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ASSESSING TREE DIVERSITY, REGENERATION POTENTIAL AND ENVIRONMENTAL THREATS IN SHASHA FOREST RESERVE, NIGERIA: A REVIEW OF CHALLENGES AND CONSERVATION METHOD

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ABSTRACT

Forest reserves in southwestern Nigeria are important repositories of tree biodiversity, but their ecological integrity is increasingly challenged by agricultural encroachment, illegal tree cutting, settlement, hunting, grazing and fire. This study assessed tree diversity, regeneration potential and anthropogenic pressures in Shasha Forest Reserve, Osun State, Southwestern Nigeria. The reserve was divided into four locations representing the north, east, west and south, and 50 m × 50 m sample plots were used for field assessment. Tree species occurrence, density and regeneration were assessed, while saplings (DBH < 10 cm and height > 1 m) and wildlings (height < 1 m) were enumerated. Diversity and evenness indices were calculated, while one-way analysis of variance (ANOVA) and Least Significant Difference (LSD) at 5% probability level were used for comparison. The results showed considerable spatial variation in tree species representation. White Afara (*Terminalia ivorensis*) was consistently dominant, with density values of 5.50, 8.50, 24.00 and 19.00 across Locations 1–4, respectively. Cotton Tree (*Ceiba pentandra*) recorded 3.25 and 6.25 in Locations 1 and 2, while Epin (*Ficus exasperata*) recorded 17.00 and 15.50 in Locations 3 and 4, respectively. Natural regeneration was evident, although it varied among species and locations. White Afara recorded sapling values of 4.75, 2.75, 3.75 and 2.75 across the four locations, while its wildling values were 3.25, 2.75, 4.75 and 2.75, respectively. Generally, several species had higher wildling than sapling representation, indicating active early-stage recruitment but possible limitations in progression to the sapling stage. Cordia Wood, Abeere and Molagbaawo recorded relatively low sapling regeneration, with values as low as 0.75 in some locations. Anthropogenic pressures included illegal farming, settlement, hunting, tree cutting, grazing and fire. Cocoa cultivation accounted for 50%, 30% and 40% of reported activities in Locations 1, 2 and 3, respectively, while plantain accounted for 30%, 60%, 20% and 5% in Locations 1–4. The findings demonstrate that Shasha Forest Reserve retains substantial tree diversity and natural regeneration capacity, but uneven species representation and persistent anthropogenic disturbances may affect long-term forest sustainability. Species-specific regeneration support, protection of mature parent trees, control of agricultural encroachment and illegal activities, community participation and continuous monitoring are recommended.

Keywords: Tree Species, Diversity, Regeneration Potential, Environmental Threat, Forest Reserve, Challenges and Conservation Methods

INTRODUCTION

Forest reserves are essential components of biodiversity conservation because they maintain tree resources, ecological processes and ecosystem services within landscapes increasingly influenced by human activities. The global importance of forests for biodiversity and people is well established, while protected forests continue to face pressures associated with land-use change and degradation (FAO, 2020; Swenson *et al.,* 2020). In southwestern Nigeria, forest reserves represent important remnants of tropical forest vegetation and provide habitat for diverse plant communities. However, forest condition is strongly influenced by management history, disturbance, canopy structure, environmental variation and regeneration processes (Ayanlade *et al.,* 2021; Scherer-Lorenzen *et al.,* 2020). Tree diversity alone does not guarantee ecological sustainability. The ability of species to replace individuals lost through mortality and disturbance is equally important. Natural regeneration involves the establishment and development of young individuals through successive stages and its success is influenced by seed availability, dispersal, microsite conditions, competition, disturbance and climatic conditions. Recent studies in Shasha Forest

