1964" to 9.081999° North and longitudes 8° 40'30.9972" to 8.675277° East. As of 2020, the population was approximately 32.5 million, accounting for around 20.44% of Nigeria's total population, according to the National Bureau of Statistics (2006) and the United Nations (2006). The region consists of six states: Oyo, Osun, Ogun, Lagos, Ondo, and Ekiti. The climate is typically tropical, with average temperatures around 33°C in the dry season and 24°C during the rainy season, and high humidity. Rainfall ranges from 1000mm to 2000mm (NBS, 2006), and the area features three main vegetation types: mangrove forest, tropical rainforest, and guinea savannah. The region is rich in resources, including land, water, minerals, forests, and agricultural products.

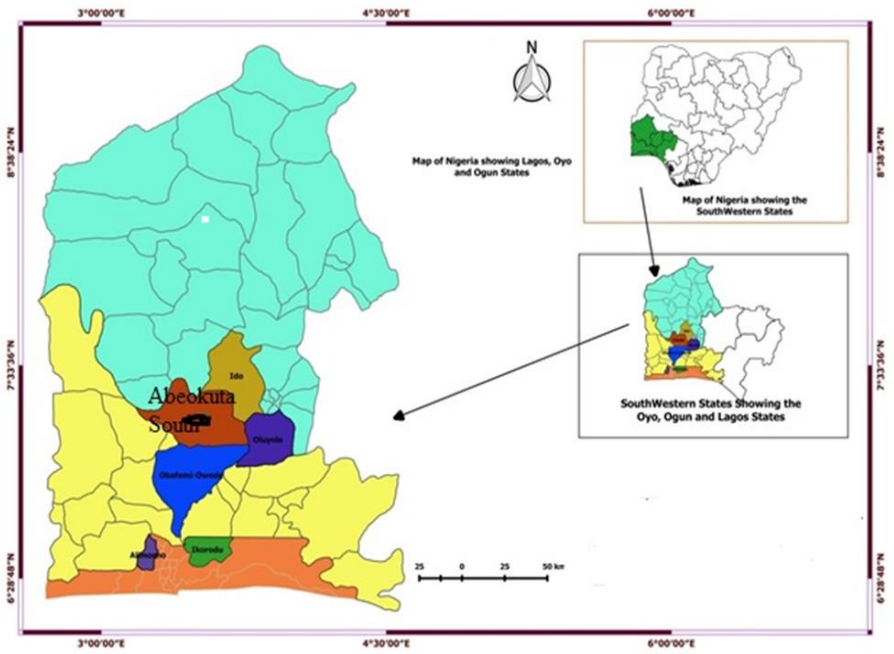

Figure 1. Map of the study area: Southwest Nigeria
Source: Adeoye (2024).

Data Collection and Sampling Procedure

This research used qualitative data, collecting primary data through questionnaires administered to household heads. Table 1 below explicitly summarizes the sampling technique used for the study.

Table 1. Analyses of sampling procedures and sample size

Selected states in southwest Nigeria	Selected Local Government Areas	Selected 22 communities in LGAs	Households listed in the selected communities	Systematic selection of Household heads
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

Source: Field survey, 2021

A multistage random sampling approach was employed, starting with the selection of Oyo, Ogun, and Lagos States based on flood volume at the first stage. In the second stage, Local Government Areas (LGAs) were selected at random based on notable flood occurrences. The chosen LGAs included Ido and Oluyole in Oyo State, Obafemi Owode and Abeokuta South in Ogun State, and Alimosho and Ikorodu in Lagos State. The number of wards selected from each LGA was as follows: Ido had 10 wards, Oluyole had 10 wards, Obafemi Owode had 12 wards, Abeokuta South had 15 wards, Alimosho had 11 wards, and Ikorodu had 19 wards. In the third stage, 22 communities with high flood risks were purposefully selected from all the selected LGAs. Finally, a systematic sampling technique was used to select household heads from 1,251 households listed in the communities, resulting in a final sample of 250 respondents, with data collection conducted between October 2020 and April 2021.

