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Fuel Wood and Forest Management: A Strategy for Agricultural Sustainability in Benue South, Nigeria

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Abstract

ABSTRACT
Background of study: Deforestation driven by fuel wood extraction has become a major environmental challenge in many developing countries, including Nigeria. Excessive dependence on forest resources contributes to land degradation, soil fertility loss, and reduced agricultural productivity. In rural communities, forests play a crucial role in sustaining agricultural systems, supporting livelihoods, and maintaining ecological balance.
Aims and scope of paper: This study examines the relationship between fuel wood utilization, forest management practices, and agricultural sustainability in Benue South Senatorial District, Nigeria.
Methods: The study was conducted across five Local Government Areas (Agatu, Apa, Otukpo, Ador, and Obi). A purposive sampling technique was used to distribute 790 questionnaires, of which 729 were returned and analyzed, representing a 92.4% response rate. Data were collected through questionnaires, Focus Group Discussions (FGDs), and Key Informant Interviews (KIIs). Descriptive statistics, including frequency and percentage, were applied, while the Relative Importance Index (RII) was used to evaluate the perceived impact of deforestation on agricultural practices.
Result: The findings indicate that most respondents were farmers and long-term residents of the study area. A significant proportion (71%) were aware of the negative effects of deforestation on agriculture. The results also highlight several adaptive strategies adopted by communities, including alternative fuel sources, improved forest management practices, and increased environmental awareness.
Conclusion: Effective forest management and reduced dependence on fuel wood are essential for promoting sustainable agricultural development. Strengthening community awareness, encouraging alternative energy sources, and implementing sustainable forestry policies are critical steps toward ensuring agricultural sustainability in the region.

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INTRODUCTION

Deforestation, defined as the destructive removal of forest vegetation without efforts to mitigate harm, inevitably leads to ecological degradation. This widespread phenomenon poses significant environmental threats, including soil fertility loss, erosion, climate change, flooding, and disruptions to the water cycle, ultimately jeopardizing the physical environment of rural communities worldwide. Forests, covering nearly a third of the Earth's land surface, provide numerous environmental benefits, such as regulating the hydrologic cycle, conserving soil, preventing climate change, and preserving biodiversity (Umar & Haruna, 2025). Forests, which account for almost one-third of the planet's terrestrial area, offer a wide range of ecological advantages, including managing

the water cycle, protecting soil health, mitigating climate change, and maintaining diverse biological species (Wang et al., 2022). Even though the significance of forest areas is growing, numerous individuals argue that these woodlands take up space needed for human habitation, development, and societal needs. Forest areas occupy ground that might otherwise be utilized to accommodate millions of individuals, particularly as the global population continues to grow rapidly (Gérard et al., 2021). Furthermore, forests supply food, generate precipitation, and present a variety of resources for health, cultural, and spiritual uses, ultimately enhancing farming efficiency by boosting crop production and supplying feed for livestock (De Blécourt et al., 2018).

Enhancing agricultural productivity remains a paramount goal for policymakers and researchers, driven by the need to ensure food security for a growing global population, as well as to alleviate poverty, foster economic growth, and facilitate structural transformation in developing countries (Luo et al., 2022). Agricultural production plays a vital role in maintaining food security and promoting long-term economic growth in both developed and developing nations (Bobbio, 2019). In Somalia, significant production losses have been recorded, including a 50% decline in sorghum, 34% in corn, 83% in sesame, and 59% in cowpea. Droughts exacerbate these losses by reducing cultivated land and causing harvest failures. The 2017 droughts in Somalia resulted in estimated losses of $71 million for major crops, including $35 million for maize and sorghum, $9 million for cowpea, and $28 million for sesame (Haji et al., 2021).

According to the Food and Agriculture Organization (FAO), the world experienced alarming rates of deforestation in the 1990s, with millions of hectares of natural forests lost annually. Moreover, FAO estimates suggest that the tropics lose over 10 million hectares of forest cover every year. Abdulmalik (2020) say while deforestation has been practiced for centuries, the mid-1800s marked the beginning of unprecedented forest destruction. In Africa, forests play a vital role in meeting basic needs, with wood fuels accounting for a significant share of primary energy consumption. Akintoye (2025) said Nigeria boasts an extensive array of forested lands, comprising swamp forests in the southernmost region, tropical rainforests in the southwest and wooded savannahs in the middle belt and northern areas. As one of the countries with the most abundant forest resources globally, Nigeria's forests cover approximately 110,890 km^2, accounting for about 12.18% of the country's total land area of 910,770 km^2.

