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Assessing Forest Resource Depletion and Rural Livelihood Sustainability in Ovia Southwest, Nigeria using Remote Sensing, GIS, and Qualitative Socio-Economic Data

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ABSTRACT
Forest resources are fundamental to rural livelihoods in sub-Saharan Africa, yet rapid land-use change threatens their sustainability. This study assessed forest cover change, available forest resources, socio-economic drivers of household dependence, and community perceptions of forest contributions to socio-economic development in Ovia Southwest LGA., Edo State, Nigeria. A mixed-methods approach was used to integrate remote sensing and GIS analysis of Landsat imagery (1987–2024), a household survey (n = 390), factor analysis, multiple regression, and chi-square tests. Land use land cover classification revealed that natural environment (forest cover) declined from 76.95% (202,031.28ha) in 1987 to 42.07% (110,449.55ha) in 2024, representing a 50% loss. Disturbed forest increased from 13.48% to 27.80%, while farmland expanded from 6.90% to 26.08%. Factor analysis identified four dominant forest resource categories: timber/charcoal/fibres (35.4% variance), medicinal plants/roots/forest soil (14.8%), fruits/animal fodder (9.9%), and meat/honey (7.0%). Multiple regression showed socio-economic factors significantly influenced household forest dependence (R^2 = 0.279, F = 29.779, $p < 0.001$), with education, age, and occupation as the strongest predictors. Chi-square analysis confirmed that communities perceive a significant contribution of forest resources to socio-economic development (χ^2 = 221.718, df = 32, $p < 0.001$). The study concludes that agricultural expansion and timber extraction are primary drivers of forest degradation, and livelihood diversification interventions are urgently needed to reduce forest dependence while sustaining rural well-being. And recommended implementation of community-participatory forest conservation programmes; investment in rural education/expanded vocational training to provide alternative income sources; and regular monitoring using remote sensing should continue to track forest cover trends and inform adaptive management.

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INTRODUCTION

Forests cover approximately 4 billion hectares globally, providing critical goods such as fuel, food, shelter, and income for an estimated 1 billion people living in extreme poverty (Ali & Rahut, 2018; FAO, 2016). In sub-Saharan Africa, where two-thirds of the population rely on forest products for survival or significant income, forests serve as essential safety nets for rural livelihoods (Olujobi & Olajuyigbe, 2020). Forest resources contribute to employment, food security, medicinal needs, and energy supply, particularly in remote areas with limited access to infrastructure and formal markets (Newton *et al*., 2016; Wale *et al.,* 2022).

Despite their importance, forest ecosystems across West Africa are undergoing rapid transformation due to population growth, agricultural expansion, urbanisation, and weak regulatory frameworks (Bore, 2014; Cheng *et al*., 2019). In Nigeria, high population pressure and limited non-agricultural income opportunities have intensified dependence on forest resources, leading to deforestation, forest degradation, and loss of biodiversity (Olujobi, 2015; Mbani, 2015; Jacob *et al*., 2015). Likewise, in southern Nigeria, particularly in Edo South, human activities have increasingly degraded forest ecosystems, resulting in a steady reduction in forest resources (Akan *et al.,* 2026; Tom *et al.,* 2026; Eighemhenrio *et al*., 2026), which in many rural areas, local residents largely depend on nearby forest resources for their livelihoods (Ema *et al.,* 2025; Goselle *et al.,* 2026; Marcus *et al.,* 2026). Yet, there remains a significant knowledge gap regarding the spatial extent of forest loss, the specific resources communities depend upon, and the socio-economic factors that drive household forest dependence. Without such data, investments in the forest sector remain unbalanced, favouring financial returns over long-term sustainability and the non-cash values forests provide to local populations (Langat *et al.*, 2016; Wale *et al.,* 2022).

Ovia South West Local Government Area in Edo State, Nigeria, lies within the lowland rainforest belt and supports a rich diversity of timber and non-timber forest products (NTFPs). However, increasing human activities, particularly subsistence and large-scale farming, as well as timber extraction, have significantly altered the natural vegetation, reducing primary forests to secondary growth, tree crop plantations, and bush fallow systems. There is an urgent need to quantify forest cover change, identify the resources most critical to local livelihoods, and understand the socio-economic drivers of forest dependence in this understudied region. The findings shall provide evidence-based insights for sustainable management of the forest environment and livelihood diversification strategies.

