

Evidence-based assessment of threatened and endangered tree species and their economic importance in Akamkpa Local Government Area of Cross River State, Nigeria



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ABSTRACT

The study presents an evidence-based assessment of threatened and endangered tree species and their economic importance in Akamkpa Local Government Area of Cross River State, Nigeria. A total of 200 respondents comprising farmers, hunters, wood traders, forestry experts, wood loggers, charcoal producers, non-timber forest product (NTFP) harvesters, traditional healers, fuelwood collectors, and researchers were proportionally selected using simple random sampling techniques. Data were collected through structured questionnaires and analysed using descriptive statistics, standard deviation, and standard error. The socio-economic characteristics showed that respondents aged 50 years and above constituted the majority (55.0%). Awareness of threatened and endangered species was high (78.5%), while 89.0% acknowledged the presence of endangered species. Most respondents (71.5%) reported that tree species were “much less available,” indicating a significant decline. Monitoring activities were largely absent (89.0%), although identification indicators (83.0%) and traditional knowledge of species names were widely recognised. Regeneration was mainly through seed propagation (79.0%). Forest resources were found to be economically, socially, and culturally important, with strong dependence on timber and non-timber products. Major drivers of forest endangerment included charcoal production (29.5%), agriculture (29.0%), logging (27.0%), and bush burning (9.0%). Conservation efforts, community rules, and NGO support were minimal, which has hindered effective management and protection of the forest resources in the area. The study highlights species decline, environmental changes, and increasing forest product scarcity as critical indicators requiring urgent, sustainable forest management interventions in the Akamkpa Local Government Area of Cross River State.

Keywords: Threatened, endangered, economically important trees species, Akamkpa

INTRODUCTION

The Cross River Rainforest in Nigeria is recognised as a significant biodiversity hotspot, harbouring numerous endemic and threatened tree species vital for both ecological balance and local livelihoods (Ite, 2019). Forest tree species in Akamkpa Local Government Area play a crucial role in maintaining ecosystem stability and biodiversity. They contribute to soil stabilisation, preventing erosion and maintaining soil fertility, which is vital for both

forest health and agricultural productivity (Chazdon *et al.*, 2008). These trees regulate local water cycles by influencing rainfall patterns and water retention, helping to sustain freshwater resources for both wildlife and human use. Furthermore, many tree species provide critical habitats and food for diverse animal populations, supporting rich biodiversity within the Cross River Rainforest (Onyekwelu *et al.*, 2015). Importantly, these forests act as significant carbon sinks, sequestering

atmospheric carbon dioxide and mitigating the effects of climate change locally and globally. The continued decline of tree populations due to deforestation and habitat fragmentation not only threatens these ecological functions but also contributes to global environmental challenges (Ite, 2019; Chazdon *et al.*, 2008).

The forests of Akamkpa are a vital economic resource for local communities, providing a wide range of timber and non-timber products that serve as sources of income and sustenance. Valuable timber species such as mahogany (*Khaya ivorensis*), ebony (*Diospyros crassiflora*), and African cherry (*Prunus africana*) are widely used in construction, furniture-making, and traditional medicine, with the latter having high pharmacological and market value (Aiyeloja and Ajewole, 2006; Ogar *et al.*, 2014). Non-timber forest products, including fruits, nuts, spices, and medicinal plants, contribute significantly to household food security and health while also supporting small-scale trade in local and external markets (Okunlola and Akinyele, 2015). However, the overexploitation of these resources driven by illegal logging and agricultural expansion threatens to deplete these economic assets, undermining the livelihoods of forest-dependent populations and increasing poverty risks (Arowosoge and Popoola, 2006; IUCN, 2020).