Ecologically, forested areas play a crucial role in maintaining ecosystem balance, storing and purifying drinking water, mitigating natural disasters like droughts and floods, and regulating the climate by storing carbon.. In Nigeria, forests have long been a cornerstone of survival, economic development, and environmental sustainability for many communities. The availability and cost of fuel wood, for instance, can impact community nutrition levels, while numerous individuals, including forest and wood workers, rely directly on forests for their livelihood (Bauchi & Othman, 2020). According to aggregate data, major crops experienced a 25% decline in productivity between 1990 and 2010, with yield levels falling short of those required for global competitiveness in agriculture (Ikpe et al., 2021). Unless addressed, deforestation may eradicate the potential benefits of the agricultural sector, including income and employment opportunities, for the majority of Nigerians. Human activities are widely acknowledged as the primary driver of global deforestation. While deforestation and habitat loss can result from both human and environmental factors, human activities are predominantly responsible. Natural causes, such as floods, droughts, forest fires, overpopulation of animals, and climate change, can also contribute to deforestation. However, human activities, including cattle breeding, timber extraction, charcoal production, mining, urbanization, agricultural expansion, oil extraction, and industrialization, are reported to be the main causes of global deforestation.

The sustainable management of forest resources has been a longstanding concern, given its significant impact on biological diversity and crucial role in maintaining global ecological functions (Fagge, 2022). To mitigate the effects of deforestation on livelihoods, farming households have developed various adaptation strategies. In response to changing environmental conditions, farming households employ diverse coping mechanisms. Notably, the survival strategies adopted in response

to deforestation have fostered environmental awareness and conservation consciousness among local communities (Ikpe et al., 2021). This research focused on examining how deforestation affects farming practices and management approaches in chosen Local Government Areas (LGAs) of Benue South. The objectives of the study are: (1) to evaluate how deforestation influences agricultural yield, (2) to uncover the root causes of deforestation, and (3) to analyze the efficiency of current management strategies in tackling deforestation and its effects on farming.

Study area

The study focused on the Benue South region, which comprises nine Local Government Areas (LGAs). For this investigation, five particular LGAs were selected: Agatu, Apa, Ador, Otukpo, and Obi. Specifically, Apa LGA is found in the northwestern part of Benue State and is defined by its unique geographic coordinates: ranging from Latitude 7°20′ North to 7°50′ North of the Equator and from Longitude 7°40′ East to 8°10′ East of the Greenwich Meridian. It shares its northern boundary with Agatu LGA, Otukpo LGA lies to the south, Gwer-West LGA is situated to the east, and to the west, it is bordered by Olamaboro LGA from Kogi State (Bauchi & Othman, 2020). Ugbokpo serves as the administrative hub for Apa Local Government Area (LGA), encompassing 11 council wards and covering an area of roughly 995 square kilometers. The population is estimated to be around 146,138 people in 2023. The climate in this area follows the Koppen's Aw classification, characterized by well-defined wet and dry seasons. The wet season spans seven months (from April through October), with an average annual rainfall between 1,200 and 2,000 millimeters, while the dry season lasts from November until March (Ikpe et al., 2021). Average temperatures in this region are usually quite high, ranging from 28 to 32 degrees Celsius, though temperatures can occasionally rise to as much as 37 degrees Celsius.

The primary ecosystem in the region is guinea savanna, noted for its coarse grasses and occasional tree species. Dense forests are uncommon, primarily found as gallery forests, community forests, or protected woodlands (Fagge, 2022). Agriculture is fundamental to the economy of the local government, engaging over 70% of the population. The advantageous geographical positioning of the area connects both the forest regions, which are ideal for cultivating tree crops, and the savanna, where grain farming thrives, thus offering a significant agricultural advantage (Ikpe et al., 2021). Otukpo Local Government Area can be found in Benue State, Nigeria, positioned between the coordinates of 7° and 7°45' North and 7°35' and 8°30' East. The 2006 national census reported that this area had a total population of 261,666, consisting of 133,347 males and 128,319 females. The weather in this area is tropical, featuring an average yearly temperature of 27.2 °C. The region receives significant rainfall, with an average annual precipitation of 1723 mm. Obi Local Government Area, one of the 23 local government areas in Benue State, is located in the central agricultural region (Zone C) and the Middle Belt. It is situated between the latitudinal coordinates of 0705′ and 7015′N and the longitudinal coordinates of 90 and 906′E, covering an approximate area of 2229 km^2. The estimated population in this locality is around 168,491. This region also has a tropical climate, with average temperatures near 27°C. There are two main seasons: the rainy season occurs from April to October, while the dry season spans from November to March.

