Assessing the Extent of Land Degradation Resulting from Deforestation Activities in Boki Local Government Area of Cross River State, Nigeria

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Abstract
This study assessed the extent of land degradation resulting from deforestation activities in Boki Local Government Area of Cross River State, Nigeria, between 2005 and 2025. The study adopted a spatial assessment approach using multi-temporal Landsat satellite imagery obtained from the United States Geological Survey EarthExplorer. Landsat 7 Enhanced Thematic Mapper Plus imagery was used for 2005 and 2015, while Landsat 9 Operational Land Imager/Thermal Infrared Sensor imagery was used for 2025. The satellite images were processed and corrected before classification and analysis in Quantum Geographic Information System (QGIS). Five land use and land cover classes were identified: forest land, vegetation, built-up areas, bare surfaces and water bodies. The extent of land degradation was assessed by calculating the area and percentage of each land-cover class and comparing the changes recorded across the three periods. The results revealed a continuous decline in forest and vegetation cover during the study period. Forest land decreased from 102,133.68 hectares (35.98%) in 2005 to 93,101.97 hectares (32.80%) in 2025, representing a loss of 9,031.71 hectares. Similarly, vegetation cover declined from 149,478.47 hectares (52.66%) to 134,191.17 hectares (47.28%), representing a loss of 15,287.30 hectares. In contrast, built-up areas increased from 22,494.91 hectares (7.92%) to 45,112.65 hectares (15.89%), while bare surfaces increased from 4,340.07 hectares (1.53%) to 6,160.55 hectares (2.17%). Water bodies recorded a slight decrease of 119.22 hectares. These findings indicate progressive changes in the natural landscape and increasing pressure on forest and vegetation resources in the study area. The study concludes that deforestation and associated land-use changes have contributed to land degradation in Boki Local Government Area, with implications for soil protection, biodiversity, water resources and the livelihoods of forest-dependent communities. The study recommends strengthening forest protection and enforcement, promoting agroforestry and forest restoration, improving land-use planning, encouraging community participation and providing sustainable livelihood alternatives. It also recommends regular monitoring of land cover changes using satellite imagery and Geographic Information Systems to support effective forest conservation and sustainable land management in the area.

Keywords: *Land Degradation, Deforestation, Forest Degradation, Land Use and Land Cover, Landsat imagery.*

1. Introduction

Forest degradation refers to a decline in the condition, structure, productivity and ecological functioning of forests. Unlike deforestation, which converts forest to another land use or involves long-term loss of forest cover, degradation can happen while the forest is still classified as forest. It reduces the capacity of forests to deliver ecosystem services such as carbon storage, biodiversity conservation, soil protection and livelihood resources (FAO, 2020). The main causes include unsustainable logging, overexploitation of forest resources, road construction, mining, shifting cultivation and other land-use activities (FAO, 2020).

Globally, forest loss and degradation remain major environmental challenges because of their effects on biodiversity, climate regulation and human livelihoods. The FAO (2020) reported that forests covered approximately 4.06 billion hectares globally, about one-third of the world's land area. Yet approximately 420 million hectares of forest had been lost through deforestation since 1990. Although the global rate of net forest loss declined over the period, Africa recorded the highest annual rate of net forest loss between 2010 and 2020, estimated at about 3.9 million hectares per year (FAO, 2020). Forest degradation is also harder to detect and quantify than deforestation because it can occur without an immediate change from forest to another land-cover class (FAO, 2020).

Agricultural expansion, logging and other forms of resource extraction are among the major drivers of forest loss in tropical regions. Curtis et al. (2018), using global spatial data on forest loss between 2001 and 2015, identified commodity-driven agriculture, forestry, shifting agriculture and wildfire as the main drivers of tropical forest loss. More recent assessments continue to identify agricultural expansion as a direct driver of deforestation, while timber extraction and mining also contribute to forest loss and degradation (Feng et al., 2023). The expansion of agricultural frontiers matters because forests are frequently cleared or modified to create land for crop production and other economic activities.

African forests face similar pressures. Forest loss varies across regions, with agricultural expansion, shifting cultivation, timber extraction and infrastructure development contributing to changes in forest cover. In the Upper Guinean Forest region of West Africa, for example, logging and shifting agriculture have been identified as major contributors to forest loss, while cocoa and oil-palm cultivation have also driven the conversion of natural forest to agricultural land (Curtis et al., 2018). The loss and degradation of African forests affect biodiversity, carbon storage, soil resources and the livelihoods of communities that depend on forest products.

In Nigeria, forest degradation and deforestation are persistent concerns. Gbadebo et al. (2022) observed that unsustainable forest management practices and increasing human pressure on forest resources contribute to forest degradation, biodiversity loss and disruption of ecological processes. The country's forest resources face pressure from agricultural activities, timber exploitation and other forms of land-use change, which reduce the ability of forests to provide environmental services and socioeconomic benefits.