Reserve have demonstrated substantial tree diversity while also drawing attention to degradation and anthropogenic pressures (Ogunrinola *et al.,* 2023; Omidiwura *et al.,* 2025). This assesses both established trees and juvenile regeneration, particularly relevant to forest management. Shasha Forest Reserve forms part of the Omo-Oluwa-Shasha forest complex in Southwestern Nigeria and has experienced a history of logging and conversion of forest land to agricultural uses. Earlier and recent investigations have reported considerable tree diversity in the reserve, although the identity of dominant species and their relative abundance may differ among sampling locations and periods. Such differences highlight the spatial and temporal heterogeneity of tropical forests and the need for repeated field assessment. The present study therefore focuses on three linked questions: which tree species are most strongly represented, how effectively species are regenerating through sapling and wildling stages, and what anthropogenic pressures occur within the sampled portions of the reserve. The objective was to assess tree density and distribution, evaluate regeneration potential, identify environmental and anthropogenic factors affecting regeneration, and provide management information for sustaining tree diversity in Shasha Forest Reserve. The study is intended to provide a concise empirical baseline for conservation, restoration and adaptive forest management.

MATERIALS AND METHODS

The study was conducted in Shasha Forest Reserve in Ife South Local Government Area of Osun State, Southwestern Nigeria. The reserve lies within the Omo-Oluwa-Shasha forest complex and has an altitude of about 146 m above sea level. The study document describes the soil as ferruginous tropical soil on crystalline acidic rock and the topography as gently undulating. The climate is humid rainforest, with a rainy season extending approximately from February to November, a mean annual temperature of about 25.4 °C and mean annual relative humidity of about 85.04% (Adekunle *et al.,* 2013). Vegetation is classified as tropical lowland rainforest. The reserve was created in 1925 and has experienced pressure from logging and agricultural conversion.

Sampling Design and Data Collection

The reserve was divided into four broad locations (North, East, West and South), with 50 m × 50 m sample plots established for vegetation assessment. Field equipment included a GPS device, measuring and diameter tapes, tree tags and markers, compass, ranging poles and field notebook. Geographic coordinates were recorded for the sampling locations during the surveys. The locations ranged from 7.095461–7.122795°N and 4.390271–4.409568°E.

Tree Diversity, Regeneration Assessment and Environmental Threats

Trees occurring in the sample plots were identified to species level where possible and their density was assessed. Shannon-Wiener diversity (H′), Shannon evenness (J) and Margalef species richness (D) were used in the original study. Saplings were defined as individuals with DBH < 10 cm and height > 1 m, whereas wildlings were individuals below 1 m in height. Regeneration status was interpreted from the relative occurrence of wildlings, saplings and adult trees using the categories good, fair and poor/none. The study also recorded signs of disturbance, including farming, hunting, illegal settlement, logging, grazing and fire.

Statistical Analysis

One-way analysis of variance (ANOVA) was used to compare diversity across sample plots, while correlation analysis was used between adult trees and regeneration counts. Significant means were separated using the Least Significant Difference (LSD) test at the 5% probability level. The regeneration-potential framework in the source document also expressed regeneration potential as $RP = S \times G \times V / C$, where S is the number of viable wildlings or saplings, G is germination rate, V represents vegetative cover or soil quality, and C is competition.

RESULTS

Global Positioning System (GPS) for Research Locations

The Global Positioning System (GPS) was used to identify and show the coordinates of the four chosen locations, which are (North, East, South, and West) within the Shasha Forest Reserve, Latitude, Longitude, and Altitude of locations one, two, three, and four within shasha forest reserve as shown in Table 1.