Agatu Local Government Area, which became distinct from Apa Local Government Area in 1996, includes 10 electoral wards and is situated between latitudes 7°45′ and 8° N, as well as longitudes 7°50′ and 8° E. This local government area covers approximately 1001 square kilometers and had a population of 115,597 according to the Census conducted in 2006. It is bordered by Nasarawa State to the north, Apa Local Government Area to the south, Gwer West on the east, and Omale Local Government Area in Kogi State to the west. This area experiences two primary climatic conditions: the rainy season, which occurs from April to October, and the dry season, which extends from November to March, with temperatures varying from 23 to 35 degrees Celsius (Akintoye, 2025). The research area is situated in the Southern Guinea Savannah zone, known for its coarse grasses and dispersed tree species. Ongoing land clearing for farming and bush fallowing has contributed to the revival of plant life. The economically significant plants in the region include locust bean, shea tree, mahogany, Isoberlina Doka, and various fruit trees such as mango.

Figure 1. Map of South Benue

METHOD

This study was conducted across the five Local Government Areas that make up the Benue South Senatorial district in Nigeria: Agatu, Apa, Otukpo, Ador, and Obi. Participants were carefully chosen from these LGAs to fill out questionnaires and take part in focused group discussions (FGDs). Additionally, key informant interviews (KIIs) were carried out to collect pertinent data from the participants. Following this approach, it is proposed that a sample size of 783 is appropriate for a population range of 500,000 to 10,000,000. An equal distribution of questionnaires was allocated to each LGA, which can be represented mathematically as:

$$Qi = \frac{QT}{N}$$

Where:
Qi = Count of surveys assigned to each Local Government Area
QT = Overall count of surveys (790)
N = Count of Local Government Areas (5)

$$Qi = \frac{790}{5} = 158$$

Thus, each LGA received 158 questionnaires.

Table 1. Questionnaire Distribution Data

S/N	LGAs	Population (2006 Census)	Allocated Sample Size
1	Apa	96,780	158
2	Agatu	115, 597	158
3	Otukpo	266,411	158
4	Ohimini	70,688	158
5	Obi	8,707	158
	Total	558,183	790

A focused sampling approach was implemented to circulate questionnaires across the five Local Government Areas (LGAs) within the study area. In all, 790 questionnaires were distributed evenly

among the five LGAs, with each area obtaining 158 questionnaires to guarantee sufficient representation. Among the 790 questionnaires that were sent out, a response rate of 92.4% was recorded (n = 729), forming the dataset that was examined in this study.

The gathered data was interpreted and analyzed with the use of descriptive statistics, including frequency counts and percentages. To evaluate the effects of deforestation on agricultural methods, the Relative Importance Index (RII) technique was employed. Participants' responses were analyzed, ranked, and assigned scores based on their frequency through the RII approach, allowing for a detailed understanding of the connections between deforestation and agricultural practices.

RII is donated by $\frac{\Sigma W}{AXN}$…… (1)

Where
W = Value assigned to each element by participants
A = Measurement or size (i.e. 5)
N = Overall count of the participants

RESULTS AND DISCUSSION

Result

The demographic analysis revealed that the majority (97%) of the respondents were male, while only 3% were female. The findings also presents the marital distribution of the respondents, indicating that 62% are married, followed by 17% who are divorced, 13% widowed, and 9% single. The occupational distribution of the respondents reveals that a significant majority (70%) are farmers, with farming being their primary occupation. Additionally, 14% of the respondents engage in self-reliant jobs to ensure their daily survival. A smaller proportion of respondents, 13%, are employed as civil servants, while 3% are involved in other occupational activities. The result furthered presents the educational background of the respondents, indicating that 16% attended primary school, 24% attended secondary school, and 20% attended higher institutions at various levels. However, a significant proportion (40%) had no formal education. Despite this, the results suggest that a substantial number of respondents have received some form of education in the study area. Furthermore, the findings in table one reveals the number of years respondents have lived in the study area. The majority (38%) have resided there for 20-30 years, followed by 35% who have lived there for 31-40 years, and 27% who have lived there for 40 years or more.