Analytical Tools

The study utilized various analytical tools, including frequencies and percentages for socio-economic demographics, ranking to assess the extent of environmental practices and understanding of forestry land use practices (FLUP), and Chi-square tests to evaluate the association between demographic characteristics and residents' forest knowledge and FLUP.

Chi-Square Model

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

Where: χ^2 = Chi square, Σ = Aggregates of the number of observations, O = Frequencies of nominal observations, e.g, sex, religion, marital status, E = Expected frequencies determined from the response

Measurement of Variables for the Study

The extent of awareness of environmental practices was assessed by asking household heads to respond to statements on a 4-point Likert scale: "Larger Extent" = 3, "Lesser Extent" = 2, "Rare Extent" = 1, and "Not Aware" = 0. The Likert scale was scored as follows: 3 + 2 + 1 + 0 = 6, divided by 4, yielding a mean of 1.5. A score of 1.5 or higher indicates a high level of awareness, while a score below 1.5 indicates a low level of awareness. A score of 1.5 indicates a low level of awareness, whereas scores ≥ 1.5 indicate a high level of awareness (Adeoye, 2024).

Forestry land use practices (FLUP) served as the dependent variable for the study, operationalized on a 4-point Likert scale: "Never Used" = 0, "Used but Stopped" = 1, "Partially in Use" = 2, and "Fully in Use" = 3. The Likert scale benchmark was similarly calculated: 0 + 1 + 2 + 3 = 6, divided by 4, yielding a mean of 1.5. Thus, a score of 1.5 or higher indicates a high level of forestry land-use practices in the study area, while a score below 1.5 indicates a low level of these practices. Consequently, scores ≤ 1.5 represent a low level of forestry land use practices, while scores ≥ 1.5 indicate a high level of forestry land use practices (Adeoye, 2024).

RESULTS AND DISCUSSION

Residents' Demographic Characteristics in Flood-stressed Communities

Figure 2 shows that a majority of respondents (68.0%) were female, while 32.0% were male. The study found that the majority of residents in flood-affected communities in southwest Nigeria were women. This aligns with Eniwotu & Otite's (2023) observation that women have a better understanding of their environment and often assume more responsibilities than men in the Isoko community.

Table 2 shows that 78.0% of participants were aged 21-50 years (the modal age group). The age distribution of residents primarily fell within the 21–50-year range, indicating that the respondents are generally youthful and active. This supports the findings of Adetarami et al. (2024) that residents have been actively engaged in environmental protection initiatives in southwest Nigeria for a long time. Furthermore, most residents (72.8%) were natives of the area, and approximately 52.4% had lived there for over 16 years. Additionally, Table 1 indicates that the most common work experience among residents was 21-25 years (19.2%), followed by 1-5 years (17.2%) and 16-20 years (15.2%).