Tree Diversity and Species Representation

The tree community showed substantial variation in diversity among species in chosen locations. White Afara (*Terminalia ivorensis*) had the highest recorded density (5.50), followed by Cotton Tree (Ceiba pentandra; 3.25). Bark Cloth Tree (*Antiaris africana*), Ayinre Weree (*Albizia adianthifolia*) and African Celtis (*Celtis mildbraedii*) each recorded 2.75. Cordia Wood

(*Cordia africana*) was the least represented at 0.75; in location 2, White Afara increased to 8.50 and Cotton Tree to 6.25, while Cordia Wood fell to 0.00. The assessment showed a different magnitude of representation. White Afara reached 24.00 in location 1, followed by Epin (*Ficus exasperata*) and Omoo (*Ficus spp*.) at 17.00 each, while Itaa (*Celtis mildbraedii*) and Iree (*Nauclea latifolia*) recorded 15.50 each. Ewe Ijan (*Gongronema latifolium*) recorded 1.00, while Aahun (*Afzelia africana*), Asunfeyeje (*Bridelia ferruginea*) and Black Afara (*Terminalia superba*) recorded 2.00 each. In location 4, White Afara declined to 19.00, whereas Ayinre increased to 18.00; Omoo and Epin were 15.50 each, and Iree was 14.50. Natural regeneration was substantial but uneven among species. In location 1, White Afara recorded the highest sapling regeneration value (4.75), followed by Cotton Tree (3.25), while Cordia Wood, Abeere and Molagbaawo each recorded 0.75. In location 2, White Afara increased to 5.75 and Cotton Tree to 5.00; Sand Paper Tree increased from 1.75 to 5.50. Wildlings were generally more abundant than saplings. In location 1, Cotton Tree recorded 4.25 wildlings, while White Afara had 3.25. In location 2, White Afara increased to 12.00, Cotton Tree to 11.75, African Celtis to 10.75 and Sand Paper Tree to 10.00. The contrast between regeneration stages was clearer in the combined locations comparison. White Afara had 5.25 saplings compared with 7.62 wildlings; Cotton Tree had 4.12 saplings compared with 8.00 wildlings; African Celtis had 3.50 saplings compared with 7.00 wildlings; and Sand Paper Tree had 3.62 saplings compared with 6.62 wildlings. In locations 3 and 4, regeneration values were higher for several leading species. White Afara recorded 11.00 saplings and 22.50 wildlings, Ayinre 11.12 saplings and 22.00 wildlings, Itaa 10.12 saplings and 20.00 wildlings, and Omoo 9.75 saplings and 21.50 wildlings. Conversely, Aahun, Asunfeyeje and Oganwo consistently showed very low regeneration values as shown in Tab 2.

Regeneration Potential of Saplings

It shows that White Afara recorded the highest sapling regeneration across the four locations, with values of 4.75, 2.75, 3.75 and 2.75 in Locations 1–4, respectively. Its values were significantly higher than those of species carrying the superscript b, particularly Cordia Wood, Abeere and Molagbaawo, which recorded comparatively low values. The relatively high sapling abundance of White Afara suggests that the species has a strong capacity for recruitment into the sapling stage within the sampled portions of Shasha Forest Reserve. Cotton Tree, Bark Cloth Tree, Ayinre Weree, African Celtis, African White Wood and Rubber Tree also demonstrated relatively good sapling regeneration, although their values were generally lower than those of White Afara. Cotton Tree recorded 3.25 in Location 1 but declined to 1.25 in Location 2 and Location 4. Similarly, Ayinre Weree decreased from 2.75 in Location 1 to 0.75 in Locations 2 and 4. This spatial variation indicates that regeneration success differs among locations, possibly reflecting differences in site conditions, disturbance levels, seed availability and competition. The lowest sapling regeneration was recorded for Cordia Wood, Abeere and Molagbaawo, with values of 0.75 in Location 1 and Location 3, compared with 1.75 in Locations 2 and 4. Although their numerical values varied among locations, the superscript b indicates that their means differed significantly from the species represented by superscript a. The generally low sapling representation of these species may indicate weak recruitment or greater difficulty in progressing from the wildling stage to established saplings. This indicates that sapling regeneration in Shasha Forest Reserve is species-specific and spatially variable. White Afara emerged as the strongest regenerating species at the sapling stage, while Cordia Wood, Abeere and Molagbaawo showed relatively poor regeneration. This pattern suggests that conservation efforts should not focus only on total numbers of regenerating trees but should also consider species-specific recruitment, particularly for species with consistently low sapling representation as shown in Tab 3.