Boki Local Government Area (LGA) in Cross River State is a relevant case for examining these processes because of its extensive rainforest, biodiversity and dependence on forest-related livelihoods. The area is part of the wider Cross River rainforest landscape, which contains habitats and species of conservation significance. The Okwangwo landscape, within the Cross River National Park, supports tropical moist forest and species including the Cross River gorilla, forest elephant, chimpanzee and drill (UNESCO, 2020). Because of this ecological significance, changes in forest condition have direct consequences for biodiversity conservation and resource management.

Historically, forests in Boki have provided communities with timber, non-timber forest products, agricultural land and other resources. Forest-dependent communities obtain food, medicinal plants, fruits and other materials from the forest, while agriculture remains a major livelihood activity. Recent research confirms the importance of cocoa production to small-scale farmers in Boki LGA, with farm resources, labour, planting materials and capital influencing cocoa production (Oniah et al., 2024). The presence of commercially valuable rainforest tree species within cocoa plantations also points to the close relationship between agricultural production and the remaining forest resources of Boki (Offiong et al., 2025).

Forest degradation in Boki is tied to increasing pressure on land and forest resources. Agricultural expansion, particularly cocoa production, can involve the modification or clearing of forest vegetation, while timber extraction and other forest-resource activities may alter forest structure and composition. A recent study in Boki and other cocoa-producing areas of Cross River State identified numerous commercially valuable rainforest tree species within cocoa plantations, indicating that cocoa landscapes can retain substantial tree resources while also reflecting changes from natural forest conditions (Offiong et al., 2025). Recent research on forest-resource utilisation in Boki has also emphasised the importance of community participation in protecting remaining forest resources (Kujoh et al., 2025).

Reports of growing concern about forest loss in Cross River State reflect these pressures. The Cross River State Government raised concerns in 2024 about activities contributing to forest depletion and called for sustainable environmental practices and greater cooperation among stakeholders in protecting the state's forest resources (Cross River State Government, 2024). This concern is relevant to Boki because of the LGA's location within one of Nigeria's most significant rainforest and biodiversity landscapes.

The consequences of forest degradation and deforestation go beyond the reduction of tree cover. Loss and deterioration of forest vegetation can affect biodiversity, soil quality, water regulation, carbon storage and the availability of forest products. For communities whose livelihoods depend on agriculture and forest resources, continued forest degradation can also affect food security and household income. Evidence from Boki indicates that communities depend on forest products for food and livelihood, while agricultural production, especially cocoa farming, is a major component of the local economy (Oniah et al., 2024; UNESCO, 2020).

The future management of Boki's forest environment requires greater attention to conservation, sustainable agriculture, agroforestry, community participation and effective forest management. Recent research in Boki has identified agroforestry and afforestation as possible approaches for improving sustainable forest-resource management in the LGA (Agomobi & Ambe, 2025). These approaches can maintain tree cover while supporting agricultural production and reducing pressure on natural forests.

Although the ecological and socioeconomic value of forests in Boki is well recognised, there has been no detailed assessment of the extent of land degradation associated with deforestation activities within the LGA. Understanding changes in forest and other land-cover classes over time is necessary for establishing the spatial and temporal pattern of environmental change, and for determining how the loss and transformation of forest areas may affect biodiversity, soil resources, water resources and agricultural land. This study therefore focuses on assessing the extent of land degradation resulting from deforestation activities in Boki Local Government Area using spatial and field-based evidence.

2. Material and Methods

2.1 Study Area

Boki Local Government Area (LGA) is in Cross River State, Nigeria, in the southern part of the country within the South-South geopolitical zone. It is bordered by Ikom and Etung Local Government Areas within Cross River State and shares an international boundary with the Republic of Cameroon to the east. The LGA sits approximately between latitude 6.25° N and longitude 9.03° E, placing it within the tropical rainforest belt of southeastern Nigeria. Its location and climate produce the dense forest vegetation and ecological diversity the area is known for (Cross River State Government, 2025; UNESCO, 2020). Figure 1.

Boki LGA was created on 28 August 1991. The area is known for agricultural and forest-based economic activities, particularly cocoa, coffee, timber and palm products. Cocoa production matters to rural livelihoods here, where small-scale farmers depend on land, labour, farm inputs and other resources (Oniah et al., 2024). Research has also found commercially valuable rainforest tree species within cocoa plantations in Cross River State, showing that agricultural production and forest resources remain closely linked in practice (Offiong et al., 2025).