To address the ongoing threats to forest tree species in Cross River State, Nigeria has implemented policies such as the National Forest Policy and established protected areas like the Cross River National Park. These efforts aim to regulate resource use, conserve

biodiversity, and promote sustainable forest management (FAO, 2020; World Wildlife Fund, 2018). However, challenges including weak enforcement, limited community participation, and socio-economic pressures continue to hamper effective conservation outcomes (Ogar *et al.*, 2014). Illegal logging persists due to high timber demand, and agricultural encroachment further fragments habitats, while infrastructure development opens previously inaccessible forest areas to exploitation (IUCN, 2022; Arowosoge and Popoola, 2006). Strengthening governance, increasing local community involvement, raising awareness of the ecological and economic importance of forests, and applying evidence-based management practices are critical to reversing these trends and ensuring the long-term sustainability of forest resources in Akamkpa and the broader Cross River region.

MATERIALS AND METHODS

Study area

The study location is in Akamkpa Local Government Area (LGA) in Southern Cross River State, Nigeria, with a projected population of approximately 228,000 as of 2022, with a land area of 4,586 km² according to the Nigerian population census, projected (NPC, 2022). It lies between latitudes 5°00' and 5°57'N and longitudes 8°06' and 9°00'E (Fig. 1). The area is characterised by dense forests, diverse flora and fauna, and a humid tropical climate with distinct wet and dry seasons. The vegetation in Akamkpa predominantly consists of tropical rainforest species, including both hardwood and softwood trees, many of which are economically and ecologically important.

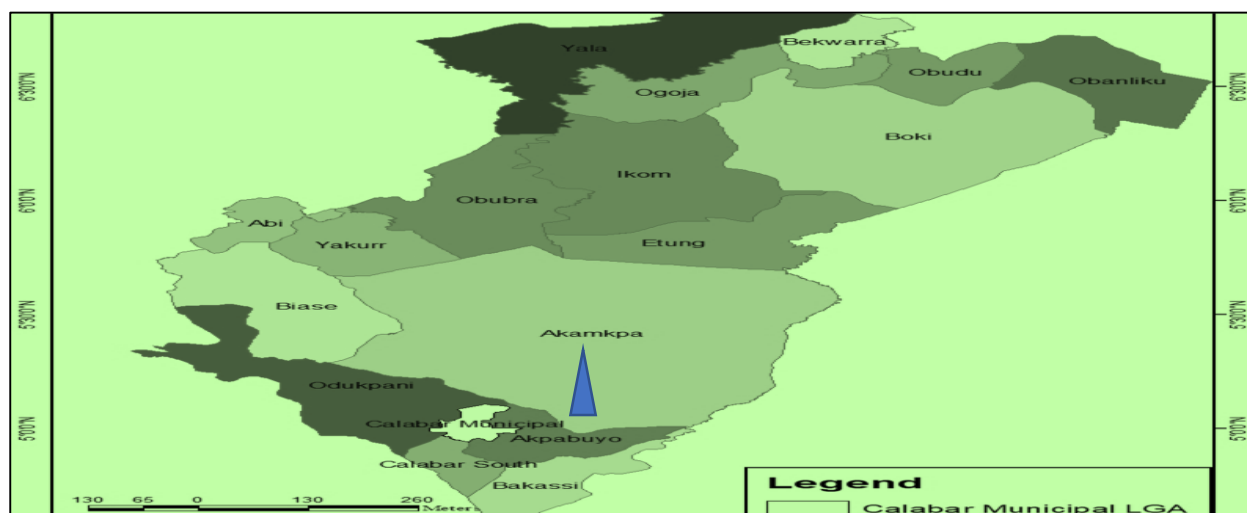


Figure 1: Map of Cross River State showing Akamkpa LGA

Sampling and data collection

The population of interest in the study are residents of Akamkpa LGA (especially those living in or near forested areas), farmers, hunters, wood traders/timber dealers, professionals/experts, timber loggers, Non-Timber Forest Product (NTFP) harvesters, traditional healers, fuelwood collectors, charcoal producers, ecotourism operators, researchers and local communities. Ten (10) political wards in the study area were proportionally selected, namely Akamkpa Urban, Uyanga, Ikpei, Awi, Mbarakom, Ojuk South, Ojuk North, Oban, Netin and Erei for distribution of the data instrument (questionnaire). The population was sampled using equation 1.

$$nh = \frac{Nh}{N!} = n \dots \dots \text{Eqn. 1}$$

Where;

nh = sample size

Nh = population size of stratum

N = total sample size

Data were gathered using pretested questionnaires administered through field surveys, observations, and interviews. Species

were classified according to their conservation status, population trends, and their ecological, economic, and cultural significance.