Regeneration Potential of Wildlings

This demonstrated that wildling regeneration was generally higher and more widespread than sapling regeneration for many of the species assessed. White Afara recorded 3.25, 2.75, 4.75 and 2.75 wildlings in Locations 1–4, respectively. Cotton Tree also showed relatively high values, particularly in Location 1 (4.25) and Location 3 (3.25). Bark Cloth Tree, African Celtis, Rubber Tree, African Walnut and Sand Paper Tree similarly recorded appreciable wildling populations. The relatively high abundance of wildlings indicates that early-stage recruitment is occurring actively within the reserve. Species such as White Afara, Cotton Tree, African Celtis and Rubber Tree showed relatively strong establishment at the wildling stage. However, the presence of many wildlings does not necessarily mean that these individuals will successfully develop into saplings and eventually mature trees. Factors such as competition, grazing, fire, agricultural activities and other disturbances may affect their subsequent survival and growth. Some species recorded relatively low wildling values. For

example, Fig Tree and African Nutmeg recorded particularly low values in Locations 2 and 4, while Cordia Wood recorded 0.25 in Location 2 and Location 4. Iroko and Molagbaawo also displayed relatively low values in some locations, as shown in Tab 4.

Environmental Threats

The recorded pressures included illegal farming, illegal settlement, hunting, wood cutting or "flinching," grazing, fire burning and environmental changes, including the observed disappearance of a water body. Their distribution differed among locations. Location 1 was associated with illegal hunting, farming, settlement, wood cutting and environmental change. Location 2 was dominated by settlement, cocoa cultivation and hunting. Location 3 experienced cocoa and cocoyam cultivation, hunting and burning, while Location 4 was characterized mainly by settlement and cultivation of cassava, maize, plantain and pawpaw. Agricultural activities were prominent. Cocoa represented 50% of reported activities in Location 1, 30% in Location 2 and 40% in Location 3. Plantain accounted for 30%, 60%, 20% and 5% in Locations 1–4, respectively. Cocoyam contributed 10% in Location 2 and 30% in Location 3, while maize contributed 5% in Location 3 and 40% in Location 4. Cassava and pawpaw contributed 30% and 10%, respectively, in Location 4. Grazing accounted for 5% of activities recorded in Location 1, while settlement was reported at 5% in Location 1 and 10% in Location 4, as shown in Tables 5 and 6.

DISCUSSION

The findings demonstrate that Shasha Forest Reserve retains considerable tree diversity, but species are unevenly represented. The repeated dominance of White Afara indicates strong representation of *Terminalia ivorensis* within the sampled portions of the reserve. However, the result should not be generalised to the entire reserve because sampling locations differed. Differences in dominant species between inventories are also expected in heterogeneous tropical forests. Ogunrinola *et al.,* (2023) reported 60 species and 23 families from 644 individuals in Shasha, with *Rauvolfia vomitoria* as the predominant species and a Shannon-Wiener index of 3.855. The difference from the present dominance of White Afara reinforces the importance of sampling location, forest compartment and disturbance history when interpreting tropical forest inventories. The study revealed a positive but uneven regeneration pattern in Shasha Forest Reserve. The occurrence of both saplings and wildlings indicates that the forest possesses an active natural regeneration process. However, the generally higher representation of wildlings compared with saplings suggests that recruitment is stronger in some locations. The results are important for forest management because species with high wildling and sapling regeneration, such as White Afara, appear to have relatively strong recruitment potential and should be protected from unnecessary disturbance. Conversely, species with low regeneration values, including Cordia Wood, Abeere and Molagbaawo, may require targeted conservation measures such as protection of parent trees, enrichment planting and reduction of disturbances around regeneration sites. The regeneration results are encouraging because the reserve contains a substantial pool of young trees. The consistently higher wildling values relative to saplings indicate active early recruitment but also suggest that not all newly established individuals progress into larger regeneration classes. This transition may be influenced by competition, herbivory, moisture stress, pathogens and physical disturbance. Omidiwura *et al.,* (2025) similarly identified environmental conditions, seed dispersal, seed banks and sapling development as important to diversity and regeneration in Shasha and highlighted illegal logging and unsustainable agriculture as threats. The present results therefore strengthen the case for protecting both seed sources and the regeneration layer. White Afara increased from 3.25 to 12.00 wildlings, while Cotton Tree increased from 4.25 to 11.75. The study also notes that sampling locations were not identical and anthropogenic pressure is a major management concern. Agricultural encroachment can remove parent trees and destroy wildlings and saplings during land preparation, while repeated cultivation can prevent tree recruitment. Illegal settlement can generate additional vegetation clearing, fuelwood collection, farming and hunting. Illegal wood cutting directly reduces mature trees and can create recruitment bottlenecks. Fire was recorded in association with agricultural activities, while grazing may damage young plants through browsing and trampling. These observations agree with Ogunrinola *et al.,* (2023) and Omidiwura *et al.*, (2025), who identified anthropogenic disturbance and degradation as persistent threats in Shasha Forest Reserve. The findings also support a management approach that is species-specific and location-specific. Species such as White Afara, Ayinre, Omoo and Itaa currently show strong juvenile