Like other local government areas, Boki has cultural traditions and social practices that distinguish its communities. Traditional dressing, festivals, communal activities and social gatherings shape the cultural identity of the people. Major cultural activities include the Boki New Yam Festival, Irruan cultural activities, Edien Festival, Borum Festival and cassava-related celebrations, with music and traditional performances accompanying these occasions. These practices, passed down across generations, form the social context within which agricultural and natural-resource activities take place (Boki Local Government Council, 2025). The people of Boki maintain a social lifestyle built around inter-village cultural activities, age-grade meetings, burial ceremonies, communal farming and other forms of interaction. Traditional markets such as Okundi, Ntamarte, Kakwagom and Wula serve as centres for exchanging agricultural produce, forest products and other goods, supporting local economic activity (Cross River State Government, 2025). Agriculture remains the backbone of the local economy, and cocoa is a major livelihood for small-scale farmers. Oniah et al. (2024) reported that the use of farm resources is closely associated with cocoa production among small-scale farmers in Boki LGA.

The forest vegetation of Boki provides habitats for wildlife and gives the area its ecological significance. The Okwangwo Division of Cross River National Park is part of the wider forest landscape of Boki and the Nigeria–Cameroon rainforest region, supporting tropical moist forest and diverse plant and animal species, including the Cross River gorilla, forest elephant, chimpanzee and drill. Okwangwo stands out for its relatively intact forest ecosystems and the presence of species of high conservation importance (UNESCO, 2020). The forest also supplies timber and non-timber products medicinal plants, fruits, rattan and other materials that surrounding communities rely on, while performing ecological functions such as soil protection and maintenance of water resources (UNESCO, 2020).

But agricultural activity and forest-resource use are placing growing pressure on the natural vegetation. The presence of commercially valuable rainforest tree species within cocoa plantations shows how forest and agricultural land use are shifting in relation to each other (Offiong et al., 2025). Boki's position within the wider Cross River rainforest and the Nigeria–Cameroon transboundary landscape adds to its ecological relevance: the area contains forest habitats that support biological diversity and threatened wildlife, with Okwangwo in particular recognised for its biodiversity value (UNESCO, 2020). The mix of natural forest, agricultural land and human

settlements means that changes in land use carry real environmental and socioeconomic consequences.

These features make Boki LGA a fitting setting for assessing the extent of land degradation resulting from deforestation. The LGA combines extensive forest resources, biodiversity conservation areas, agricultural production and communities whose livelihoods depend on land and forest resources. Cocoa production, forest-product use and the presence of valuable rainforest species all illustrate how closely human activities and the natural environment are connected here (Oniah et al., 2024; Offiong et al., 2025; UNESCO, 2020). Changes in forest cover and their effects on vegetation, soil, biodiversity, water resources and agricultural land make Boki a relevant area for investigating land degradation associated with deforestation.