Data analysis

Data were analysed descriptively using version 20.0 of the IBM Statistical Package for the Social Sciences (SPSS).

RESULTS AND DISCUSSION

Socio-economic characteristics of participants

As illustrated in Table 1, the socio-economic data underscores the varied backgrounds of the individuals participating in the study. The majority of respondents were 50 years and above (55%), and 9.5% were below 20 years. This showed that knowledge about threatened, vulnerable and endangered trees is mainly concentrated among the older generation, who had lived long enough to observe changes in tree abundance in the study area and forest conditions. This concurs with Lindenmayer and Laurance (2017) and Qin (2015), who claim that large old trees are susceptible to an array of threats by any generation that understands their potential and utilisation.

Table 1: Socio-economic characteristics of participants

Variables	Frequency (N=200)	Percentage (%)	Standard deviation	Standard error of mean
Age				
0-20	19	9.5	3.17	0.22
21-30	26	13.0		
31-40	22	11.0		
41-50	22	11.0		
50 years	110	55.0		
Gender				
Male	158	79.0	0.4	0.02
Female	42	21.0		
Educational Level				
No Formal	151	75.5	0.75	0.02
Primary	31	15.5		
Secondary	10	5.0		
Tertiary	8	4.0		
Occupation				
Farmer	141	70.5	0.89	0.06
Logger	23	11.5		
Hunter	27	13.5		
Professional	9	4.5		
Residence period				
less than 5 years	111	52.1	0.89	0.06
5-10 years	27	12.7		
over 10 years	62	29.1		

The relatively high standard deviation (3.17) and low error (0.22) confirm that the sample captures a wide age range but with reliable accuracy. Male-dominated in forest activities, 79% male and 21% female respondents. The skew reflects the male dominance in occupations linked to forestry, farming, and wood logging. The small standard deviation (0.4) and higher error (0.02) suggest a relatively homogeneous gender response pattern but less balance in representativeness, which agrees with Ogeh (2023) and Krishna's (2007) position that more males are engaged in forest-connected activities than their female counterparts because of their labour-intensive nature. 75.5% of respondents had no formal education, while only 4% attained tertiary education. This indicates limited literacy and constrained awareness of conservation policies, sustainable forestry practices, and modern ecological management. The strong reliance on local ecological practices shows that informal knowledge is in charge. Most of the people surveyed were farmers, making up 70.5% of the total. Next were hunters, who accounted for 13.5%. Then came wood loggers with 11.5%, and professionals made up the remaining 4.5%. This highlights the reliance of the local economy on land-based and forest-related activities. This reliance puts pressure on endangered tree species, but it also shows how important these trees are for the people living in the study area, as they rely on them for their daily lives and income. Over half of the people surveyed (52.1%) have lived in the area for less than five years, and 29.1% have been there for more than ten years. Long-term residents are more likely to provide reliable knowledge about the decline or disappearance of particular tree species. The mix of newer and older residents adds different perspectives to the data, but a large number of short-term settlers might weaken the traditional knowledge about the environment. This could lead to a focus on reducing conservation efforts in the area, as reported by Qiu (2015).