MATERIALS AND METHODS

Study Area

The study area - Ovia South West Local Government Area, as indicated in Figure 1, is in the south-western part of Edo State, Nigeria (latitudes 6°00'00" to 6°48'50"N; longitudes 4°57'18" to 5°30'00"E). The area covers approximately 262,532 hectares and falls within the lowland rainforest ecological zone, characterised by tall trees, dense undergrowth, and high biodiversity. Major land uses include secondary lowland rainforest, swamp forest strips along floodplains, oil palm and rubber plantations, and patches of farmland and fallow land.

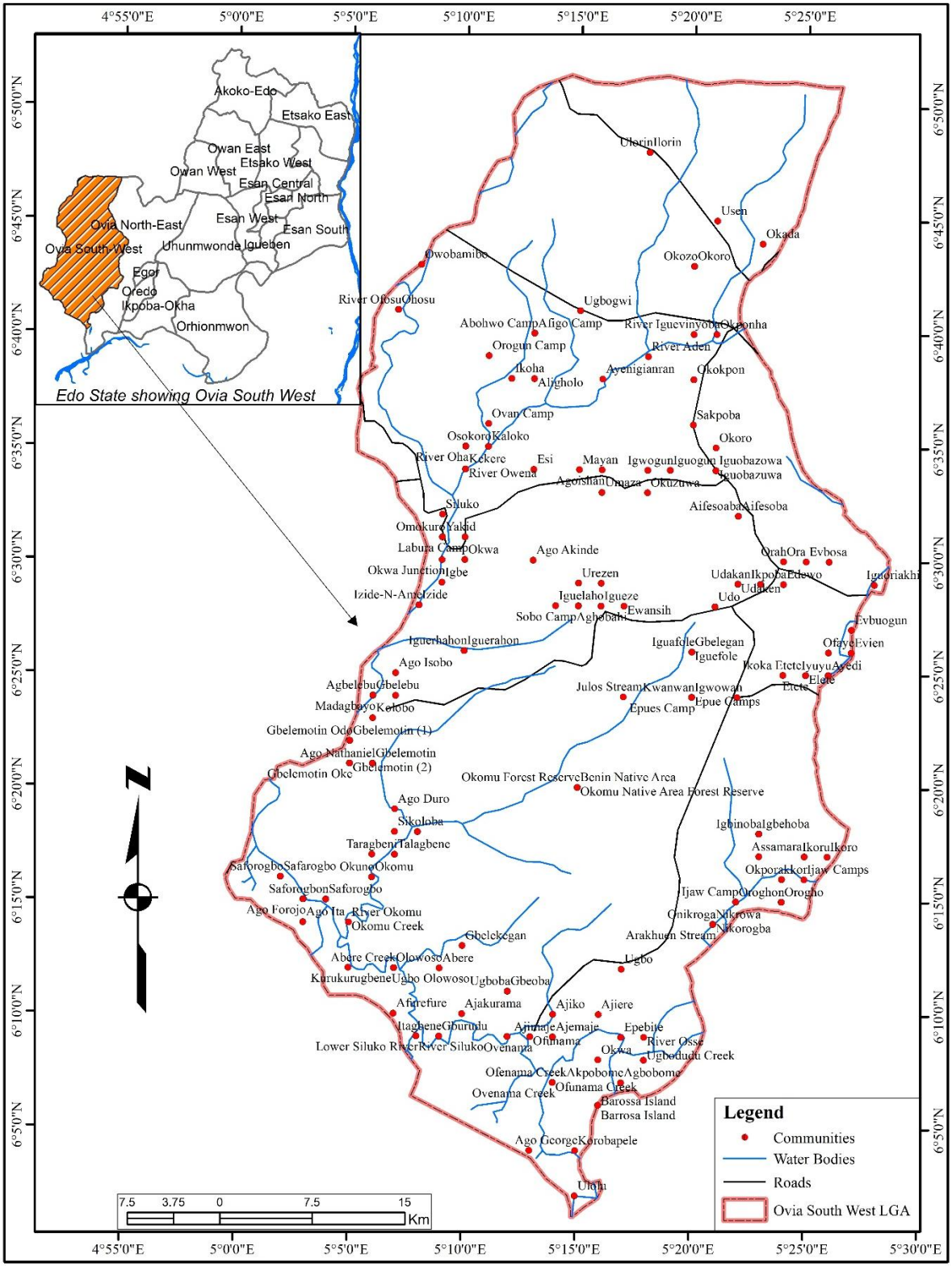


Figure 1: Ovia South West Local Government Area – The Study Area

Research Design and Data Collection

A survey research design was adopted, integrating primary and secondary data. Primary data were collected using structured questionnaires administered to 390 randomly selected households across eight communities (Okomu, Iguariakhi, Etete, Abere, Iguerhahon, Udo, Safarogbo, and Umaza Camp) between January and April 2026. The sample size was determined using the Taro Yamane formula (n = 394), with a 98.9% response rate (n = 390). The questionnaire captured demographic characteristics,

forest resource use, methods of extraction, income from forest products, and perceptions of forest contributions to socio-economic development. Secondary data comprised Landsat 5 and Landsat 8 satellite imagery (30 m resolution) for 1987 and 2024 obtained from the United States Geological Survey (USGS), an administrative map of Edo State, and national population census reports.