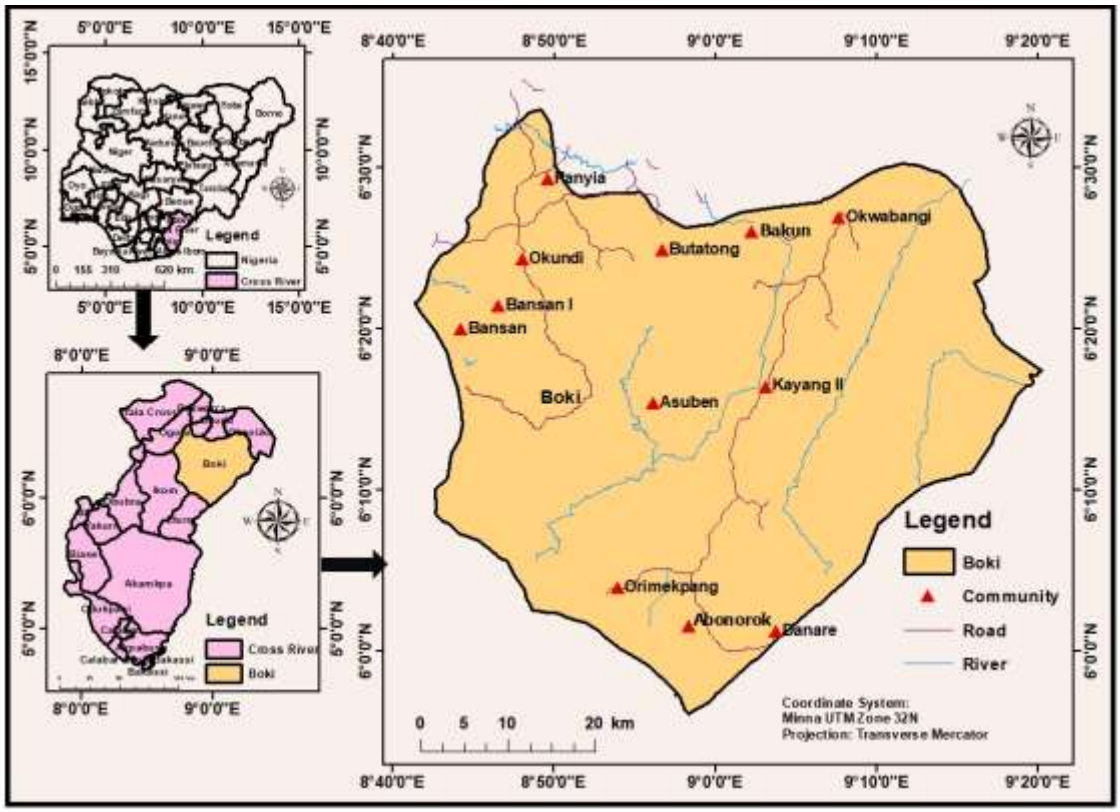


Figure 1: Map of Cross River State showing the Study Area

2.2 Methodology

Research Design

The extent of forest degradation in Boki Local Government Area was assessed using multi-temporal Landsat satellite imagery for 2005, 2015 and 2025, obtained from the United States Geological Survey (USGS) Earth Explorer. Landsat 7 ETM+ imagery was used for the earlier years, while Landsat 9 OLI/TIRS imagery was used for 2025. The acquired imageries were processed and corrected to improve their quality and suitability for land use/land cover analysis. The corrected images were subsequently analysed using QGIS to identify and classify the major land-cover types within the study area.

The images were classified into forest land, vegetation, built-up area, bare surface and water bodies. The area occupied by each land-cover class was calculated in hectares and expressed as a

percentage of the total area for each reference year. The extent of forest degradation was determined through a comparison of forest and vegetation cover across 2005, 2015 and 2025. The change in area was calculated as the difference between the area recorded in 2005 and 2025, while the percentage change was determined by relating the change in area to the 2005 area. A decline in forest and vegetation cover was taken as an indication of forest degradation, while increases in built-up and bare surfaces were examined as evidence of forest conversion and increasing human pressure. The resulting land-cover maps and change statistics were used to determine the extent and spatial pattern of forest degradation in Boki Local Government Area between 2005 and 2025.

3. Results and Discussion

The Extent of Forest Degradation Due to Degradation Activities

Table 1 showed that land degradation has intensified in the study area between 2005 and 2025 due to increasing human activities. The rise in bare surfaces from 4,340.07 ha (1.53%) in 2005 to 6,160.55 ha (2.17%) in 2025 indicates that more land has become exposed through the removal of vegetation. Figure 2, 3, and 4. Exposed soil is more vulnerable to erosion, loss of soil nutrients, declining moisture retention, and reduced agricultural productivity. At the same time, built-up areas expanded from 22,494.91 ha (7.92%) to 45,112.65 ha (15.89%), reflecting continuous urban expansion and the conversion of natural land into residential, commercial, and transportation infrastructure. This expansion has reduced the amount of land available for ecological functions and agricultural production while increasing pressure on surrounding natural resources. According to FAO (2024), the conversion of forests and vegetated landscapes into settlements and infrastructure remains one of the principal causes of land degradation across developing countries. The UNCCD (2024) also reported that land degradation continues to increase where population growth, weak land-use planning, and unsustainable resource exploitation occur simultaneously.

Table 1: Extent of Forest Degradation Due to Degradation Activities in Boki Local Government Area (2005–2025)

Class Name	2005 Area (Ha)	2005 (%)	2015 Area (Ha)	2015 (%)	2025 Area (Ha)	2025 (%)
Bare surface	4,340.07	1.53	5,466.82	1.93	6,160.55	2.17
Water	5,399.43	1.90	5,256.55	1.85	5,280.21	1.86
Built-up	22,494.91	7.92	33,212.68	11.70	45,112.65	15.89
Vegetation	149,478.47	52.66	142,219.04	50.10	134,191.17	47.28
Forest land	102,133.68	35.98	97,691.46	34.42	93,101.97	32.80
Total Area	**283,846.55**	**100.00**	**283,846.55**	**100.00**	**283,846.55**	**100.00**

Source: Researcher GIS Analysis; 2026

The continuous decline in vegetation and forest land provides further evidence of increasing degradation across the study area. Vegetation declined from 149,478.47 ha (52.66%) in 2005 to 134,191.17 ha (47.28%) in 2025, while forest land decreased from 102,133.68 ha (35.98%) to 93,101.97 ha (32.80%) during the same period. See Figure 2 – figure 4. These reductions reflect the cumulative effects of logging, agricultural expansion, fuelwood harvesting, road construction, and other land-clearing activities. The loss of vegetation weakens soil structure, reduces organic matter, accelerates erosion, and limits the capacity of the land to recover from environmental disturbances. Forest degradation also reduces biodiversity, lowers carbon storage, alters local climatic conditions, and diminishes the ecosystem services that sustain rural livelihoods. IPCC (2023) emphasized that continued degradation of forests reduces ecosystem resilience and

contributes to climate change through increased greenhouse gas emissions and declining carbon sequestration. In addition, FAO (2024) reported that Africa continues to experience one of the highest rates of forest degradation in the world because of increasing demand for agricultural land, timber, and household energy.