Table 2. Demographic characteristics of the respondents

Distribution of respondents by sex		
Variable	**Répondants**	**Percentage**
Male	509	70
Female	220	30
Total	**729**	**100**
Marital status		
Married	450	62
Divorce	120	17
Widowed	92	13
Single	67	9
Total	**729**	**100**
Respondents by occupation		
Farming	511	70
Self employed	101	14
Civil servant	92	13
Others	25	3
Total	**729**	**100**

Level of education	120	16
Primary	171	24
Secondary	143	20
Tertiary	295	40
Non formal education	**729**	**100**
Total		
Years of residency	275	38
20 – 30	257	35
31 - 40	197	27
40 & above		
Total	**729**	**100**

Table 3. Level of Awareness on the Impact Deforestation on Agricultural Practices

Level of awareness	Respondents	Percentage
Aware	521	71
Not aware	208	29
Total	729	100

Table 3 reveals that a significant majority (71%) of the respondents are aware of the impact of deforestation on agricultural activities, while 29% are not aware. This high level of awareness can be attributed to the widespread use of social media platforms, which facilitate seamless information sharing and accessibility among the public.

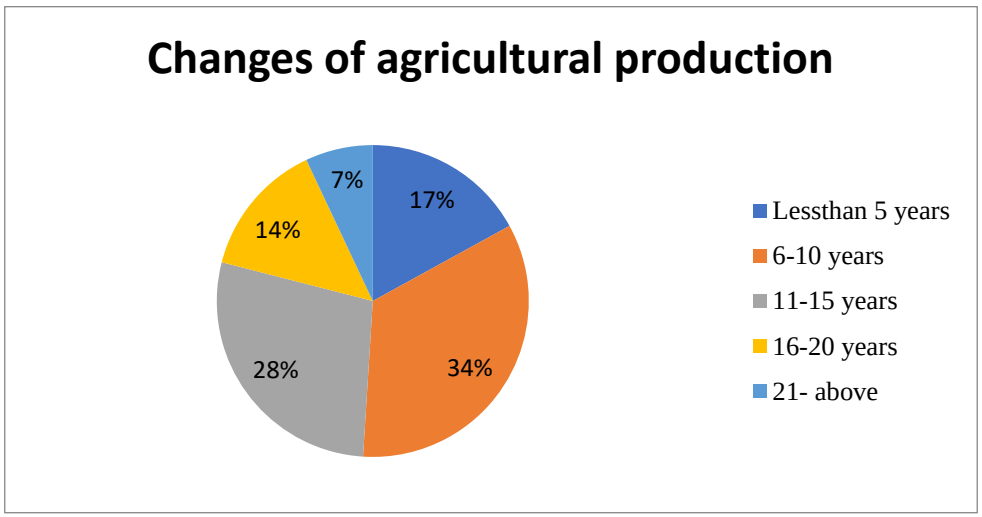

Figure 2. Noticed of Changes in Agricultural Production

Figure 2 reveals that a significant proportion of respondents (34%) perceived changes in agricultural yields in the area within 6-10 years, while 28% experienced changes over the last 11-15 years. Additionally, 17% noticed changes within less than 5 years, 14% between 16-20 years, and 7% 21 years or more ago.

Table 4. Causes of Deforestation in the study area

S/N	Causes of deforestation	SA	A	U	SD	D	RII	RANK
1	Farmland expansions	226	381	29	58	35	0.79	3
2	Timber productions	429	247	04	08	14	0.90	2
3	Fuel wood harvesting	243	374	39	34	39	0.94	1
4	Settlement expansions	84	106	20	341	178	0.48	4

Where: **SA**- Strongly Agreed; **A**- Agreed; **U**- Undecided; **SD**- Strongly Disagreed; **D**- Disagreed

Table 4 presents the four major causes of deforestation in the study area, ranked using the Relative Importance Index (RII). The ranking criteria were: RII > 0.94 (highly causative), 0.90 (fairly high),

0.79 (fairly low), and 0.48 (very low). The results reveal that two practices are major causes of deforestation: farmland expansion for agricultural practices, cutting of trees for timber production, fuel wood harvesting for energy consumption and charcoal production, and clearing of vegetation for settlement expansion. The data show that fuel wood harvesting is the leading cause of deforestation, with an RII of 0.94 (high), followed by timber production with an RII of 0.90 (fairly high). Farmland expansion has an RII of 0.78 (fairly low), while settlement expansion has an RII of < 0.48 (very low).