Level of awareness of threatened, vulnerability and endangered (TVE) tree species in the study area

The results in table 2 indicated that 78% of respondents were aware of the existence of endangered tree species in the area. The relatively low standard deviation (0.42) and error (0.03) suggest consistent responses across

the sampled population. According to Macura *et al.* (2011), this level of awareness is encouraging, as it means most community members recognise threats to forest biodiversity. However, the 22.5% unaware indicates a knowledge gap that may undermine conservation practices if not addressed through sensitisation. An overwhelming 89.0% of respondents acknowledged the presence of endangered tree species, compared to only 11% who did not. As concurred by Bosu *et al.* (2020), indigenous tree species are under attack. This showed a widespread recognition of species such as *Azalia africana* (African mahogany), *Milicia excelsa* (iroko), *Khaya ivorensis* (African mahogany), and *Entandrophragma cylindricum* (sapele), which are under severe pressure due to logging, farming, and settlement expansion. The low error (0.02) suggests a strong consensus. When asked about the extent of endangered species' availability, 71.5% reported "much less available", and 6.0% considered them still available. Pare (2008) perceived that these species that disappear often are considered to be economically important. This indicates that most respondents perceived a significant decline in population density of these trees over time. The standard deviation (0.31) and error (0.06) highlight consistency in perceptions across respondents. The responses align with evidence of rapid deforestation and unsustainable harvesting in Akamkpa, a forest-rich zone within Cross River State. Only 11.0% of the people who answered said their communities actively watch over things, but most of them, which is 89.0%, said there isn't any official way to check on things. This lack of monitoring makes the risk of extinction worse, because there are no good ways to check if the efforts to restore or protect the species are working. It also indicates weak enforcement of forestry regulations and limited involvement by conservation agencies. Most of the people surveyed, which is 83%, said they use signs that can help identify a species' decline, like fewer numbers, a harder time catching them, smaller areas where they regrow, or reliance on certain environments. However, 17% said they don't know about these signs. This means that people in the community have valuable knowledge about the environment that has been passed down through generations. This knowledge can help science-based systems keep track of the environment better if it is used in the right way.

Respondents identified seed regeneration as the most common method of natural recruitment, with 79.0%, indicating that many endangered species rely heavily on natural seed dispersal for population recovery. Stem regeneration (10.5%), often occurring in species resilient to

logging or fire disturbances, and budding regeneration (10.0%), less common but significant for certain hardwoods. The fact that seeds can regrow shows that if the mother trees are lost or too much is taken, it really hurts the chance of these species coming back.

Table 2: Awareness of threatened, vulnerable and endangered tree species in Akamkpa LGA

Variables	Frequency (N=200)	Percentage (%)	Standard deviation	Standard error of mean
Are you Aware of endangered tree species				
Yes	157	78.5	0.41	0.03
No	43	21.5		
Trees species threatened, vulnerable and endangered				
Yes	178	89.0	0.31	0.02
No	22	11.0		
Compared to a decade ago, how available are these tree species in Akamkpa LGA				
much less available	143	71.5	0.86	0.06
Slightly available	32	16.0		
the same in availability	13	6.5		
Slightly available	12	6.0		
Form of Monitoring by the community of these tree species				
Yes	22	11.0	0.31	0.02
No	178	89.0		
Indicators by communities in identifying TVE tree species				
Yes	166	83.0	0.37	0.02
No	34	17.0		
Means of Recovering TVE tree species				
Seed regeneration	158	79.0	0.65	0.04
Stem regeneration	21	10.5		
Budding	21	10.0		

TVE= Threatened, vulnerability and endangered

Economic, social and cultural importance of threatened, vulnerable and endangered tree species

The significance of threatened, vulnerable, and endangered tree species—economically, socially, and culturally—to the participants is presented in Table 3. Most participants who answered (78.0%) said that endangered and threatened tree species help them earn a living, but 22.0% said they do not. The small error margin of 0.02 shows that this result is very accurate. This highlights the significant dependence of rural households on forest resources for agriculture, logging, and

subsistence activities. Based on what Lax and Kothke (2017) found, people rely too much on forests for their income, both from farming and from selling forest products. This dependence emphasises the role of forests as an economic backbone while also highlighting the pressure placed on already declining species. Most people, 94.5%, said that forests help them earn money, while just 5.5% did not agree. This strong agreement (error 0.01) shows that threatened tree species are not only important for daily living but also provide money through activities like logging, selling firewood, medicinal plants, and other non-wood products.