Although the water bodies remained relatively stable, declining slightly from 1.90% in 2005 to 1.86% in 2025, the degradation occurring in the surrounding landscape can still affect their ecological condition. The reduction in vegetation and forest cover increases surface runoff, transports more sediments into rivers and streams, and reduces the ability of watersheds to regulate water flow. The overall pattern observed in this study demonstrates that degradation activities have progressively transformed the natural environment by increasing exposed land and reducing healthy vegetation and forest ecosystems. These changes have serious implications for soil fertility, agricultural productivity, biodiversity conservation, water resource protection, and the livelihoods of communities that depend directly on forest resources. The findings agree with Olokeogun et al. (2023), who reported that continuous human pressure on forest ecosystems in southern Nigeria has accelerated environmental degradation and weakened ecosystem functions. They also align with the Global Land Outlook (UNCCD, 2024), which concluded that reversing land degradation requires effective land-use planning, sustainable forest management, restoration of degraded landscapes, and stronger community participation in natural resource conservation. Without these interventions, the rate of land degradation in the study area will continue to increase, threatening both environmental sustainability and the socio-economic well-being of the local population.

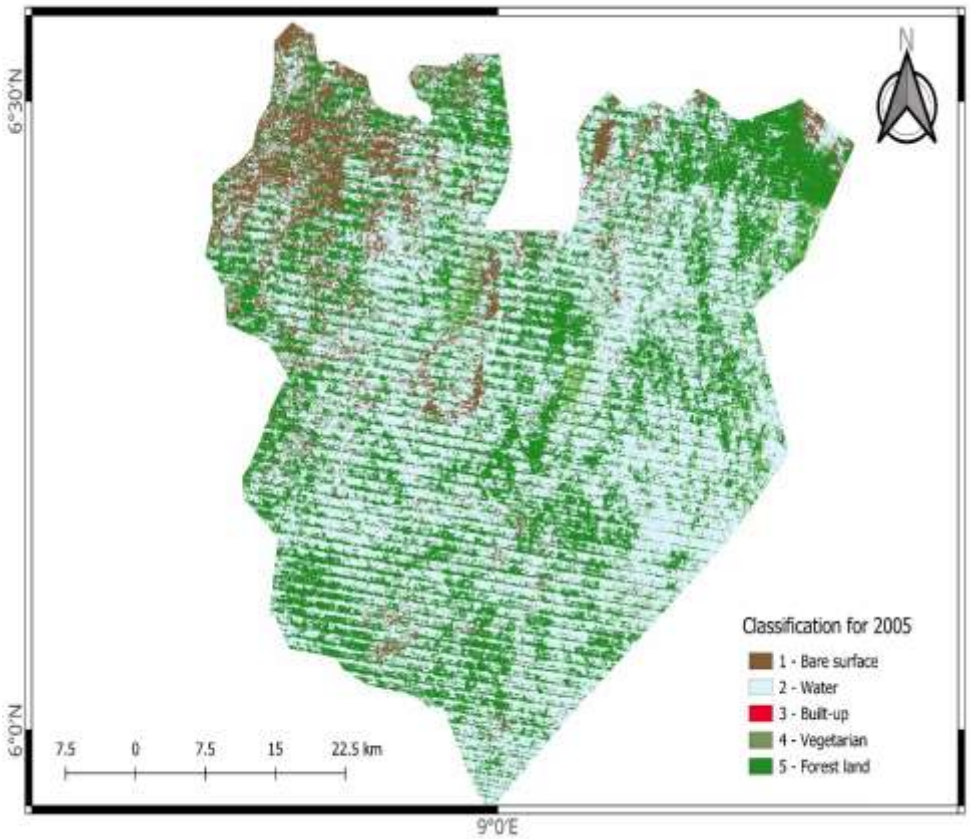


Figure 2: 2005 Land Use and Land Cover of Boki Local Government Area
Source: Researcher GIS Analysis; 2026