Table 5. Impact of Deforestation on Agricultural Activities

S/N	Variables	SA	A	U	SD	D
1	Reduced in crop yield	199 (27%)	408 (56%)	34 (5%)	29 (4%)	59 (8%)
2	Loss of nutrients	167 (23%)	286 (39%)	209 (29%)	20 (3%)	47 (6%)
3	Presences of soil erosion and desertification	271 (37%)	397 (54%)	05 (1%)	18 (3%)	38 (5%)
4	Climate change and water cycle disruptions	94 (13%)	113 (15%)	181 (25%)	254 (39%)	87 (12%)
5	Drought experiences	89 (12%)	111 (15%)	32 (4%)	188 (26%)	309 (43%)

Where: **SA**- Strongly Agreed; **A**- Agreed; **U**- Undecided; **SD**- Strongly Disagreed; **D**- Disagreed

Table 5 presents respondents' feedback on the impact of deforestation on agricultural activities. A majority (56%) agreed that reduced crop yields are a major impact, with 27% strongly agreeing. Regarding the loss of soil nutrients, 39% of respondents agreed, 29% were undecided, and 23% strongly agreed. Furthermore, 54% of respondents believed soil erosion and desertification are physical impacts of deforestation, with 37% strongly agreed. The respondents' perceptions of climate change, water cycle disruption, and drought experiences were also recorded. Notably, 39% strongly disagreed that deforestation causes climate change, likely due to strong religious beliefs. Additionally, 43% disagreed that they experienced drought in recent years, indicating that drought is not a prevalent issue in the study area

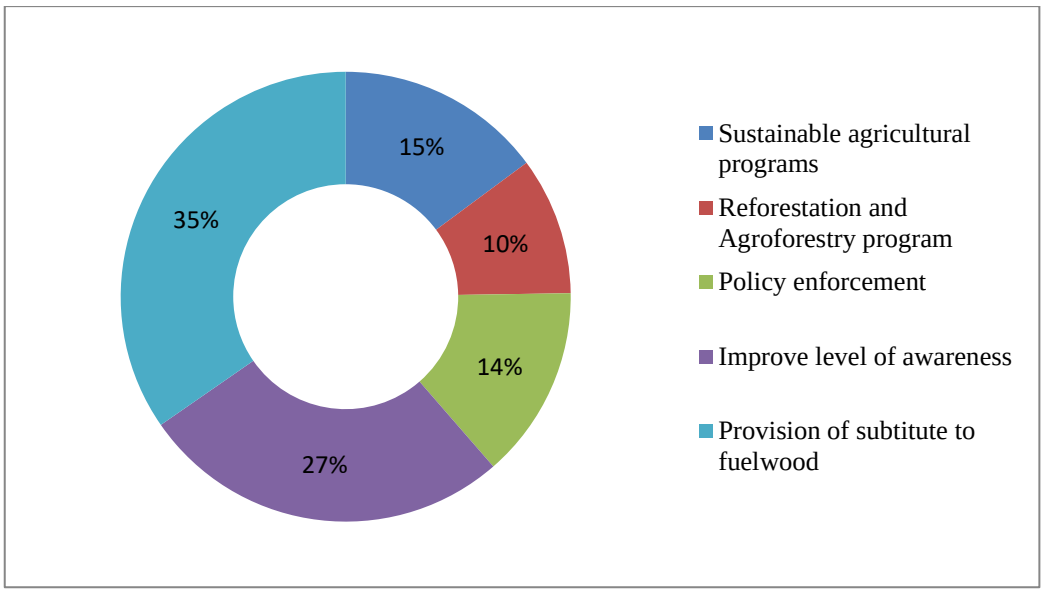

Figure 3. Adaptation Strategies to Mitigate the Deforestation Menaces

Figure 3 indicated community responses regarding adaptation strategies to mitigate excessive deforestation in the study area. A significant 34% of respondents considered substituting fuel wood extraction with sustainable energy options as the best approach to combat deforestation, driven by the fact that many residents rely on charcoal and fuel wood due to economic constraints. The interaction with the respondents in figure 2 also revealed that 27% perceived that awareness campaign and programs can also contribute massively in curbing the excessive deforestation practices in the study area. The study further indicated that policy enforcement with 14 %, followed by sustainable agricultural practices of 15% and reforestation and agroforestry programs of 10% are also among the proper strategies to combat deforestation practices in the study area.