GIS and Remote Sensing Analysis

To map forest cover change, Landsat images of 1987 and 2024 were pre-processed using the Earth Resources Data Analysis System (ERDAS) 10.5 software. Images were pansharpened to 30m resolution, masked to the study area boundary, and subjected to supervised classification. Four land cover classes were delineated: forest (dense evergreen and deciduous forests), disturbed forest (secondary forest, bush fallow, and derived forest), farmland (existing cultivated land), and built-up area (settlements, barren land, and infrastructure). Classification accuracy was validated using high-resolution Google Earth imagery and GPS ground-truth data. The area in hectares for each class was calculated for 1987 and 2024.

Statistical Analysis

Data were analysed using SPSS version 25. Descriptive statistics (frequencies, percentages, means) summarised demographic characteristics and forest resource use. Factor analysis (principal component extraction with Varimax rotation) identified dominant forest resource categories based on 15 resource types reported by respondents. Multiple regression analysis examined the effect of socio-economic factors (age, gender, education, occupation, and marital status) on household forest dependence. Chi-square test assessed the association between forest resource contribution and socio-economic development. The significance level was set at $\alpha = 0.05$.

RESULTS AND DISCUSSION

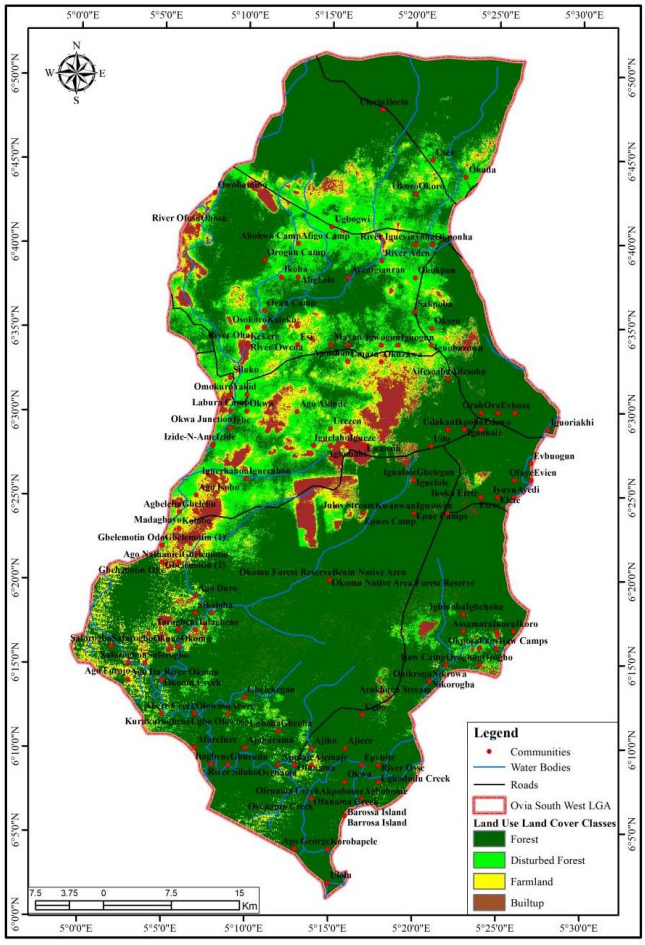
Forest Cover Change (1987–2024)