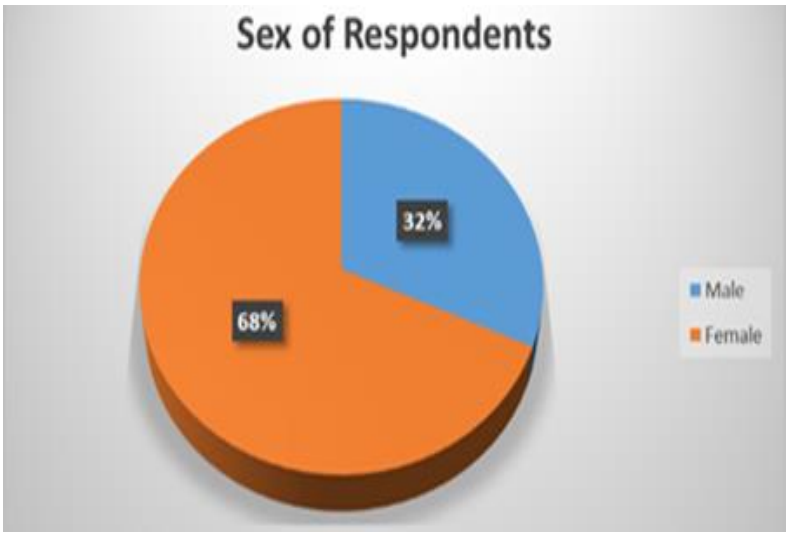

Figure 2. Distribution of respondents' sex

Table 2. Residents' demographic characteristics in the study area

Demographic Characteristics	F	%	Mode
Age (years)			
≤ 20	10	4.0	
21-30	68	*27.2	21-50
31-40	65	*26.0	
41-50	63	*25.2	
51-60	33	13.2	
Years of residing in the locality			
3-5	38	15.6	
6-10	35	14.0	
11-15	45	18.0	
≥16	131	*52.4	
Work experience			
≤ 5	43	17.2	
6-10	37	14.8	
11-15	27	10.8	21-25
16-20	38	15.2	
21-25	48	*19.2	
26-30	19	7.2	
≥ 30	38	15.2	

Note: Frequencies are denoted as **F**, while Percentages are denoted as **%**
Source: Field Survey, 2021

The distribution of educational backgrounds shown in Figure 3 reveals that 37.0% of respondents held advanced degrees, while approximately 26.0% held Bachelor of Science (BSc) or Higher National Diploma (HND) degrees. The educational levels of residents were predominantly formal, suggesting a strong link between education and the knowledge necessary for environmental practices. This corroborates Magali & Anne (2022), who noted that education plays a vital role in raising awareness about environmental protection.

Regarding marital status, around 74.0% of residents were married, and 60.0% identified as Christians (Figures 4 & 5, respectively). A significant proportion of residents were married, suggesting that marital status may influence their commitment to utilizing FKEP. This is consistent with Zheng *et al*. (2021), who noted that marital relationships can encourage the adoption of environmental protection practices, with the majority of residents identifying as Christian, indicating that Christianity is the predominant religion. Ottuh (2018) previously suggested that religion plays a critical role in educating followers on the importance of environmental stewardship.