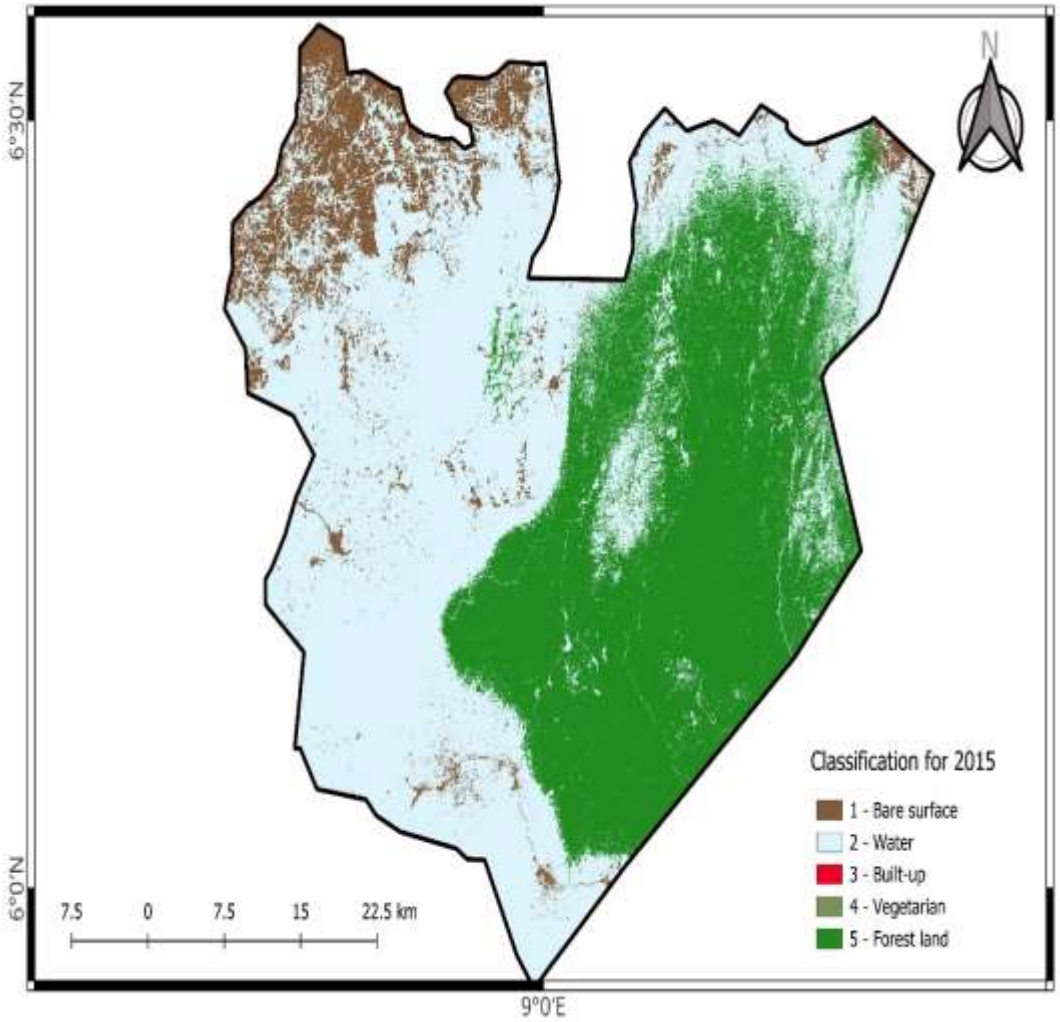


Figure 3: 2015 Land Use and Land Cover of Boki Local Government Area
Source: Researcher GIS Analysis; 2026