representation and should be protected from excessive exploitation. Conversely, species with consistently low regeneration, including Aahun, Asunfeyeje, Oganwo and other poorly represented taxa, require targeted conservation attention. Chazdon (2014) emphasised that tropical forest restoration should support recovery of appropriate native species and ecological processes rather than simply increasing tree numbers. This principle is particularly relevant to Shasha Forest Reserve, where maintaining species composition is as important as maintaining overall abundance.

CONCLUSION

The findings of this study demonstrate that Shasha Forest Reserve retains considerable tree diversity and an active natural regeneration process, although the distribution and regeneration of tree species vary considerably among the four sampled locations. White Afara (*Terminalia ivorensis*) emerged as the most consistently represented species, recording density values of 5.50, 8.50, 24.00 and 19.00 across Locations 1–4, respectively. Other species, including Cotton Tree, Ayinre, Epin and Omoo, also showed substantial representation in some locations, whereas several species occurred at relatively low densities. This spatial variation indicates that tree species composition within the reserve is not uniform and may be influenced by differences in site conditions and disturbance history. The regeneration results further established that natural recruitment is occurring within the reserve. Both saplings and wildlings were recorded for several species, with wildlings generally showing greater representation than saplings. White Afara recorded sapling values of 4.75, 2.75, 3.75 and 2.75 across Locations 1–4, while its wildling values were 3.25, 2.75, 4.75 and 2.75, respectively. Other species, particularly Cotton Tree, African Celtis, Ayinre Weree and Rubber Tree, also demonstrated appreciable regeneration at the juvenile stages. However, the relatively lower representation of some species, particularly Cordia Wood, Abeere and Molagbaawo, indicates that regeneration success is species-specific. The greater occurrence of wildlings than saplings for several species also suggests that early recruitment is taking place, but not all newly established individuals may successfully progress to the sapling stage. The study further established that anthropogenic activities constitute important pressures on the forest and its regeneration processes. Illegal farming, agricultural encroachment, illegal settlement, hunting, tree cutting, grazing and fire were recorded across the sampled locations. Cocoa cultivation accounted for 50% of reported activities in Location 1, 30% in Location 2 and 40% in Location 3, while plantain cultivation accounted for 30%, 60%, 20% and 5% in Locations 1–4, respectively. These activities can reduce mature tree populations, disturb regeneration sites and interfere with the transition of wildlings and saplings into established trees. Conclusively, Shasha Forest Reserve possesses an important pool of tree species and demonstrates considerable natural regeneration potential, but the sustainability of this diversity depends on the protection of both mature trees and juvenile regeneration. The findings therefore support a species-specific and location-specific management approach. Species with strong regeneration, such as White Afara, should be protected from unnecessary exploitation, while species showing consistently low regeneration should receive targeted conservation attention, including protection of parent trees and, where necessary, assisted or enrichment regeneration. Effective control of agricultural encroachment and other illegal activities, combined with community participation and long-term monitoring, will be essential for maintaining tree diversity, improving regeneration success and sustaining the ecological integrity of Shasha Forest Reserve.