This dependence, however, makes conservation difficult as households prioritise short-term economic gain over long-term sustainability, as shown in Table 3. Most participants (65.5%) said they were very concerned about the decrease in endangered animals, while 14% were somewhat concerned, 12.5% a little concerned, and 8% very worried. This showed that cutting down trees has big effects, especially when it comes to lower income, less food security, and fewer options for traditional medicine. The relatively even distribution among moderate, slight, and severe effects indicates the varying levels of reliance across households. Cultural practices are closely connected to forest resources. About 51% of people attend cultural ceremonies regularly,

34% do so very often, and only 2% say they attend often. This shows that forests and the endangered species in them are more than just materials people use. They are important parts of how communities see themselves, their beliefs, and their traditions. The loss of these trees could therefore erode traditions, weaken cultural heritage, and reduce the transfer of indigenous knowledge across generations. Most people, 71.5%, think that having other ways to make a living can help reduce reliance on species that are in danger, while 28.5% believe it won't make much of a difference. This means that actions like agroforestry, small businesses, ecotourism, and better farming methods might help keep ecosystems safe while also supporting the local economy.

Table 3: Economic, Social and Cultural Importance of threatened, vulnerable and endangered tree species

Variables	Frequency (N=200)	Percentage (%)	Standard deviation	Standard error of mean
Importance of TVE to livelihood				
Yes	156	78.0	0.46	0.02
No	44	22.0		
Income from selling forest products				
Yes	189	94.5	0.22	0.01
No	11	5.5		
Uses of forest products in the area				
Timber	68	34.0	1.40	0.09
Fuel wood	18	9.0		
Medicine	30	15.0		
Food	73	36.5		
Spiritual/Cultural	11	5.5		
Effects of TVE tree species to livelihood				
Strongly affected	131	65.5	0.99	0.07
Slightly affected	25	12.5		
Moderately affected	28	14.0		
Severely affected	16	8.0		
Uses of forest product for ceremonies				
Often	102	51.0	0.77	0.05
Very often	68	34.0		
Sometimes	26	13.0		
Sometimes	4	2.0		
Alternative livelihood of respondents				
Yes	143	71.5	0.45	0.03
No	57	28.5		

TVE= *threatened, vulnerable and endangered*

Factors contributing to forest endangerment in the study area

The results presented in Table 4 indicate that several factors contributed to forest depletion. Making charcoal accounted for 29.5%, closely followed by farming at 29.0%. These two factors were nearly equal in their impact. Logging came next, contributing 27.0%. While bush burning and the collection of fuelwood were not the primary activities leading to depletion, they still played a significant role. The high standard deviation (1.39) and error (0.09) indicate a wide range of responses, demonstrating that deforestation results from a complex interplay of economic and livelihood factors rather than a single activity. As stated by Kunkybe (2015), the variety of ways people earn a living in rural areas is connected to many different factors. Agriculture and charcoal production contribute to meeting household energy demands and farmland expansion, while logging continues to be a major commercial

cause of forest loss. Nearly every participant (98.0%) said there are logging companies in Akamkpa, and only a small number (2.0%) said there are not. This overwhelming response (error margin 0.00) highlights the dominant role of commercial logging in forest exploitation. Logging companies, which usually have access to big machines and support from politicians, help speed up the cutting down of valuable types of wood like *Milicia excelsa*, *Khaya ivorensis*, and *Afzelia africana*. A large majority, 84.5%, of the participants surveyed said that illegal actions like illegal cutting of trees, moving into protected areas without permission, and timber theft are main reasons why forests are in danger. This shows that forestry laws are not being properly enforced and there is corruption in how forests are managed. The standard deviation (0.36) suggests general agreement, while the higher error (0.22) indicates some variations in perception across respondents.