Table 6. Obstacles to effective deforestation prevention measures

S/N	Obstacle to effective deforestation prevention measures	SA	A	U	SD	D	RII	RANK
1	Limited funding	108	87	251	148	135	0.56	**3**
2	Resistance to changes	56	41	28	276	328	0.38	**5**
3	High cost of sustainable practices	309	286	41	27	66	0.80	**2**
4	Limited awareness and education	421	158	18	90	42	0.82	**1**
5	Population growth and pressure	102	91	24	214	214	0.45	**4**

The results revealed that out of five obstacles to effective deforestation prevention measures, limited awareness and lack of education among respondents ranked highest, followed by high costs of sustainable practices (RII score: 0.80), limited funding (RII score: 0.56), population pressure (RII score: 0.45), and resistance to changes (RII score: 0.38).

Discussion

The demographic analysis revealed that the majority (97%) of the respondents were male, while only 3% were female. This skewed distribution may be attributed to the dominant role males play in providing for their households' basic needs, such as food. In many African societies, including Nigeria, women often face social barriers that limit their access to property rights, resulting in fewer resources and capabilities compared to men Oghenero (2022). This finding aligns with the study by Lawrence (2022), which reported that out of 120 respondents, 109 (91%) were males and 11 (9%) were females. The preponderance of male farmers in the study area may be due to the traditional division of labor, where women's work revolves around household chores. However, this does not imply that males outnumber females in the entire study area. The findings also presents the marital distribution of the respondents, indicating that 62% are married, followed by 17% who are divorced, 13% widowed, and 9% single. This distribution indicates that most members of the respondents' households are married, which means these households likely have more people to support. As a result, those who are married in these households tend to participate in agricultural work to secure food and earn money for their families, in contrast to those who are single or divorced. This Agreed with findings of Gana et al (2022), who indicated that the farming methods in the researched region are primarily linked to those who are married, and it is probable that they involve their family members in agricultural tasks, thus facilitating the farming process.

The occupational distribution of the respondents reveals that a significant majority (70%) are farmers, with farming being their primary occupation. Additionally, 14% of the respondents engage in self-reliant jobs to ensure their daily survival. A smaller proportion of respondents, 13%, are employed as civil servants, while 3% are involved in other occupational activities. These findings highlight that farming is the dominant occupation in the study area, with the majority of respondents being fully engaged in farming activities. This is mostly common within most rural communities of Nigeria and Africa at large. This is in consistent with the findings of Abdulmalik (2020), who said that about 70% Nigerians are farmers. The result furthered presents the educational background of the respondents, indicating that 16% attended primary school, 24% attended secondary school, and 20% attended higher institutions at various levels. However, a significant proportion (40%) had no formal education. Despite this, the results suggest that a substantial number of respondents have

received some form of education in the study area. This suggests that the educational attainment of the respondents may affect their activities and opportunities within the forest region in relation to their socioeconomic position, which should be utilized to enhance productivity. It also signifies that agricultural endeavors in this region are primarily led by individuals who have received formal education. Bodo (2021) highlighted that education serves as a key form of human capital that significantly influences one's standing in society. Education is anticipated to not only increase individuals' capacity to read and comprehend directions but also to assist them in embracing innovative methods. This may result in more job opportunities, greater economic empowerment, and improved welfare for the community members. In addition, Dhakane (2024) cited that education represents one of the resources rural inhabitants possess for enhancing their socioeconomic status. It is recognized that a number of individuals in the studied communities have sought to attain some level of formal education; however, most have only progressed through secondary schooling, spanning across different age groups. Furthermore, the findings in table one reveals the number of years respondents have lived in the study area. The majority (38%) have resided there for 20-30 years, followed by 35% who have lived there for 31-40 years, and 27% who have lived there for 40 years or more. This finding aligns with the study by Zhang (2023), which reported that farmers knowledge and experience of their environment increase with the amount of time they spend working the land.