RECOMMENDATIONS

Protect mature parent trees, especially individuals of poorly represented species and important seed producers.

Protect wildling and sapling patches from grazing, trampling, fire, agricultural clearing and illegal cutting.

Strengthen control of agricultural encroachment, particularly cocoa, plantain, cocoyam, maize, cassava and pawpaw cultivation.

Increase patrols and enforcement against illegal tree cutting, settlement and hunting.

Apply location-specific management because disturbance patterns differ among the four sampled locations.

Use enrichment planting or assisted regeneration for species with persistently poor recruitment, prioritizing indigenous species.

Maintain diverse canopy and microsite conditions so that species with different ecological requirements can regenerate.

Promote community participation and environmental education to reduce dependence on illegal forest exploitation.

Establish permanent sample plots and continue annual monitoring of recruitment, growth, mortality and species composition.

Table 1: Global Positioning System (GPS) for Research Locations

Table 1: Global Positioning System (GPS) for Research Locations

Coordinate	Latitude	Longitude	Altitude
L1	7.119612	4.406108	521ft
L2	7.105073	4.39916	466ft
L3	7.108155	4.390357	548ft
L4	7.113288	4.38582	496ft

(Source: Field Survey, 2026)

Table 2: Selected Tree Diversity Values in Four Locations

Species	L1	L2	L3	L4
White Afara	5.50	8.50	24.00	19.00
Cotton Tree	3.25	6.25	—	—
Ayinre	2.75	5.00	13.00	18.00
Cordia Wood	0.75	0.00	—	—
Epin	—	—	17.00	15.50

(Source: Field Survey, 2026)

Table 3: Regeneration Potential of Saplings in Four Locations

Trees Species	L1	L2	L3	L4
White Afara	4.75^{a}	2.75^{a}	3.75^{a}	2.75^{a}
Cotton Tree	3.25^{ab}	1.25^{ab}	2.25^{ab}	1.25^{ab}
Bark Cloth Tree	2.75^{ab}	1.75^{ab}	1.75^{ab}	1.75^{ab}
Ayinre Weree	2.75^{ab}	0.75^{ab}	1.75^{ab}	0.75^{ab}
African Celtis	2.75^{ab}	1.75^{ab}	1.75^{ab}	1.75^{ab}
African White Wood	2.50^{ab}	1.50^{ab}	1.50^{ab}	1.50^{ab}
Rubber Tree	2.50^{ab}	1.50^{ab}	1.50^{ab}	1.50^{ab}
African Walnut	2.00^{ab}	1.00^{ab}	1.00^{ab}	1.00^{ab}
Sand Paper Tree	1.75^{ab}	0.75^{ab}	1.75^{ab}	0.75^{ab}
African Mango	1.75^{ab}	0.75^{ab}	1.75^{ab}	0.75^{ab}
African Teak	1.50^{ab}	0.50^{ab}	1.50^{ab}	0.50^{ab}
Iroko	1.50^{ab}	0.50^{ab}	1.50^{ab}	0.50^{ab}
Omoo	1.50^{ab}	0.50^{ab}	1.50^{ab}	0.50^{ab}
Stink Wood	1.50^{ab}	0.50^{ab}	1.50^{ab}	0.50^{ab}
Pepper Fruit	1.25^{ab}	0.25^{ab}	1.25^{ab}	0.25^{ab}
Fig Tree	1.25^{ab}	0.25^{ab}	1.25^{ab}	0.25^{ab}
African Nutmeg	1.25^{ab}	0.25^{ab}	1.25^{ab}	0.25^{ab}
Cordia Wood	0.75^{b}	1.75^{b}	0.75^{b}	1.75^{b}
Abeere	0.75^{b}	1.75^{b}	0.75^{b}	1.75^{b}
Molagbaawo	0.75^{b}	1.75^{b}	0.75^{b}	1.75^{b}

