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ORIGINAL RESEARCH ARTICLE

Assessing the Role of Agricultural Practices in Accelerating Forest Degradation in Hong LGA Adamawa State, Nigeria

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ABSTRACT

Forest degradation has emerged as a critical environmental challenge in Hong Local Government Area due to increasing population pressure and the heavy dependence of rural households on agriculture and forest resources for livelihood. This study adopts a mixed-method approach, utilizing both primary and secondary data sources. Primary data were obtained through the administration of structured questionnaire copies across six wards using a stratified sampling technique, while secondary data were sourced from existing literature, forestry reports, and previous studies on land use. A total of 398 questionnaires were administered, out of which 381 were retrieved and analyzed using descriptive statistical tools such as frequencies and percentages. The results revealed that agricultural practices play a significant role in driving forest degradation in the study area. Land clearing for farming was identified as the most dominant factor (94.0%) reflecting the expansion of subsistence agriculture into forested lands. Fuelwood extraction (91.1%) was also a major driver, indicating high dependence on biomass energy. Similarly, slash-and-burn agriculture (90.5%) contributes to both immediate forest loss and long-term soil degradation. Other factors such as poor land management practices (86.6%), overgrazing and farmland expansion (86.1%), use of chemical fertilizers and pesticides (80.6%), and shifting cultivation (76.1%) further contribute to vegetation loss, soil degradation, and reduced forest regeneration. The study concludes that forest degradation in Hong LGA is largely driven by unsustainable agricultural practices, reinforced by socio-economic pressures, energy dependence on fuelwood, and weak institutional frameworks. This study recommends the adoption of sustainable agricultural practices such as agroforestry, crop rotation, and conservation agriculture, as well as the promotion of alternative energy sources like liquefied petroleum gas (LPG) and biogas to reduce pressure on forest

Introduction

Agricultural expansion is a dominant driver of the forest degradation in many developing economies, where population growth and livelihood needs compel farmers to extend cultivation into forested areas. Curtis, et al. (2019), argue that shifting cultivation, smallholder farming, and commercial agriculture together account for the majority of global forest disturbances.

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In West Africa, the expansion of cocoa and cassava production has been linked to extensive forest degradation, creating fragmented landscapes that weaken ecological stability (Acheampong, et al., 2019). Similarly, Geist and Lambin (2020), demonstrate that livestock production, through overgrazing and rangeland expansion, intensifies soil compaction and reduces regeneration rates. On a broader scale, Ordway, et al. (2019) show how rising global demand for export crops like palm oil, soy, and cocoa accelerates forest clearing in fragile ecosystems. These drivers highlight that forest degradation is not solely a local issue but is tied to global consumption patterns.

Nigeria ranks among the countries with the highest rates of forest loss globally, with an annual deforestation rate of about 3.7%, largely attributed to agricultural expansion, logging, and fuelwood extraction (Adepoju et al., 2020; Fadairo & Williams, 2021). The impacts of climate change, such as prolonged droughts and flooding, further aggravate this situation by weakening natural regeneration processes. Agricultural practices, especially shifting cultivation and slash-and-burn methods, have intensified pressure on Nigeria's already fragile forest ecosystems (Agwu et al., 2019; Ite et al., 2022).

In Hong LGA, Adamawa State, forest degradation has become increasingly pronounced due to the interaction of climate variability and agricultural dependence. The area lies within the Sudan Savanna zone, which is highly vulnerable to declining rainfall, rising temperatures, and desertification risks (Nyanganji et al., 2020; Umar et al., 2023). Local communities, whose livelihoods are heavily dependent on subsistence farming, often resort to clearing forests for cultivation, overgrazing, and fuelwood harvesting. These practices, compounded by weak institutional frameworks and lack of sustainable land management strategies, have led to forest fragmentation, biodiversity loss, and reduced soil fertility. Consequently, forest degradation not only undermines ecological balance but also threatens food security, energy access, and resilience to climate change in the LGA (Zemba & Inuwa, 2021).

Therefore, this research aims to fill this gap by providing a detailed and localized analysis of the pathways through which agricultural practices accelerating to the forest degradation in Hong LGA, thereby offering a more comprehensive understanding that can inform sustainable land management and policy interventions.

Materials and Methods

Study Area

Hong Local Government Area lies between latitudes 100 00'N and 100 32'N of the equator and longitudes 120 40'E and 130 12'E of the prime meridian. The Local Government Area has a land area of about 117,240 square kilometers with a projected population of 226,100. Is bordered in the north by Borno State, to the East by Maiha, Local Government Area and to the south by Song Local Government Area and lastly to the west by Gombi L.G.A. (Adebayo, et. al., 2011).