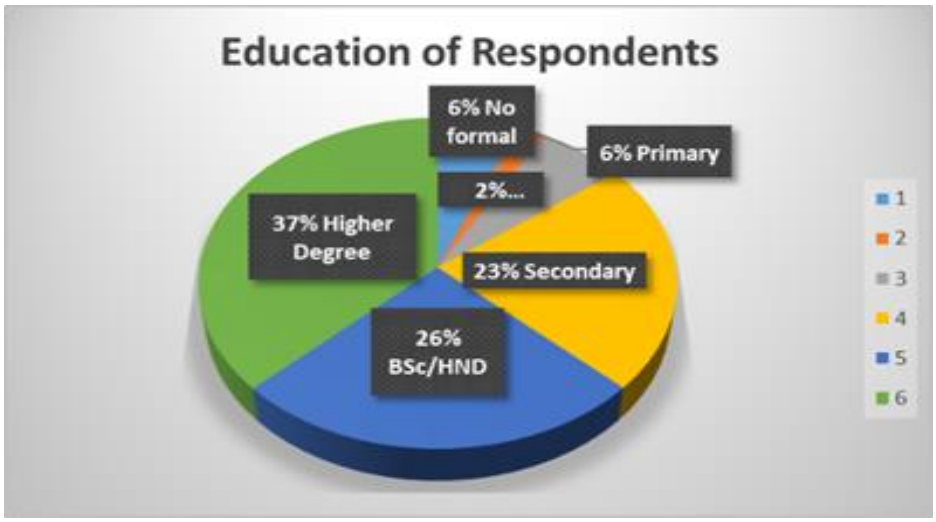

Figure 3. Distribution of respondents' level of education

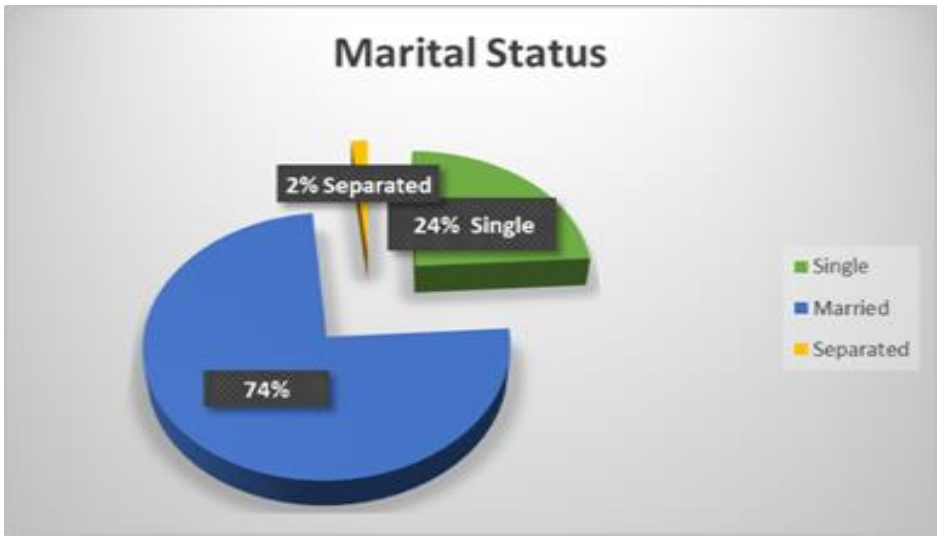

Figure 4. Distribution of respondents' marital status

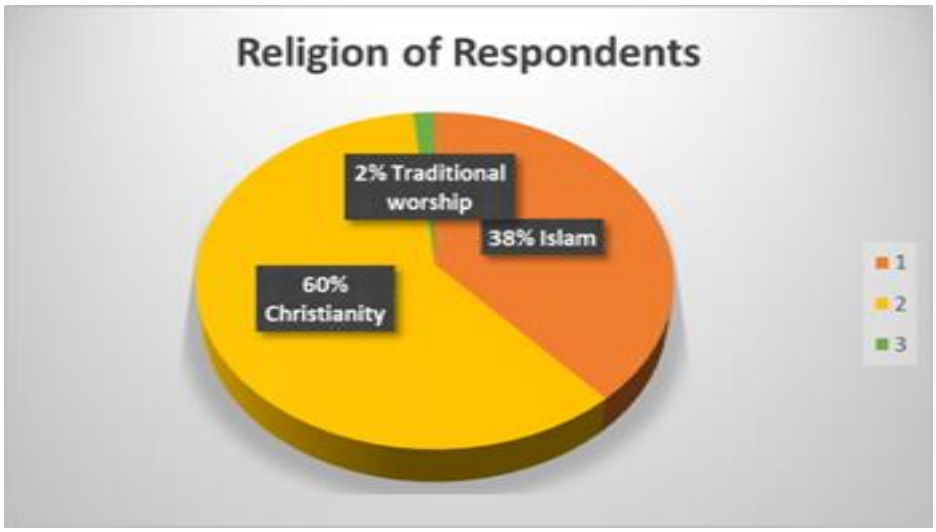

Figure 5. Distribution of respondents' religion

Figures 6 show that 40.0% of the residents worked as civil servants, while 22.0% were engaged in trading as their primary occupation. The data also showed that most residents were engaged in civil service, trade, or other non-farm occupations, which could affect their commitment to forestry land-use strategies. This supports Danso-Abbeam *et al*. (2021), who found that many agricultural households participate in non-farm economic activities, which are essential for adapting to climate change impacts.