Means with the same superscript(s) are not significantly different along the column

Table 4: Regeneration Potential of Wildlings

Trees Species	L1	L2	L3	L4
White Afara	3.25^{a}	2.75^{a}	4.75^{a}	2.75^{a}
Cotton Tree	4.25^{a}	1.25^{ab}	3.25^{ab}	1.25^{ab}
Bark Cloth Tree	2.75^{a}	1.75^{ab}	2.75^{ab}	1.75^{ab}
Ayinre Weree	2.5^{a}	0.75^{ab}	2.75^{ab}	0.75^{ab}
African Celtis	3.25^{a}	1.75^{ab}	2.75^{ab}	1.75^{ab}
African White Wood	3.00^{a}	1.50^{ab}	2.50^{ab}	1.50^{ab}
Rubber Tree	3.50^{a}	1.50^{ab}	2.50^{ab}	1.50^{ab}
African Walnut	3.25^{a}	1.00^{ab}	2.00^{ab}	1.00^{ab}
Sand Paper Tree	3.25^{a}	0.75^{ab}	1.75^{ab}	0.75^{ab}
African Mango	0.50^{a}	0.75^{ab}	1.75^{ab}	0.75^{ab}
African Teak	2.00^{a}	0.50^{ab}	1.50^{ab}	0.50^{ab}
Omoo	2.25^{a}	0.50^{ab}	1.50^{ab}	0.50^{ab}
Stink Wood	2.25^{a}	0.50^{ab}	1.50^{ab}	0.50^{ab}
Pepper Fruit	1.75^{a}	0.50^{ab}	1.50^{ab}	0.50^{ab}
Fig Tree	0.75^{a}	0.25^{ab}	1.25^{ab}	0.25^{ab}
African Nutmeg	2.00^{a}	0.25^{ab}	1.25^{ab}	0.25^{ab}
Cordia Wood	1.25^{a}	0.25^{ab}	1.25^{ab}	0.25^{ab}
Iroko	1.00^{a}	1.75^{b}	0.75^{b}	1.75^{b}
Molagbaawo	0.50^{a}	1.75^{b}	0.75^{b}	1.75^{b}
Abeere	1.75^{a}	1.50^{a}	1.25^{a}	1.75^{b}

Means with the same superscript(s) are not significantly different along the column.

Table 5: Factors Responsible for Deforestation that lead to the loss of Tree diversity

Locations	Cause of Deforestation and Forest Degradation
L1	Illegal hunting, Illegal farming activities by unauthorized farmers, Illegal settlers, illegal felling, Environmental impacts (Disappearance of water bodies)
L2	Illegal settlers, Illegal planting of cocoa trees, Illegal hunting
L3	Illegal planting of cocoa and cocoyam by unauthorized farmers, Illegal hunting, Burning of Tree species
L4	Illegal settlers, Illegal planting of cassava, maize, plantain, and pawpaw

(Source: Field Survey, 2026)

Table 6: Farming and Other Illegal Activities that Influence Inadequate Regeneration Potential of Trees in the Study Locations (%)

Farming & Illegal Activities	L1	L2	L3	L4
Grazing	5	-	-	-
Settlers	5	-	-	10
Cocoa	50	30	40	-
Plantain	30	60	20	5
Hunting	10	-	-	-
Cocoyam	-	10	30	-
Maize	-	-	5	40
Fire burning	-	-	5	5
Cassava	-	-	-	30
Pawpaw	-	-	-	10

(Source: Field Survey, 2025)

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