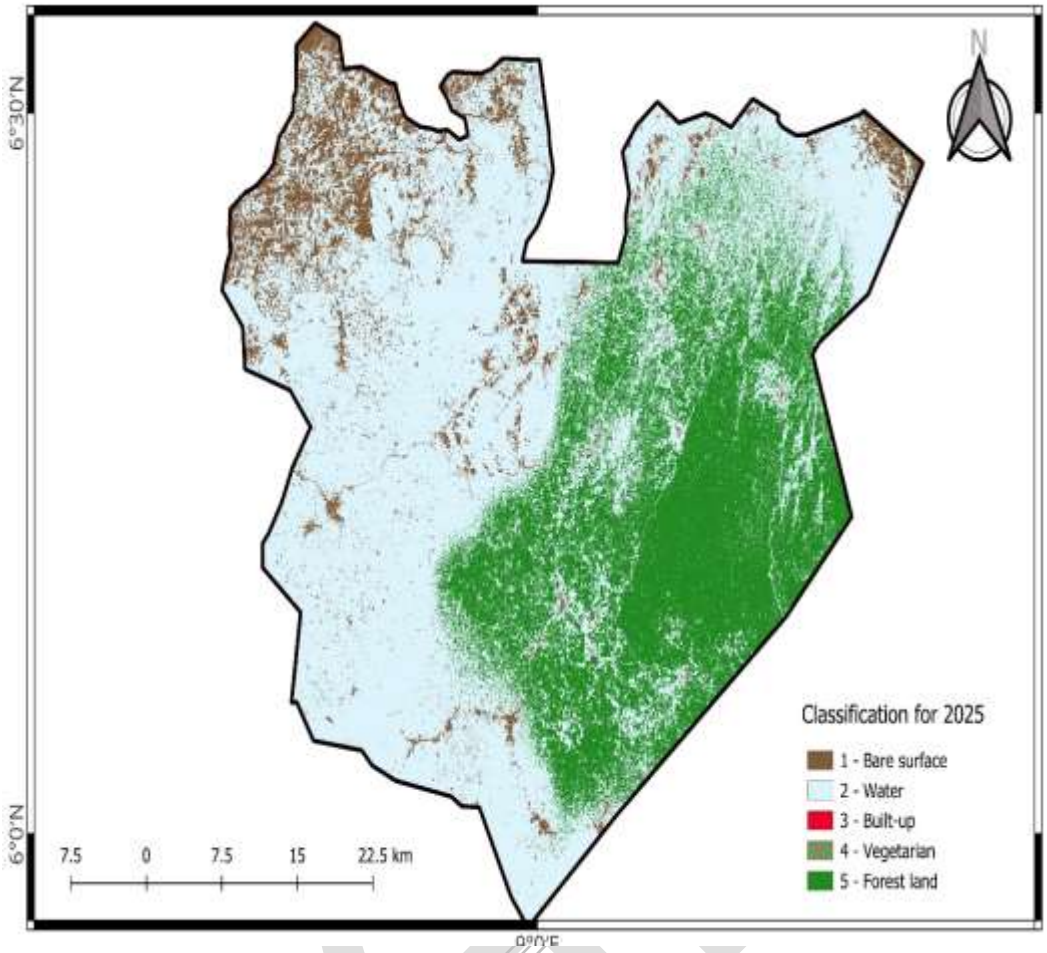


Figure 4: 2005 Land Use and Land Cover of Boki Local Government Area

Net Gains and Losses in Land Cover Classes in Boki Local Government Area (2005–*2025)*

The net change in Figure 5, revealed substantial gains in built-up areas and bare surfaces, while vegetation, forest land, and water bodies recorded net losses over the 20-year period. Built-up areas experienced the highest net gain of 22,617.74 ha, increasing from 22,494.91 ha in 2005 to 45,112.65 ha in 2025. This increase reflects the rapid expansion of settlements, road networks, public infrastructure, and other development activities across Boki Local Government Area. Bare surfaces also recorded a net gain of 1,820.48 ha, indicating increasing exposure of land following vegetation clearance, logging, farming, and construction activities. The increase in exposed land demonstrates that degradation activities have progressively altered the natural landscape, reducing soil protection and increasing the susceptibility of the land to erosion and declining productivity. According to FAO (2024), continuous conversion of forests and vegetated land into built-up areas and exposed surfaces accelerates soil degradation, reduces ecosystem productivity, and weakens the capacity of landscapes to provide essential environmental services. Similarly, UNCCD (2024) emphasized that the expansion of degraded and impervious surfaces is a clear indicator of increasing land degradation and declining ecosystem health.

Vegetation recorded the highest net loss of 15,287.30 ha, followed by forest land, which declined by 9,031.71 ha, while water bodies experienced a slight loss of 119.22 ha. The reduction in vegetation and forest cover reflects the cumulative impacts of timber harvesting, agricultural

expansion, fuelwood collection, and increasing human settlement within the study area. These losses reduce biodiversity, diminish carbon sequestration, increase soil erosion, and weaken watershed protection, thereby reducing the resilience of the environment to climate variability and extreme weather events. Although the decline in water bodies was relatively small, continued degradation of surrounding vegetation may gradually affect water quality and aquatic ecosystems through increased sedimentation and surface runoff. The observed pattern of net gains and losses confirms that natural land cover is being steadily replaced by human-dominated landscapes, resulting in increasing land degradation across Boki Local Government Area. This finding agrees with IPCC (2023), which reported that continued forest degradation and vegetation loss reduce ecosystem resilience and contribute to climate change, and with Olokeogun et al. (2023), who found that anthropogenic activities remain the principal drivers of land degradation and forest decline in southern Nigeria. Overall, the net change analysis demonstrates that degradation activities have significantly transformed the landscape over the last two decades, underscoring the need for sustainable land management, ecosystem restoration, and strengthened forest conservation policies.