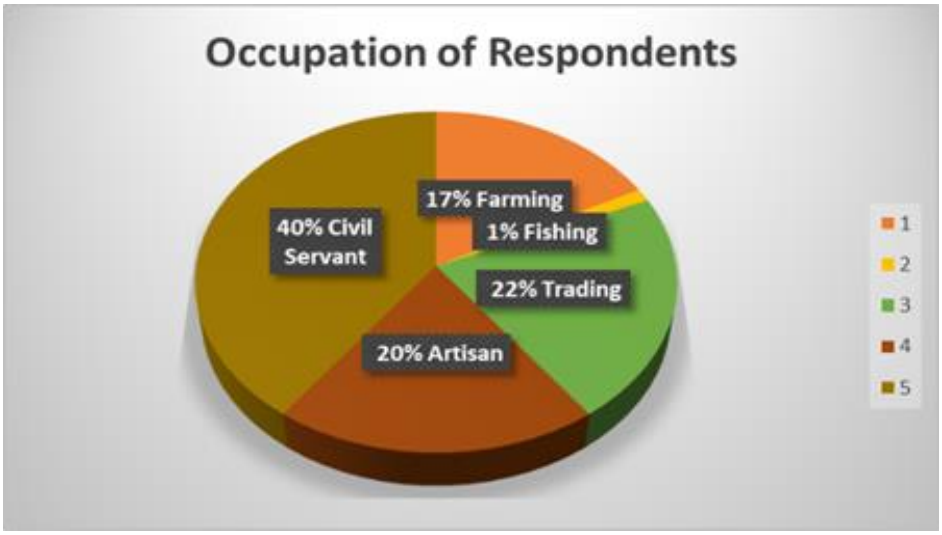

Figure 6. Distribution of respondents' occupation

Figures 2-6 depict the gender, education, marital status, religion, and occupation of the residents. The findings regarding residents' work experience indicated that many had extensive experience, suggesting they possess the skills and knowledge necessary to implement FKEP for flood management. This aligns with Danso-Abbeam *et al*. (2021), who asserted that work experience is critical for the effective use of adaptation strategies to mitigate environmental challenges stemming from climate change.

Residents' Awareness of Environmental Practices Enhanced Flood Management

The existence of environmental practices does not guarantee their application; rather, their use depends on residents' knowledge, access to information, and relevant skills. According to the findings in Table 3, the level of awareness of environmental practices among residents indicates that proscribing refuse and waste disposal into drainages and rivers (mean = 1.6) was the most widely recognized environmental practice, and ranked first. This suggests that greater awareness of waste management may reduce flooding incidents, underscoring the importance of forestry knowledge and environmental practices. The assessment of public awareness regarding environmental practices revealed that residents were highly informed about the prohibition on disposing of refuse and waste into sewage, culverts, and water bodies. This finding suggests that the government should increase awareness of more effective waste management practices to achieve a profound reduction in flooding in the future. This is supported by EnviroNews (2021), which reported that various government ministries and agencies conducted sensitization campaigns across Nigerian communities regarding the dangers of waste disposal in waterways. Implicitly, there is significant awareness of the prohibition on dumping waste into drainage and rivers in southwest Nigeria. The government's advisories urging residents in floodplain areas to relocate (mean = 1.1) ranked second in terms of awareness. This indicates that a low level of information use among residents could lead to potential loss of life and property in flood-prone areas, resulting from poor and inadequate dissemination of information about the vulnerabilities and exposure to flooding.

Additionally, the knowledge about the use of early warnings and sensitization regarding flooding (mean = 1.0) ranked third among the residents. This suggests that there was a low level of knowledge about early warnings and flood sensitization. Overall, the findings indicate a limited awareness among residents of environmental practices throughout southwestern Nigeria. This corroborates Okayo *et al*. (2015), who stated that public awareness of environmental management remains low and stunted in environmental hazard education.

Table 3. Residents' awareness of environmental practices

Environmental Practices	Extent of Awareness				Mean	Rank
	None	RrE	LsE	LgE		
Prohibiting and discouraging refuse and waste from entering drainage and rivers with sanctions	39 (15.6)	89 (35.6)	67 (26.8)	55 (22.0)	1.6	1st
The government is warning residents living in the floodplain or in flood-prone areas to relocate	53 (21.2)	154 (61.6)	18 (7.2)	25 (10.0)	1.1	2nd
Restriction of cattle grazing in the upland area of the floodplain to avoid soil compactness	229 (91.6)	17 (6.8)	3 (1.2)	1 (0.4)	1.0	3rd
Sensitization and early warnings to residents about flooding are useful in flood management	65 (26.0)	135 (54.0)	26 (10.4)	24 (9.6)	1.0	3rd
The contribution of the government and NGO in combating floods	86 (34.4)	124 (49.6)	26 (10.4)	14 (5.6)	0.9	4th
Prohibiting the construction of building structures on the floodplain by the government	118 (47.2)	74 (29.6)	32 (12.8)	26 (10.4)	0.9	4th
Frequent desilting of rivers and drainage for the free flow of water	145 (58.0)	52 (20.8)	34 (13.6)	19 (7.6)	0.7	5th

NB* Figures in parentheses are in percentages; R_rE = Rare Extent; L_sE = Lesser Extent; L_gE = Larger Extent
Source: Field Survey, 2021

Forestry Land Use Practices in Flood-Stressed Communities

Table 4 presents the distribution of forestry land-use strategies among flood-prone communities, indicating that six strategies were employed. Tree planting (mean = 1.8) ranked first, with 34.8%, 33.6%, and 30.0% of residents in Lagos, Oyo, and Ogun States, respectively, using it as a partial forestry land-use strategy.