Hong Local Government covers a total land area of about 2,429km2. It has twelve (12) political wards which were subdivided into two state constituencies with each having six wards, the two constituencies are named. Hong constituency comprising Bangshika ward, Daksiri Ward, Hong ward, Husherzum ward, Shangui ward and Thilbang Ward. While Uba - Gaya constituency comprising Garaha Ward, Gaya ward Hildi Ward, Kwarhi ward, Mayo lope ward and Uba Ward (Adebayo, et. al., 2011).

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Agriculture in Hong LGA is predominantly subsistence-oriented, characterized by smallholder farming systems with plots averaging between 1 and 3 hectares per household. The major crops cultivated include sorghum (Sorghum bicolor), millet (Pennisetum glaucum), maize (Zea mays), groundnut (Arachis hypogaea), cowpea (Vigna unguiculata), and cassava (Manihot esculenta) (Adebayo, 1999; Umar et al., 2016). In the wetter lowland areas, especially along river valleys, farmers cultivate rice (Oryza sativa), sugarcane (Saccharum officinarum), and vegetables, taking advantage of residual moisture and alluvial soils (Adebayo & Tukur, 1999).

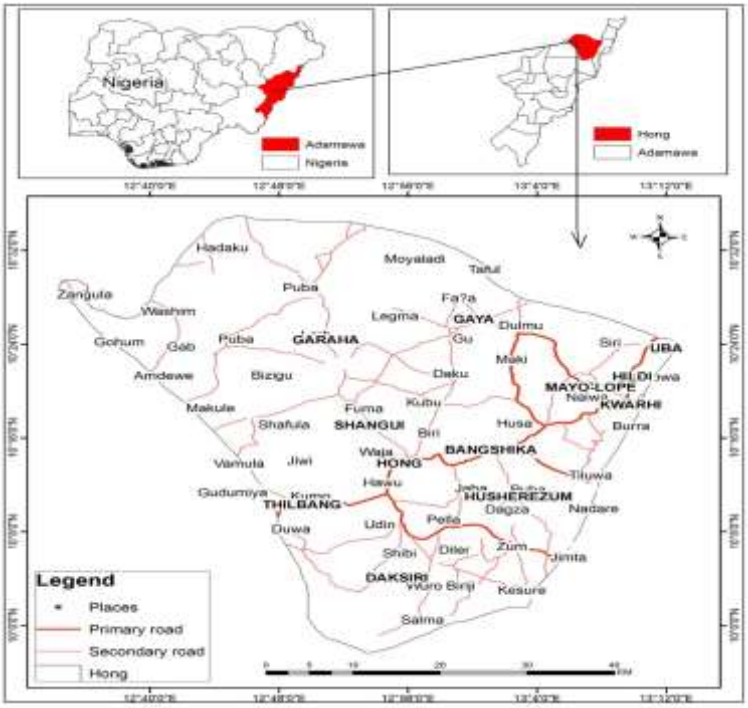

Figure 1: The Study Area
Source: Guaranty Geospatial Services, (2023)

Data types and Sources

Data used in the study were both primary and secondary data. The primary data were collected through the administration of questionnaire copies. The secondary data was obtained from previous forest assessment, forestry reports, and published literature on land use and forest degradation in Adamawa state Nigeria.

To ensure separation across the study area, a purposive sampling technique was adopted. Hong Local Government Area was administratively divided into twelve wards, which served as strata for the sampling process. Each ward was considered a sampling unit, and respondents were considered sampling units, and respondents were randomly selected within each unit. This approach enabled the inclusion of all areas that are proximity to the forest. Stratification by wards was also necessary to understand the spatial variation in forest degradation across Hong local government area.

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Table 1: Registered voter population in the 12 wards in Hong Local Government Area

	Ward Name	Registered Voters
1.	Banshika	22,966
2.	Hong	18,334
3.	Uba	11,656
4.	Gaya	9,995
5.	Daksiri	9,450
6.	Garaha	8,340
7.	Hildi	8,318
8.	Thilbang	8,219
9.	Husherezum	7,662
10	Kwarhi	7,106
11	Mayo-Lope	6,662
12	Shangui	6,234
	Total	**124,942**

Source: INEC, 2023

To determine the sample size, the study used the formula proposed by Mott and Long (2017) in their sampling method. This formula was appropriate for estimating sample sizes in studies involving large populations where the exact size of the target population was too large to be easily manageable. Given the population size of the study area, the sample size was determined using Mott and Long's (2017) formula:

$$n = \frac{N}{1 + N(e^2)}$$

Where:
n = Sample size
N = Population size (72,836) e = Margin of error (0.05 for confidence level)

$$n = \frac{72,836}{1 + 72,836(0.05^2)}$$
$$n = \frac{72,836}{1 + 72,836(0.0025)}$$
$$n = \frac{72,836}{1 + 182.09}$$
$$n = \frac{72,836}{183.09}$$
$$n \approx 398$$