Land use and land cover analysis revealed substantial forest loss over the 37-year period (Table 1, Figures 2 and 3). In 1987, natural forest covered 202,031.28 hectares (76.95% of total land area). By 2024, natural forest had declined to 110,449.55 hectares (42.07%), representing a loss of 91,581.73 hectares (50% of the 1987 forest cover). Concurrently, disturbed forest increased from 35,393.79 ha (13.48%) to 72,960.75 ha (27.80%), a gain of 37,566.96 ha. Farmland expanded dramatically from 18,102.14 ha (6.90%) to 68,487.48 ha (26.08%), accounting for 27.51% of total land cover change. Built-up area increased minimally from 7,005.45 ha (2.67%) to 10,634.88 ha (4.05%). Total forested area (forest + disturbed forest) decreased from 90.43% to 69.87% of the landmass over the study period.

Table 1: Land Cover Change in Ovia South West LGA (1987–2024)

Land Cover Class Status	1987 in Hectares	%	2024 in Hectares	%	Change in Hectares	% Change
Forest	202,031.28	76.95	110,449.55	42.07	-91,581.73	50
Disturbed Forest	35,393.79	13.48	72,960.75	27.80	37,566.96	20.51
Farmland	18,102.14	6.90	68,487.48	26.08	50,385.34	27.51
Built-up	7,005.45	2.67	10,634.88	4.05	3,629.43	1.98
Total	262,532.66	100.00	262,532.66	100.00	-	100

Source: Researcher's Compilation, 2026. Extracted from Landsat Satellite Imagery of 1987 & 2024



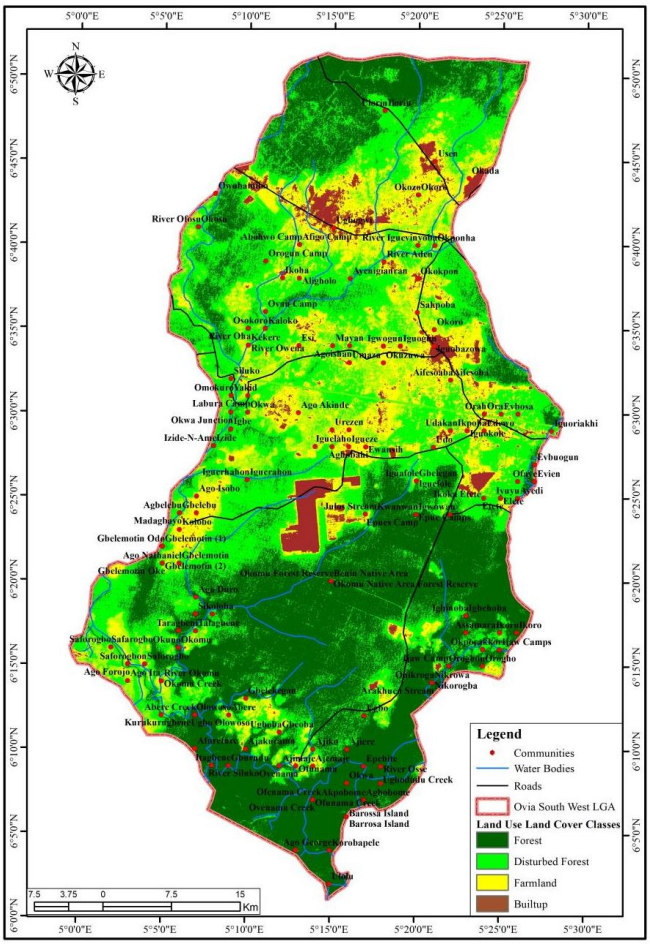


Figure 2: LULC Map of Ovia South West for 1987 Figure 3: LULC Map of Ovia South West for 2024
Source: Extracted from Landsat Satellite Imagery of 1987 & 2024

Identification of Forest Resources

The respondents reported 15 types of forest resources available in the study area, including both timber and non-timber forest products (NTFP), such as timber, charcoal, honey, medicinal plants, poles, thatch grass, fruits, animal fodder, forest soils, stones, mushrooms, fibres, meat, among others. The factor analysis technique in the Statistical Package for social sciences (SPSS) was used to assess the available forest resources from respondents, and the result is presented in Table 4.6. Factor analysis extracted four components with eigenvalues >1.00, explaining 67.16% of total variance (Table 2). Factor 1 (Timber/Wood Factor) loaded highly on timber, charcoal, and fibres (variance = 35.41%). Factor 2 (Medicinal/Root Factor) loaded highly on roots, medicine, and forest soil (14.77%). Factor 3 (Fruit/Fodder Factor) loaded highly on fruits and animal fodders (9.95%). Factor 4 (Meat/Honey Factor) loaded highly on meat and honey (7.03%). Timber and wood-based products thus represent the most dominant forest resource category.