Table 2 reveals that a significant majority (71%) of the respondents are aware of the impact of deforestation on agricultural activities, while 29% are not aware. This high level of awareness can be attributed to the widespread use of social media platforms, which facilitate seamless information sharing and accessibility among the public. According to Umar & Haruna (2025), the level of awareness is imperative to reduce the rate of deforestation. This finding is consistent with the study by Ceddia (2019), which reported that approximately 77% of respondents in Apa LGA of Benue State were aware of the environmental effects of deforestation. Figure 2 reveals that a significant proportion of respondents (34%) perceived changes in agricultural yields in the area within 6-10 years, while 28% experienced changes over the last 11-15 years. Additionally, 17% noticed changes within less than 5 years, 14% between 16-20 years, and 7% 21 years or more ago. These findings indicate significant changes in agricultural production, primarily caused by the severe impact of deforestation activities in the study area.

Table 3 presents the four major causes of deforestation in the study area, ranked using the Relative Importance Index (RII). The ranking criteria were: RII > 0.94 (highly causative), 0.90 (fairly high), 0.79 (fairly low), and 0.48 (very low). The results reveal that two practices are major causes of deforestation: farmland expansion for agricultural practices, cutting of trees for timber production, fuel wood harvesting for energy consumption and charcoal production, and clearing of vegetation for settlement expansion. This viewpoint contrasts with the position put forth by Bhardwaj (2020), who pointed out that bush fires, uncontrolled logging, and the transformation of forests into agricultural land are significant factors contributing to deforestation. The evidence indicates that gathering fuel wood is the primary driver of deforestation, with a Relative Importance Index (RII) of 0.94 (high), a conclusion that aligns with the findings of (Ndegwa et al., 2020). They indicated that data from the Kenya Bureau of Statistics identify charcoal as one of the two main fuel sources in Kenya, following firewood. The energy consumption pattern in Kenya challenges the energy ladder theory, which posits that with rising disposable incomes, households should shift away from inexpensive energy options such as charcoal and firewood towards more sustainable alternatives like Liquefied Petroleum Gas (LPG) and electricity. Following this, timber production emerged with an RII of 0.90 (fairly high), indicating a significant reliance on trees as a fundamental source of wood for construction, furniture, fuel, and various other necessary items (Olowoyeye, 2021). The research by Collins (2020) indicated that the logging issues in the nation are driven by the growing demand for timber products from large construction firms, and the volume of trees felled in the country falls short of meeting the required raw materials for furniture production and building purposes. Farmland expansion has an RII of 0.78 (fairly low), This result is disagreed with the findings of Prochazka (2023) who suggested that agricultural expansion is the leading cause of deforestation in Jos East, Plateau State. Similarly Dhakane (2024), noted that agricultural expansion and practices are

the major cause of deforestation.. Settlement expansion has an RII of < 0.48 (very low). This is in consistent with the findings of Zhang (2023). Which indicated that the division of land into smaller parcels requires the removal of trees in order to facilitate other economic ventures that the small farms can assist. This has resulted in the expensive plots of land in urban and semi-urban regions that are solely utilized for housing.

Table 4 presents respondents' feedback on the impact of deforestation on agricultural activities. A majority (56%) agreed that reduced crop yields are a major impact, with 27% strongly agreeing. This aligns with findings by Poore (2018), which highlight deforestation's negative effects on agricultural productivity due to reduced rainfall, increased temperatures, and extreme heat events. Regarding the loss of soil nutrients, 39% of respondents agreed, 29% were undecided, and 23% strongly agreed. This findings correlate with the study of De Blécourt (2018) which suggest that deforestation leads to a 10-20% decline in crop yields due to reduced rainfall and soil fertility. Furthermore, 54% of respondents believed soil erosion and desertification are physical impacts of deforestation, with 37% strongly agreeing. The findings also agreed with the work of Abdulmalik (2020). Who pointed out that the degradation of land caused by soil erosion has led to a decline in livestock farming as there is insufficient grass available. This leads to a reduction in the output of both milk and meat. It has also been noted that soil erosion in the country presents a serious threat to food security since the nutrients in the soil, which would have supported the growth of wheat, rice, and maize, have been depleted. The respondents' perceptions of climate change, water cycle disruption, and drought experiences were also recorded. Notably, 39% strongly disagreed that deforestation causes climate change, likely due to strong religious beliefs. Additionally, 43% disagreed that they experienced drought in recent years, indicating that drought is not a prevalent issue in the study area. This result contradicts the research conducted by Wang (2022), which recognized that forests also maintain soil moisture that is frequently held within the root structures of trees. When these trees are felled, the decline in soil moisture happens at a pace comparable to the speed at which clouds dissipate.