Table 2: Sample Size of the Respondents in Selected Wards of Hong LGA

Ward Name	Registered Voters	Sample Respondents
Banshika	22,966	125
Hong	18,334	100
Daksiri	9,450	52
Hildi	8,318	45
Kwarhi	7,106	39
Mayo-Lope	6,662	37
Total	**72,836**	**398**

Source: INEC, 2023

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Role of Agricultural Practices in Accelerating Forest Degradation in the Study Area

Table 3: Land clearing for farming contributes to forest loss in Hong LGA

Variable	Frequency	Percent (%)
Strongly Agreed	270	70.9
Agreed	88	23.1
Undecided	4	1.0
Disagreed	19	5.0
Total	**381**	**100**

Source: Field Survey, 2025

The result in Table 3 demonstrates that, land clearing for farming is a dominant driver of forest loss in Hong LGA. Out of 381 respondents, 270 (70.9%) strongly agreed and 88 (23.1%) agreed, representing a combined 94.0% who acknowledged that agricultural expansion significantly reduces forest cover. Only 4 respondents (1.0%) were undecided, while 19 (5.0%) disagreed, indicating minimal opposition to this perception. The overwhelming level of agreement reflects the high dependence of rural households on crop production and the consequent expansion of farmland into previously forested areas. The results underscore the environmental trade-off between food security needs and ecosystem sustainability, a pattern widely observed in tropical and sub-Saharan regions experiencing rapid agricultural expansion (Geist & Lambin, 2002)

Table 4: Shifting cultivation reduces natural forest recovery

Variable	Frequency	Percent (%)
Strongly Agreed	157	41.2
Agreed	133	34.9
Undecided	26	6.8
Disagreed	52	13.6
Strongly Disagreed	13	3.4
Total	**381**	**100**

Source: Field Survey, 2025

The result in Table 4 indicates that, shifting cultivation is widely perceived as reducing natural forest recovery in Hong LGA. A total of 157 respondents (41.2%) strongly agreed and 133 (34.9%) agreed, summing to 76.1% who affirmed that repeated land use limits forest regeneration. Meanwhile, 26 (6.8%) were undecided, and 65 (17.0%) either disagreed or strongly disagreed, suggesting that some respondents still perceive traditional fallow systems as sustainable under certain conditions. These findings align with research showing that intensified shifting cultivation systems, without adequate fallow restoration, contribute significantly to deforestation and biodiversity decline in developing regions (van Vliet *et al.*, 2012).

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Table 5: Dependence on fuelwood accelerates tree cutting

Variable	Frequency	Percent (%)
Strongly Agreed	242	63.5
Agreed	105	27.6
Undecided	20	5.2
Disagreed	12	3.1
Strongly Disagreed	2	0.5
Total	**381**	**100**

Source: Field Survey, 2025

The result in Table 5 reveals that, dependence on fuelwood is a critical factor accelerating tree cutting in Hong LGA. A combined 347 respondents (91.1%) strongly agreed (242; 63.5%) or agreed (105; 27.6%) that reliance on wood for domestic energy reduces forest cover. Only 20 (5.2%) were undecided, while 14 (3.6%) disagreed or strongly disagreed. In comparison with other drivers, fuelwood dependence ranks second only to land clearing in level of agreement, underscoring the strong link between household energy needs and forest exploitation. These findings correspond with broader evidence that biomass energy reliance remains a major contributor to deforestation in sub-Saharan Africa (IEA, 2019).

Table 6: Slash-and-burn practices degrade soils and forests

Variable	Frequency	Percent (%)
Strongly Agreed	212	55.6
Agreed	133	34.9
Undecided	17	4.5
Disagreed	15	3.9
Strongly Disagreed	4	1.0
Total	**381**	**100**

Source: Field Survey, 2025

The result in Table 6 demonstrates that, slash-and-burn agriculture is widely recognized as degrading soils and forests in Hong LGA. From the responses, 212 (55.6%) strongly agreed and 133 (34.9%) agreed, totaling 90.5% affirmation. Only 17 (4.5%) were undecided, while 19 (4.9%) disagreed or strongly disagreed. Compared with land clearing and fuelwood dependence, slash-and-burn ranks among the most environmentally harmful practices due to its immediate destruction of biomass and long-term soil degradation. The findings are consistent with ecological studies indicating that slash-and-burn systems, particularly under intensified use, contribute to persistent forest degradation and carbon emissions (Lawrence & Vandecar, 2015).