Table 2: Rotated Component Matrix for Forest Resources

Resource	Component 1 (Timber)	Component 2 (Medicinal)	Component 3 (Fruit/Fodder)	Component 4 (Meat/Honey)
Charcoal	0.972			
Timber	0.972			
Fibres	0.970			
Root		0.838		
Medicine		0.838		
Forest soil		0.437		
Fruits			0.846	
Animal fodders			0.802	
Meat				0.812

Honey				0.836
Eigenvalue	5.312	2.215	1.492	1.054
% Variance	35.41%	14.77%	9.95%	7.03%

Note: Extraction method – Principal Component Analysis; Rotation – Varimax with Kaiser Normalisation.

Socio-Economic Factors Influencing Household Forest Dependence

Multiple regression analysis examined the effects of five socioeconomic variables (age, gender, education, occupation, and marital status) on households' dependence on forest resources. The model was statistically significant ($F = 29.779$, $p < 0.001$), rejecting the null hypothesis that socio-economic factors have no effect. The R^2 value of 0.279 indicated that the independent variables collectively explained 27.9% of the variance in household forest dependence. Education, age, and occupation were the strongest predictors, followed by gender and marital status (Table 3).

Table 3: Multiple Regression Summary for Socio-Economic Factors

Predictor	Standardised Coefficient (Beta)	t-value	p-value
Education	-0.341	-6.872	<0.001
Age	0.285	5.744	<0.001
Occupation	0.272	5.483	<0.001
Gender	0.158	3.186	0.002
Marital Status	0.112	2.258	0.024

$R = 0.529$; $R^2 = 0.279$; Adjusted $R^2 = 0.270$; $F(5,384) = 29.779$; $p < 0.001$

Source: Researchers ' computation from SPSS Analysis (2026)

Community Perceptions of Forest Contributions to Socio-Economic Development

The Chi-square analysis tested the association between forest resource contribution and socio-economic development. The result was highly significant ($\chi^2 = 221.718$, $df = 32$, $p < 0.001$), rejecting the null hypothesis. Over 84% of respondents agreed that forest resources contribute substantially to local socio-economic development, citing employment, income generation (with 47.7% earning >₦200,000 annually from forest products), and provision of construction materials, medicine, and food as primary benefits.

Discussion

Forest Cover Change and Drivers of Deforestation

This study documents a 50% loss of natural forest environment in Ovia South West between 1987 and 2024, representing an annual deforestation rate of approximately 1.35%. This rate is higher than the national average for Nigeria (estimated at 0.8–1.0% per year) and consistent with hotspots identified in the Niger Delta region (Suleiman *et al*., 2017; Fokeng *et al*., 2020). The expansion of farmland (27.51% increase) as the primary end-use of cleared forest confirms that agricultural expansion, rather than urbanisation, is the main driver. This finding aligns with studies across sub-Saharan Africa, where smallholder agriculture and cash crop plantations (oil palm and rubber) are leading causes of forest loss (Hosonuma *et al*., 2012; Kissinger *et al*., 2012). The concurrent 20.51% increase in disturbed forest indicates that degradation is occurring even where complete clearance is avoided. Selective logging, fuelwood collection, and shifting cultivation transform natural forested environment into secondary forests with reduced biodiversity and lower economic value. This degradation pathway is particularly threatening because it reduces forest quality incrementally, often escaping detection in coarse-resolution deforestation analyses.

Forest Resources and Livelihood Dependence

The factor analysis revealed that timber, charcoal, and fibres constitute the most dominant resource category, explaining over one-third of resource variance. This finding is consistent with studies across Nigeria (Olujobi & Olajuyigbe, 2020; Mbani, 2015) and other developing countries (Saifullah *et al*., 2018; Ullah *et al*., 2021a), where wood products remain primary forest outputs. However, the high loading of charcoal alongside timber is concerning, as charcoal production is often associated with inefficient, low-technology processes that waste substantial biomass and accelerate forest degradation (Mwampamba *et al*., 2013).