Table 4: Factors contributing to forest endangerment

Variables	Frequency (N=200)	Percentage (%)	Standard deviation	Standard error of mean
Causes of TVE tree species				
Logging	54	27.0	1.39	0.09
Agriculture	58	29.0		
Fuelwood collectors	11	5.5		
Charcoal production	59	29.5		
Bush burning	18	9.0		
Presence of Logging companies in the study area				
Yes	196	98.0	0.14	0.00
No	4	2.0		
Illegal harvesting TVE trees species				
Yes	169	84.5	0.36	0.22
No	31	15.5		
Community member involve in deforestation				
Yes	143	71.5	0.45	0.03
No	57	28.5		
Taboo rules				
Yes	70	35.0	0.47	0.03
No	130	65.0		
Enforce rules forbidden deforestation				
Yes	144	72.0	0.45	0.03
No	56	28.0		

TVE= *threatened, vulnerable and endangered*

Around 71.5% of the people surveyed said they agree that deforestation has occurred, while 28.5% said they do not. This means that even though most people know about a lot of forests disappearing, some might not realise how much changed, maybe has because they live in different places or rely on forests for their living. The low error rate of 0.03 shows that these results are dependable. Deforestation in Akamkpa is linked not only to logging and farming but also to settlement expansion and unsustainable fuelwood extraction. Only 35% acknowledged existing taboo rules that restrict access to certain forest areas or sacred tree species, while 65% reported none. This means that traditional ways of protecting the environment, which were once very strong, are now quickly weakening because of modern changes, business activities, and increasing population. This decrease weakens the local efforts that used to help keep biodiversity safe. Most people, 72.0%, said they think rules are in place to make sure people follow limits on how forests are used. However, 28.0% said they don't agree with that idea. Although formal rules exist, the persistence of illegal activities (84.5%) suggests that enforcement is weak or selective. This gap weakens sustainability because rules do not stop excessive use.

Conservation and sustainable management of TVE in the study area

The results in Table 5 showed an overwhelming absence of conservation efforts, with 98.0% of respondents reporting no conservation initiatives and only 2.0% acknowledging any form of effort. The low standard deviation (0.14) and error (0.00) confirm uniform responses across the population. This reveals a critical gap in practical conservation action, leaving endangered species highly vulnerable to exploitation in the area. As Lacher et al. (2025) concur, these gaps exist more probably because of inadequate conservation action. Only 6.5% of respondents reported receiving training related to conservation or sustainable forest management, compared to 93.5% without any training. This suggests that communities lack the technical knowledge and capacity to practise modern conservation strategies. The low error (0.01) reflects the reliability of this result. Without training, forest users may continue unsustainable practices like over-harvesting and indiscriminate logging. About 24.5% of respondents confirmed the presence of conservation programmes, while 75.5% reported none. This suggests that while some programmes may exist (likely introduced by forestry authorities or NGOs), they remain limited in scope, coverage, or effectiveness. The high percentage reporting “No” also indicates weak awareness or poor community involvement in these programmes.

Table 5: Conservation and sustainable management

Variables	Frequency (N=200)	Percentage (%)	Standard deviation	Standard error of mean
Any Conservation Effort in the study area				
Yes	4	2.0	0.14	0.00
No	196	98.0		
have you received any conservation training about TVE tree species				
Yes	13	6.5	0.24	0.01
No	187	93.5		
Are you willing to participate in any Conservation Programme about TVE tree species				
Yes	49	24.5	0.43	0.03
No	151	75.5		
Any community members involved in protecting TVE tree species				
Yes	5	2.5	0.15	0.01
No	195	97.5		
Does any Government t or NGO support conservation in your area				
Yes	4	2.0	0.14	0.00
No	196	98.0		
Any Community rules in protecting TVE tree species				
Yes	33	16.5	0.37	0.02
No	167	83.5		