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Table 7: Overgrazing and farmland expansion increase deforestation

Variable	Frequency	Percent (%)
Strongly Agreed	193	50.7
Agreed	135	35.4
Undecided	41	10.8
Disagreed	2	0.5
Strongly Disagreed	10	2.6
Total	**381**	**100**

Source: Field Survey, 2025

The result in Table 7 highlights overgrazing and farmland expansion as major contributors to forest degradation in Hong LGA. A total of 193 respondents (50.7%) strongly agreed and 135 (35.4%) agreed, giving 86.1% confirmation. Additionally, 41 (10.8%) were undecided, while only 12 (3.1%) disagreed or strongly disagreed. Compared to previous variables, overgrazing ranks slightly below land clearing and fuelwood dependence but remains a significant factor. Similar findings have been documented across dryland ecosystems, where uncontrolled grazing and agricultural expansion significantly reduce forest resilience (FAO, 2020).

Table 8: Use of chemical fertilizers and pesticides degrades soil and forests

Variable	Frequency	Percent (%)
Strongly Agreed	155	40.7
Agreed	152	39.9
Undecided	36	9.4
Disagreed	13	3.4
Strongly Disagreed	25	6.6
Total	**381**	**100**

Source: Field Survey, 2025

The result in Table 8 indicates that, the use of chemical fertilizers and pesticides contributes to soil and forest degradation in Hong LGA. A total of 155 respondents (40.7%) strongly agreed and 152 (39.9%) agreed, summing to 80.6% affirmation. Meanwhile, 36 (9.4%) were undecided, and 38 (10.0%) disagreed or strongly disagreed. These findings are supported by environmental studies highlighting the long-term ecological consequences of unsustainable agrochemical application (Lal, 2019).

Table 9: Poor land management promotes forest encroachment

Variable	Frequency	Percent (%)
Strongly Agreed	182	47.8
Agreed	148	38.8
Undecided	19	5.0
Disagreed	32	8.4
Total	**381**	**100**

Source: Field Survey, 2025

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The result in Table 9 highlights poor land management as a significant structural driver of forest encroachment in Hong LGA. A combined 330 respondents (86.6%) strongly agreed (182; 47.8%) or agreed (148; 38.8%) that weak land governance accelerates forest degradation. Only 19 (5.0%) were undecided, while 32 (8.4%) disagreed. The findings underscore the importance of institutional reforms and participatory land-use planning to mitigate deforestation pressures. Similar research emphasizes that effective governance and sustainable land administration are critical in reducing forest loss in developing regions (FAO, 2020).

Conclusion

It is therefore concluded based on the findings of this study that; assessing the role of agricultural practices in accelerating forest degradation in Hong Local Government Area of Adamawa State, Nigeria. Practices such as land clearing for farming, shifting cultivation, fuelwood extraction, slash-and-burn agriculture, overgrazing, and poor land management were widely acknowledged by respondents as major drivers to the depletion of forest. Among these, land clearing and fuelwood dependence emerged as the most significant factors, reflecting the high reliance of local communities on agriculture and biomass energy for their livelihoods. The study further reveals that unsustainable farming methods not only reduce forest cover but also hinder natural regeneration, degrade soil quality, and contribute to long-term ecological imbalance. The high level of agreement among respondents indicates a strong awareness of the environmental impacts of these practices, yet the persistence of such activities suggests the absence of viable alternatives and weak institutional enforcement. Additionally, the interaction between agricultural pressure and climate variability exacerbates forest degradation, increasing the vulnerability of the area to desertification and food insecurity.

The following recommendations are made based on the findings of this study:

Farmers should be encouraged to adopt sustainable farming techniques such as agroforestry, crop rotation, conservation agriculture, and organic farming. These practices will help reduce pressure on forests while maintaining soil fertility and productivity.

Government and development agencies should promote affordable and accessible alternative energy sources such as liquefied petroleum gas (LPG), biogas, and solar energy to reduce dependence on fuelwood and minimize tree cutting.

There is a need for stronger enforcement of existing forestry laws and policies. Local authorities should implement effective monitoring systems and community-based forest management strategies to control illegal logging and forest encroachment.

Large-scale tree planting initiatives should be undertaken to restore degraded forest areas. Community participation should be encouraged to ensure sustainability and local ownership of such programs.

Awareness campaigns and extension services should be intensified to educate farmers and local communities on the long-term impacts of unsustainable agricultural practices and the benefits of forest conservation.

Proper land-use planning should be implemented to regulate agricultural expansion and protect forest reserves. Participatory land management involving local stakeholders will enhance compliance and sustainability.

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