The emergence of medicinal plants and roots as the second factor (14.8% variance) underscores the importance of forests as natural pharmacies for rural communities, corroborating studies in South Africa (Dalu *et al*., 2021) and Ethiopia (Fikir *et al*., 2016). This finding highlights a critical policy gap: conservation programmes that focus solely on timber may overlook the medicinal values that are equally vital to household well-being. The significant contribution of fruits, fodder, meat, and honey (combined 17% variance) confirms the multi-functional role of forests in food security and nutrition (Sunderland & Ndoye, 2014). These NTFPs provide essential

micronutrients and protein that complement starch-based diets, particularly during seasonal food shortages (Onuche, 2011; Awe *et al*., 2011).

Socio-Economic Drivers of Forest Dependence

The regression analysis identified education as the strongest negative predictor of forest dependence. This aligns with the theory that education opens alternative employment opportunities and promotes adoption of modern energy sources, reducing reliance on forest extraction (Fonta & Ayuk, 2013; Hedges & Enters, 2000). Inoni (2009) similarly found that each additional year of secondary education reduced forest participation by 0.64% in Delta State, Nigeria. The implication for policy is clear: investing in rural education and vocational training may yield dual benefits of poverty reduction and forest conservation.

Age was a positive predictor, indicating older individuals are more forest-dependent, likely due to accumulated traditional ecological knowledge and limited alternative livelihood options in later life (Kohlin & Parks, 2001). However, this finding contrasts with Garekae *et al*. (2017) in Botswana, who reported decreasing dependence with age. The discrepancy may reflect differences in local land tenure systems and the availability of social pensions.

Occupation as a strong predictor confirms that households engaged in agriculture and unskilled labour exhibit the highest forest dependence, aligning with the sustainable livelihoods' framework where natural capital substitutes for limited financial and physical capital (Babulo *et al*., 2008; DFID, 2000). The significant but weaker effect of gender reflects gendered divisions in forest product collection, with men dominating timber extraction (higher income, higher impact) and women focusing on NTFPs (subsistence-orientated; generally lower impact) (Shackleton & Shackleton, 2004; Ekong, 2003).

Community Perceptions and Policy Implications

The strong community consensus that forests contribute significantly to socio-economic development validates the instrumental value of forest resources. However, this high valuation presents a paradox: the same dependence that provides short-term welfare undermines the long-term resource base. With 47.7% of respondents earning over ₦200,000 annually from forest products, the economic incentive for unsustainable extraction is substantial. Effective policy interventions must therefore address both supply-side (forest management) and demand-side (livelihood alternatives) factors. Payment for Ecosystem Services (PES) schemes, community forest management agreements, and agroforestry extension programmes have shown promise in similar contexts (Newton *et al*., 2016; Angelsen et al., 2014). Critically, any intervention must be participatory, democratic, and bottom-up, integrating local communities in planning, design, and implementation.

CONCLUSION

This study provides empirical evidence of substantial forest environment loss (50% reduction in natural forest cover over 37 years) in Ovia South West LGA, driven primarily by agricultural expansion. Timber, charcoal, and fibres are the most dominant forest resources, followed by medicinal plants, fruits, fodder, meat, and honey. Socio-economic factors, particularly education, age, and occupation, significantly influence household forest dependence, with education serving as the strongest negative predictor. Communities perceive forests as indispensable to their socio-economic well-being, a perception validated by high annual incomes from forest products.

RECOMMENDATIONS

To reconcile livelihood needs with forest conservation, the following recommendations are made: (1) governments should implement community-participatory forest conservation programmes that integrate local populations in planning and decision-making; (2) investment in rural education and vocational training should be expanded to provide alternative income sources; (3) sustainable NTFP extraction and value-adding processing (e.g., honey and medicinal plant products) should be promoted as lower-impact livelihood options; (4) agroforestry and climate-smart agriculture should be incentivised to reduce pressure for agricultural expansion into natural forests; and (5) regular monitoring using remote sensing should continue to track forest cover trends and inform adaptive management.