TVE= *threatened, vulnerable and endangered*

Alarming, only 2.5% of respondents acknowledged active endangered species protection, compared to 97.5% reporting none. This highlights a serious lack of formal or informal mechanisms dedicated to safeguarding high-value tree species such as *Azizelia africana*, *Khaya ivorensis*, and *Milicia excelsa*. It also reflects a failure to integrate scientific conservation methods with indigenous knowledge systems. Support from external actors is virtually non-existent, with 98.0% reporting no government or NGO support. This finding points to a policy practice gap, where forest conservation laws and international commitments (e.g., REDD+ or biodiversity agreements) fail to translate into local-level interventions. The lack of institutional presence leaves communities to manage forests largely on their own. Only 16.5% of respondents reported the presence of community rules guiding forest use, while 83.5% reported none. This showed that traditional forest governance systems, such as taboos, sacred groves, or communal restrictions, are weak or eroding in Akamkpa. Since indigenous knowledge has historically played a key role in biodiversity conservation, its decline further undermines sustainability.

Evidence based assessment of threatened, vulnerable and endangered trees species decline in the study areas

The results in Table 6 showed that logging operations (56.5%) are the leading driver, followed by uncontrolled harvesting (28.0%), wildfire (7.0%), farming activities (5.5%), and urbanisation (3.0%). The relatively high standard deviation (1.18) and error (0.08) reflect varied but consistent responses across households. Environmental changes are significant for 80.0%, while 19.5% did not. This highlights logging and unsustainable exploitation as the primary threats to tree species, particularly high-value hardwoods such as *Milicia excelsa*, *Azizelia africana*, and *Khaya ivorensis*. Farming and urbanisation, while less dominant, contribute indirectly through deforestation and habitat fragmentation. These changes are likely linked to deforestation, reduced canopy cover, soil degradation, and altered microclimates. Based on Olanipon and Olayide (2024), these are forms of gross abuse

and unsustainable uses of land resources. Tree regeneration is reported to occur mainly through seed regeneration (77.5%), natural regeneration (5.0%), and stem regeneration (4.0%). The dominance of seed-based regeneration underscores the vulnerability of endangered trees, since continuous logging of mother trees reduces seed banks and slows recovery. The standard deviation (0.90) shows differences in local experiences with regeneration, possibly reflecting uneven access to restoration programmes. Only 20.0% of respondents acknowledged changes in forest product prices, while 80.0% did not. This suggests that while scarcity has driven up the price of certain timber species, most households may not recognise or benefit from these market changes. This disconnect reflects a common situation where local communities bear the cost of resource depletion but do not enjoy proportional economic gains. A majority of respondents (77.5%) reported tree disappearance in the area, compared to 22.5% who did not. This aligns with earlier findings on logging and uncontrolled harvesting as major causes of decline. The perception of disappearance reflects community-level awareness of species like iroko, mahogany, and sapele becoming increasingly rare. Only 22.7% of respondents reported restrictions on certain tree species, while 77.3% reported no restrictions. This indicates that both traditional taboos and modern protective regulations are weak or absent in Akamkpa. Without restrictions, endangered species are vulnerable to indiscriminate exploitation, further accelerating decline.

The percentage assessment shows that the LGA is facing significant biodiversity loss, especially among economically important tree species (Figure 2). Without quick actions like planting trees, using forest resources in a way that doesn't harm the environment, managing forests with local communities, and protecting endangered species through laws, many of these trees could disappear from their areas, says Newton (2008). Cutting down forests for resources can cause certain species to become extinct or face a high risk of disappearing.