Table 4. Utilization of Forestry Land Use Practices in Flood-stressed Communities

Forestry Land Use Practices	Level of Utilization				Mean	Rank
	NU	US	PU	FU		
Involvement in tree planting	4 (1.6)	-	246 (98.4)	-	1.8	1st
Conservation of trees and shrubs in the upland areas of floodplains	55 (22.0)	-	195 (78.0)	-	1.6	2nd
Stream bank stabilization	56 (22.4)	-	194 (77.6)	-	1.6	2nd
De-silting of streams and rivers in the floodplain areas	123 (49.2)	-	126 (50.4)	1 (0.4)	1.0	3rd
Sustenance of the natural environment	162 (64.8)	-	82 (35.2)	-	0.7	4th
Landscaping of the environment	164 (65.6)	-	86 (34.4)	-	0.7	4th

Note: **NU** = never used, **US** = used but stopped, **PU** = partially in use, **FU** = entirely in use. Percentages are in brackets.
Source: Field Survey, 2021

This signifies that tree planting emerged as the most commonly utilized practice for flood management among residents in Lagos, Oyo, and Ogun States, indicating that this strategy is widely recognized and employed. This study corroborates Yimer *et al*. (2024), who submit that reforestation and sustainable forest management play an important role in mitigating flooding in flood-prone environments. Additionally, the conservation of trees and shrubs in upland areas (mean = 1.6) ranked second, attracting 14.4%, 33.6%, and 30.0% of residents in Lagos, Oyo, and Ogun States, respectively, as partial users. This indicates that conservation of trees and shrubs in upland areas, as well as stream bank stabilization, ranked second, reflecting a higher proportion of users in Oyo State

than in Lagos and Ogun states. Yimer *et al*. (2024) also concur with this assertion. Stream bank stabilization through re-vegetation (mean = 1.6) also ranked second, appealing to 14.0% of residents in Lagos State, 33.6% in Oyo State, and 30.0% in Ogun State as a partially viable forestry land use strategy. Moreover, desilting of streams and rivers (mean = 1.0) ranked third and garnered 8.0% popularity in Lagos State, 22.0% in Oyo State, and 20.4% in Ogun State as a partially used forestry land-use strategy. This indicates that desilting streams, sustaining natural environments, and landscaping are less frequently employed practices and are underutilized for flood mitigation. This concurs with the assertion of Ashrafizadeh & Yousefpour (2025) that specific land-use infrastructure also plays a reciprocity effect, which is adaptive for combating flooding as a disaster risk reduction in the environment. the overall, this finding shows that tree planting, conservation of trees in upland areas, and stream bank stabilization are prominent and prioritized among residents in south west Nigeria for flood mitigation as well as aligning with SDGs 13 and 15 to combat climate change, protect ecosystems, and preserve biodiversity. This concurs with the findings of Neupane *et al*. (2023), who opine that forest tree biodiversity and social features, as well as the spatial dynamics of nature, exhibit percolating and absorbing effects that mitigate flooding in a built ecosystem.

Association between Demographic Characteristics and Utilization of Forestry Land Use Practices