REFERENCES

Ali, A., & Rahut, D. (2018). Forest-based Livelihoods, Income, and Poverty: Empirical Evidence from the Himalayan Region of Rural Pakistan. *Journal of Rural Studies*, 57, pp 44-54.

Akan, A. T. and Marcus, M. E. (2026). Drivers and Socio-economic Repercussions of Urban Expansion in a Rapidly Growing Secondary City: Evidence from Uyo Capital City, Nigeria. *Global Academic International Journal of Art and Social Sciences (GAIJASS*), 1(1): pp 1 -11.

Akan, A. T. and Eighemhenrio, D. E. (2026). Geospatial Investigation of Shoreline and Land Cover Changes in Ilaje LGA Coastal Stretch, Nigeria (1987-2024. *Global Academic International Journal of Multidisciplinary (GAIJM)*, 1(1): pp 1 -13.

Angelsen, A., Jagger, P., Babigumira, R. (2014). Environmental Income and Rural Livelihoods: A Global-

Comparative Analysis. *World Development*, 64(1), pp 12-28.

Awe, F. (2011). Forest Resources and Food Security in Nigeria. *Journal of Sustainable Agriculture*, 35(3), pp 234-249.

Babulo, B., Muys, B., Nega, F. (2008). Household Livelihood Strategies and Forest Dependence in the Highlands of Tigray, Northern Ethiopia. *Agricultural Systems*, 98, pp 147-155.

Bore, N. (2014). *A Struggle between Livelihood and Forest Conservation*. Institute of Development Studies, University of Nairobi.

Chazdon, R. L. (2014). *Second Growth: The Promise of Tropical Forest Regeneration in an Age of Deforestation*. University of Chicago Press.

Cheng, S. H., MacLeod, K. & Ahlroth, S. (2019). A Systematic Map of Evidence on the Contribution of Forests to Poverty Alleviation. *Environmental Evidence*, 8, p 3.

Dalu, M. T., Gunter, A. W., Makatu, M. (2021). Contribution of Natural Forest Products to Rural Livelihoods at Mavunde and Sambandou Villages, South Africa. *Sustainability*, 13: p 4252.

DFID. (2000). *Sustainable Livelihoods Guidance Sheets*. Department for International Development.

Eighemhenrio, D. E. and Tom, A. A. (2026). Spatio-Temporal Analysis of Forest Cover Dynamics (1987-2024) and its Implications for Conservation in Ovia South-West, Edo State, Nigeria. *Alvan Journal of Social Sciences* (AJSS), 3(1): pp 897 – 906.

Ekong, E. (2003). Gender Dimensions in Forest Resource Use in Rural Nigeria. *African Journal of Environmental Studies*, 4(2), pp 45-56.

Ema, E., Etim, E., Tom, A., Ansa, I., Ituen, U., Ekpenyong, R., Inyanam, M. & Akpan, U. (2025). Remote Sensing Based-Assessment of Land Use and Land Cover Dynamics in Mangrove Vegetation, Akwa Ibom State, Nigeria (1986-2024). *Global Journal of Environmental Science and Sustainability (GJESS)*, 2(2): pp 92-103.

FAO. (2016). *State of the World's Forests: Forests and Agriculture – Land-Use Challenges and Opportunities*. Food and Agriculture Organisation.

Fikir, D., Tadesse, W., & Gure, A. (2016). Economic Contribution to Local Livelihoods and Households' Dependency on Dryland Forest Products in Hammar District, Ethiopia. *International Journal of Forestry Research*, 1, pp 1-11.

Fokeng, R. M., et al. (2020). Forest Cover Change Dynamics in Cameroon. *Journal of Land Use Science*, 15(4), pp 456-472.

Fonta, W. M., & Ayuk, E. T. (2013). Measuring the Role of Forest Income in Mitigating Poverty in Rural Nigeria. *Forest Policy and Economics*, 34, pp 19-27.

Garekae, H., Thakadu, O., & Lepetu, J. (2017). Socio-Economic Factors Influencing Household Forest Dependency in Chobe Enclave, Botswana. *Ecological Processes*, 6, p 40.

Goselle, N. T. and Tom, A. A. (2026). Application of Geospatial Technology in Assessing Urban Expansion in Benin and Environs – Implications on Climate Change. *Int. J. Renew. Energy & Environ,* 4(1): pp 104-116.