Table 6: Evidence based assessment of threatened, vulnerable and endangered trees species

Variables	Frequency (N=200)	Percentage (%)	Standard deviation	Standard error of mean
Causes of Species Decline				
logging	113	56.5	1.18	0.08
farming	11	5.5		
uncontrol harvesting	56	28.0		
wildfire	14	7.0		
urbanization	6	3.0		
Environmental changes				
Yes	161	80.0	0.39	0.02
No	39	19.5		
Regeneration method to restore TVE tree species				
Seed	155	77.5	0.90	0.06
Stem	8	4.0		
Artificial restoration	27	13.5		
Natural regeneration	10	5.0		
Seed	155	77.5		
Stem	8	4.0		
Increase in Forest product price				
Yes	40	20.0	0.40	0.03
No	160	80.0		
Tree disappearance				
Yes	155	77.5	0.41	0.02
No	45	22.5		
Restricted trees				
Yes	44	22.7	0.42	0.03
No	150	77.3		

TVE= *threatened, vulnerable and endangered*

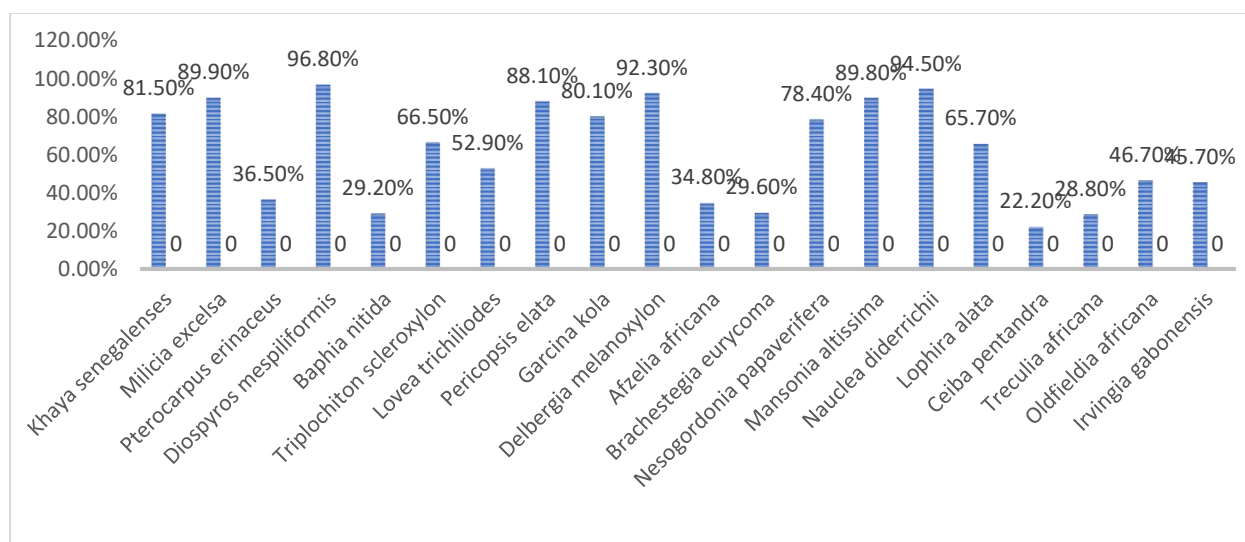


Figure 2: Percentage of trees threatened, vulnerable and endangered in the study area

CONCLUSIONS

Over-exploitation of trees and crops threatens species and harms local economies reliant on these resources. This reliance exacerbates economic vulnerabilities, especially as younger generations may lack knowledge about endangered species due to educational gaps.

Insufficient formal education hinders sustainable forest management, escalating deforestation for farming, logging, and construction. Signs of resource depletion suggest unsustainable usage patterns, while poor monitoring impairs conservation efforts, putting endangered species at greater risk.

dependence on timber and agriculture leads to overexploitation, undermining livelihoods and food security. Conflicts arise between immediate financial needs and long-term sustainability. Traditional beliefs and community practices that once protected forests are eroding, and illegal logging further exacerbates the crisis. Deforestation has significant environmental impacts, affecting soil health, water quality, and cultural traditions linked to sacred trees. Weak governance and inadequate support for local communities hinder biodiversity protection. The lack of training and connection in conservation efforts leads to unequal access to sustainable forest management resources.

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