The statistics in Table 5 demonstrate a significant relationship between residents' participation in tree planting ($\chi^2 = 29.81$, $p = 1\times10^{-4}$) and their years of experience. Furthermore, the analysis showed a significant association between tree conservation practices and residents' years of experience ($\chi^2 = 86.81$, $p = 1\times10^{-4}$), years of residence in the area ($\chi^2 = 15.91$, $p = 3\times10^{-4}$), and marital status ($\chi^2 = 10.61$, $p = 0.01$). This agrees with Adetarami *et al*. (2024), who submit that residents have been participating in environmental protection initiatives in Southwest Nigeria for many years. Additionally, the practice of sustaining the natural environment was significantly associated with residents' years of experience ($\chi^2 = 15.98$, $p = 2\times10^{-4}$), years of residence ($\chi^2 = 16.75$, $p = 2\times10^{-3}$), and marital status ($\chi^2 = 7.99$, $p = 0.05$). Likewise, the stabilization of riparian vegetation/stream banks exhibited significant associations with residents' years of experience ($\chi^2 = 89.73$, $p = 1\times10^{-4}$), years of residence ($\chi^2 = 16.03$, $p = 3\times10^{-3}$), and marital status ($\chi^2 = 12.24$, $p = 0.01$). These findings indicate that demographic characteristics significantly influence residents' commitment to utilizing FLUP for flood management in Southwestern Nigeria. This corroborates the findings of Danso-Abbeam et al. (2021), who found that specific social characteristics of inhabitants are crucial for the effective use of adaptation strategies to mitigate environmental challenges stemming from climate change.

Table 5. Chi-square statistic of selected inhabitants' demographic characteristics with Forestry Land Use Practices (FLUP)

Forestry Land Use Practices	Demographics		
	Inhabitants' Years of Experience	Years of Residing in the Locality	Marital Status
Tree planting	8.18 (4×10^{-3})*	3.69 (0.449)^{ns}	0.694 (0.995)^{ns}
Tree conservation	86.81 (1×10^{-4})*	15.91 (3×10^{-3})*	10.61 (0.01)*
Sustenance of the natural environment	15.98 (2×10^{-4})*	16.75 (2×10^{-3})*	7.99 (0.05)*
Stream bank stabilization	89.73 (2×10^{-4})*	16.03 (3×10^{-3})*	12.24 (0.01)*
De-silting of streams and rivers in the floodplains	32.44 (1×10^{-4})*	10.07 (0.261)^{ns}	2.69 (0.847)^{ns}
Landscape and beautification of the environment	19.33 (3×10^{-3})*	16.39 (3×10^{-3})*	7.39 (0.060)^{ns}

Note: Chi-square values outside brackets, p-values are in brackets, * represents Significance @ $\alpha_{0.05}$

Association between the Extent of Awareness of FKEP among Residents and FLUP

The results in Table 6 indicate a significant relationship between the extent of residents' awareness of governmental and non-governmental roles in flood management and their engagement in tree conservation ($\chi^2 = 18.31$, $p = 1\times10^{-4}$); sustaining the natural environment ($\chi^2 = 20.28$, $p = 1.2\times10^{-4}$); stream bank stabilization through vegetation ($\chi^2 = 19.19$, $p = 1\times10^{-4}$); and landscaping

efforts (χ^2 = 22.66, p = $1^{\times}10^{-4}$). Furthermore, there was a significant connection between residents' awareness of river de-silting and their use of tree conservation practices in upland areas (χ^2 = 22.07, p = $1^{\times}10^{-4}$); sustaining the natural environment (χ^2 = 11.88, p = 0.01); stream bank stabilization through vegetation (χ^2 = 22.85, p = $1^{\times}10^{-4}$); and landscaping efforts (χ^2 = 12.43, p = 0.01). Additionally, significant relationships were found between residents' awareness of the prohibition on building in flood-prone areas and their engagement in tree conservation (χ^2 = 52.19, p = $1^{\times}10^{-4}$); sustaining the natural environment (χ^2 = 10.40, p = 0.02); stream bank stabilization (χ^2 = 51.67, p = $1.1^{\times}10^{-4}$); de-silting of streams and rivers (χ^2 = 71.84, p = $1^{\times}10^{-4}$); and landscaping efforts (χ^2 = 10.07, p = 0.02). In conclusion, these findings indicate that residents' awareness of government agency interventions in flood management is significantly associated with the use of FLUP in flood-prone communities in Southwestern Nigeria. The Chi-square estimates presented in Table 5 suggest that residents' knowledge of tree conservation in upland areas, sustaining the natural environment, stream bank stabilization, and landscaping are influenced by their understanding of their roles in combating flooding. Oladokun & Proverbs (2016) also noted that increasing flood occurrences have heightened residents' awareness of flood risks. Moreover, the study found that residents' knowledge of tree planting diminishes their engagement in sustaining the natural environment. This finding supports Akinola *et al.* (2020), who argued that while residents are aware of nature-based adaptation strategies in flood-prone areas, they have not fully internalized or disseminated this information.