Hedges, S., & Enters, T. (2000). *Forest Products and Household Economies*. FAO Regional Office.

Hosonuma, N., Herold, M. and De Sy, V. (2012). An Assessment of Deforestation and Forest Degradation Drivers in Developing Countries. *Environmental Research Letters*, 7(4), 044009.

Inoni, O. E. (2009). Forest Resource Exploitation and Rural Livelihoods in Delta State, Nigeria. *Journal of Environmental Management*, 90(2), pp 1120-1128.

Jacob, D. E., Nelson, I. U., Okoh, K. S. & Tom, A. A. (2015). Trend in Land Use/Cover Changes in Stubbs Creek Forest, Akwa Ibom State, Nigeria. *International Journal for Research in Business, Management and Accounting,* 1(1), pp 123 - 130.

Kissinger, G., Herold, M., & De Sy, V. (2012). *Drivers of Deforestation and Forest Degradation*. Lexeme Consulting.

Kohlin, G., & Parks, P. J. (2001). Spatial Variability and Disincentives to Harvest: Deforestation and Fuelwood Collection in South Asia. *Land Economics*, 77(2), pp 206-218.

Langat, D. K. (2016). Valuation of Forest Resources in Developing Countries. *Forest Policy and Economics*, 72, pp 103-112.

Marcus, M. E., Tom, A. A. & Ituen, U. J. (2026). Spatio-Temporal Dynamics of Urban Expansion and Land

Use/Land Cover Change in Uyo Capital City, Nigeria (1986 2024): A Remote Sensing and GIS-Based Analysis. Global Academic *International Journal of Information Sciences and Technology (GAIJIST)*, 1(1), pp 1 -13.

Mbani, A. O. (2015). Contributions of Forest Resources to Rural Household Income in Enugu State, Nigeria. *Journal of Forestry Research*, 26(3), pp 721-730.

Mwampamba, T. H. (2013). Charcoal and forest degradation in Sub-Saharan Africa. *Energy for Sustainable Development*, 17(6), pp 577-588.

Newton, P., Miller, D., Byenkya, M., & Agrawal, A. (2016). Who are forest-dependent people? A Taxonomy to Aid Livelihood and Land Use Decision-Making. *Land Use Policy*, 57, pp 388-395.

Olujobi, O. (2015). Evaluation of the Contributions of Ikere Forest Reserve to Sustainable Livelihood of Adjoining Communities in Ekiti State. *Journal of Research in Forestry, Wildlife and Environment*, 7, pp 103-114.

Olujobi, O., & Olajuyigbe, B. (2020). Socio-economic Contributions of Forest Products to Rural Livelihood: A Case Study of Aramoko Forest Reserve, Ekiti State. *Journal of Agriculture and Crops*, 6(8), pp 105-112.

Onuche, O. (2011). Forest v Vegetables and Household Food Security in Nigeria. *African Journal of Food Science*, 5(8), pp 472-479.

Saifullah, M., Kari, F. & Othman, A. (2018). Income Dependency on Non-Timber Forest Products: Empirical Evidence of Indigenous People in Peninsular Malaysia. *Social Indicators Research*, 135, pp 215-231.

Shackleton, C. M. & Shackleton, S. E. (2004). The Importance of Non-Timber Forest Products in Rural Livelihoods Security. *International Forestry Review*, 6(1), pp 15-26.

Suleiman, M. S. (2017). Spatial and Temporal Analysis of Forest Cover Change in Falgore Game Reserve, Kano, Nigeria. *FUDMA Journal of Sciences*, 1(2), pp 45-58.

Sunderland, T. & Ndoye, O. (Eds.). (2014). *Forest Products, Livelihoods and Conservation: Case Studies of Non-timber Forest Product Systems* (Vol. 2 – Africa). CIFOR.

Ullah, S. (2021a). Socioeconomic Impacts of Livelihood from Fuelwood and Timber Consumption on Forest Environment: Evidence from Basho Valley, Pakistan. *Forests*, 12, p 245.

Wale, E., Nkoana, M. A., & Mkuna, E. (2022). Determinants of Rural Household Livelihood Dependence on Non-Timber Forest Products: A Case Study from Inanda Community, South Africa. *Frontiers in Forests and Global Change*, 5, pp 788-815.