Figure 3 indicated community responses regarding adaptation strategies to mitigate excessive deforestation in the study area. A significant 34% of respondents considered substituting fuel wood extraction with sustainable energy options as the best approach to combat deforestation, driven by the fact that many residents rely on charcoal and fuel wood due to economic constraints. These findings support the research conducted by Luo (2022), which found that 30% of participants thought that substituting alternative energy resources for wood extraction is the most effective method for minimizing deforestation activities in Apa LGA of Benue State. The engagement with participants shown in figure 2 further indicated that 27% believed that awareness initiatives and programs could significantly aid in limiting the rampant deforestation practices in the area under study. These results reflect the conclusions reached by Bobbio (2019), who found that raising community awareness about the impact of deforestation serves as a practical approach to reducing such activities in the region. Similarly, the United Nations Convention on Combating Desertification collaborates with local authorities to educate community members, including women and children, so they can engage more effectively with natural resources and actively take part in efforts aimed at restoring forest cover. Notable initiatives include Desertification Day, which features extensive awareness campaigns that remind community members of the importance of cooperating, working together, and actively participating in environmental discussions (Gérard et al., 2021). The research also revealed that policy enforcement accounts for 14%, aligning with Gana et al (2022), who suggested that measures against logging, educating residents about the consequences of deforestation, initiating tree planting initiatives, and creating nurseries in each community to cultivate seedlings for planting should be implemented. Sustainable agricultural methods represent 15%, consistent with findings by Akintoye (2025), indicating that over 50,000 acres of forested land are cleared globally each day by farmers and loggers, resulting in the destruction of an area equivalent to more than 10,000 football fields daily in the Amazon Basin alone. Reforestation and agroforestry programs of 10% are also among the proper strategies to combat deforestation practices in the study area.

The results in table 5 revealed that out of five obstacles to effective deforestation prevention measures, limited awareness and lack of education among respondents ranked highest. The study of

Oghenero (2022) It shows that a lack of knowledge among individuals, particularly in rural regions such as Kibale and Kigezi, results in insufficient understanding of the importance of forests. These communities often remove forests because they perceive them as barriers to more beneficial land utilization. The significant expenses associated with sustainable methods (RII score: 0.80), the scarcity of financial support (RII score: 0.56), as well as the pressures of population and poverty (RII score: 0.45), contribute to these issues. In their efforts to provide food, shelter, and enhance their quality of life, impoverished people heavily rely on resources from their immediate surroundings, which leads to the destruction of forests Lawrence (2022). The result further shows that resistance to changes (RII score: 0.38). this findings is in line the study of Poore (2018) which reported that about 22.3% of his respondents agreed that resistance to changes are among the major setback in curbing deforestation practices in the study area. These findings indicate that respondents in the study area lack awareness and critical knowledge about the negative impacts of deforestation on agricultural production

CONCLUSION

This research sought to examine how deforestation affects farming practices and to pinpoint management methods that can lessen deforestation activities in specific Local Government Areas (LGAs) within Benue South. Forests are essential for preserving ecological equilibrium and facilitating sustainable farming, yet deforestation, which is fueled by timber extraction, collection of firewood, expansion of farmland, and growth of settlements, endangers both community livelihoods and agricultural output. Although there is apprehension regarding deforestation, a significant number of participants did not recognize its serious repercussions, which include diminished crop production, depletion of soil nutrients, soil erosion, desertification, drought, and shifts in climate patterns. The results highlight the necessity for alternatives to firewood, the implementation of sustainable agricultural initiatives, the enforcement of policies, and enhancing public understanding of the devastating impacts of deforestation on farming output.

To address this, governments and NGOs should implement poverty alleviation programs and provide essential infrastructure, such as electricity and affordable cooking alternatives, to reduce dependence on fuel wood. Policies should promote tree plantation initiatives, environmental sustainability, and the enforcement of regulations to curb excessive deforestation.

Adequate funding should be allocated for adaptation strategies, including incentives to discourage deforestation and the establishment of protected green belt areas. Additionally, environmental education efforts should be intensified, particularly in rural communities, to raise awareness about long-term effects of deforestation and promote sustainable land-use practices.

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AUTHOR CONTRIBUTION STATEMENT

S.A.I. conceived and designed the study, developed the research methodology, conducted the data collection, performed the formal analysis, interpreted the results, and drafted the original manuscript. N.S. contributed to the supervision of the research process, validated the findings,

reviewed and edited the manuscript critically for important intellectual content, and approved the final version of the manuscript.

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