Table 6. Chi-square statistic showing residents' extent of environmental practices and FLUP for flood management

Extent of Environmental Practices	Forestry Land Use Practices (FLUP)					
	Tree Planting	Tree Conservation	Sustenance of the Natural Environment	Stream Bank Stabilisation	Desilting of Streams	Landscaping and Environment
The role of the government and non-government organisations in combating floods	0.93 (0.816)^{ns}	18.31 ($1^{\times}10^{-4}$)*	20.28 ($1.2^{\times}10^{-4}$)*	19.19 ($1^{\times}10^{-4}$)*	5.01 (0.542)^{ns}	22.66 ($1.1^{\times}10^{-4}$)*
Desilting of the river is frequently	1.09 (0.777)^{ns}	22.07 ($1^{\times}10^{-4}$)*	11.88 (0.01)*	22.85 ($1^{\times}10^{-4}$)*	18.40 (0.01)*	12.43 (0.01)*
Prohibition of building construction in the floodplain	4.54 (0.208)^{ns}	52.19 ($1^{\times}10^{-4}$)*	10.40 (0.02)*	51.67 ($1.1^{\times}10^{-4}$)*	71.84 ($1^{\times}10^{-4}$)*	10.07 (0.02)*
Sensitization and early warning of flooding	1.72 (0.631)^{ns}	18.92 ($1^{\times}10^{-4}$)*	27.88 ($1.1^{\times}10^{-4}$)*	19.06 ($1.3^{\times}10^{-4}$)*	21.81 ($1^{\times}10^{-3}$)*	28.12 ($1^{\times}10^{-4}$)*
Government warning on relocation from flood-prone areas	2.37 (0.498)^{ns}	14.64 ($2^{\times}10^{-3}$)*	33.42 ($1^{\times}10^{-4}$)*	15.05 ($1^{\times}10^{-4}$)*	29.85 ($1.2^{\times}10^{-4}$)*	36.53 ($1^{\times}10^{-4}$)*
Prohibiting the Dumping of refuse into drainage and rivers	2.06 (0.558)^{ns}	27.89 ($1^{\times}10^{-4}$)*	20.37 ($1.2^{\times}10^{-4}$)*	27.24 ($1^{\times}10^{-4}$)*	6.31 (0.389)^{ns}	23.05 ($1.1^{\times}10^{-4}$)*

Note: Chi-square values outside brackets, p-values are in brackets, * represents Significance @ $\alpha_{0.05}$

CONCLUSION AND SUGGESTIONS

The study demonstrated that residents had a high level of awareness of proper waste-disposal practices, specifically avoiding sewage, culverts, and water bodies, underscoring the potential for effective environmental conservation initiatives. Furthermore, there was a critical gap in

information use among residents, resulting in a potential increase in flood-related risks and losses, emphasizing the need for effective risk communication and information dissemination to mitigate vulnerabilities. The knowledge levels and forestry practices in reforestation/tree planting, tree conservation and sustainability of the natural environment, stream bank stabilization through vegetation, aligned with SDGs 13 and 15, emphasizing urgent action to combat climate change impacts, and sustainably managing forests and ecosystems, and promoting their restoration. In addition, residents' awareness drives effective forestry practices, including tree conservation and stream bank stabilization through massive vegetation supporting the SDGs to combat climate change and protect ecosystems. Therefore, the study recommends that community forestry extension services should target younger and less educated demographics, implement effective environmental landscaping practices to mitigate flood impacts and enhance ecosystem resilience, and allocate sufficient resources and management attention to support these practices, ensuring effective implementation and sustainability. In addition, a multi-stakeholder approach involving government agencies, private sector entities, residents, and policymakers is crucial for developing effective flood mitigation strategies that require collaborative efforts to enhance resilience and reduce flood-related risks in southwest Nigeria.

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