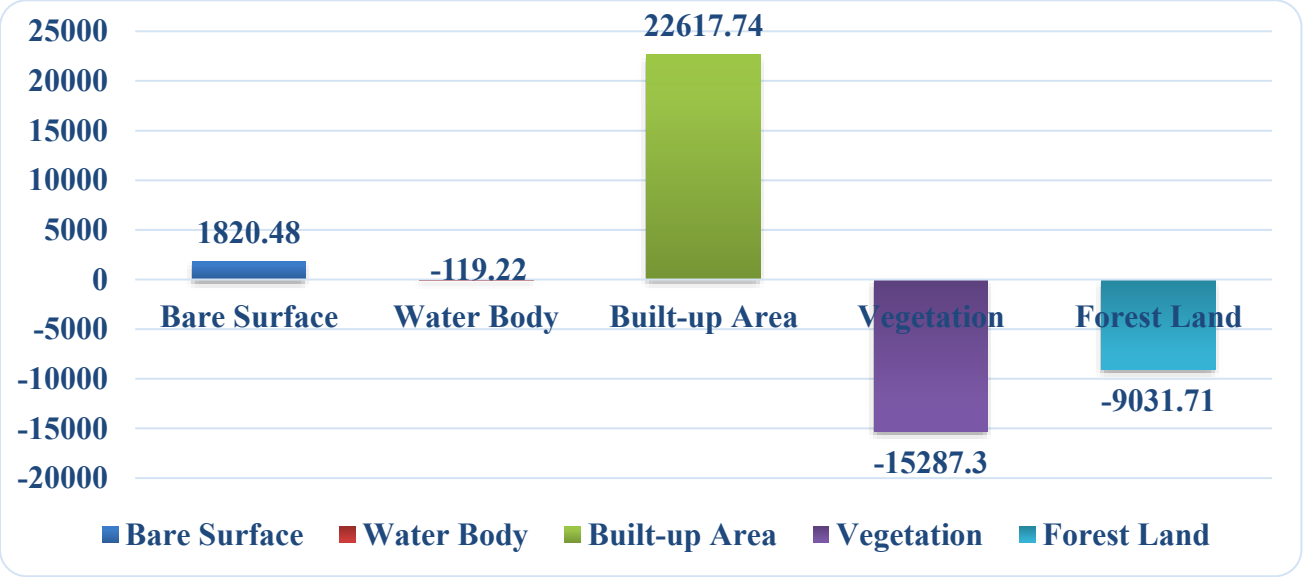


Figure 5: ***Net Gains and Losses in Land Cover Classes in Boki Local Government Area (2005–2025).***

Major Indicators of Forest Degradation in Boki Local Government Area (2005–2025)

The results presented in Table 2 indicate that the extent of forest degradation in Boki Local Government Area increased considerably between 2005 and 2025, as evidenced by the continuous decline in forest land and vegetation cover. Forest land reduced from 102,133.68 ha (35.98%) in 2005 to 97,691.46 ha (34.42%) in 2015 and further to 93,101.97 ha (32.80%) in 2025, representing a cumulative loss of 9,031.71 ha, equivalent to 3.18% of the total land area. Similarly, vegetation cover declined from 149,478.47 ha (52.66%) to 142,219.04 ha (50.10%) and eventually to 134,191.17 ha (47.28%), resulting in an overall reduction of 15,287.30 ha (5.38%). The greater decline in vegetation relative to forest land suggests that degradation affected not only dense forests but also secondary forests, woodlands, and other natural vegetation types. Collectively, these changes demonstrate that over 24,000 hectares of natural forest and vegetation were lost within the two decades, reflecting a high extent of forest degradation across the study area. Such

a magnitude of decline indicates persistent pressure on forest ecosystems, likely driven by agricultural expansion, logging, fuelwood extraction, and other land conversion activities. This pattern agrees with recent reports by the Food and Agriculture Organization (FAO, 2024) and Global Forest Watch (2024), which noted that forest landscapes across tropical regions continue to shrink due to increasing human activities. Similarly, Ogar et al. (2024) observed substantial reductions in forest cover across Cross River State, attributing the trend to unsustainable land-use practices and increasing pressure on protected forest landscapes.

Table 2: Major Indicators of Forest Degradation in Boki Local Government Area (2005–2025)

Indicator	2005 (Ha)	(%)	2015 (Ha)	(%)	2025 (Ha)	(%)	Change (2005–2025) (Ha)	(%)
Forest Land	102,133.68	35.9	97,691.46	34.42	93,101.97	32.80	−9,031.71	−3.18
Vegetation	149,478.47	52.6	142,219.04	50.10	134,191.17	47.28	−15,287.30	−5.38
Built-up	22,494.91	7.92	33,212.68	11.70	45,112.65	15.89	+22,617.74	+7.97
Bare Surface	4,340.07	1.53	5,466.82	1.93	6,160.55	2.17	+1,820.48	+0.64

The extent of degradation is further demonstrated by the substantial expansion of degraded and developed land categories. Built-up areas almost doubled during the study period, increasing from 22,494.91 ha (7.92%) in 2005 to 33,212.68 ha (11.70%) in 2015 and 45,112.65 ha (15.89%) in 2025, representing an increase of 22,617.74 ha (7.97%), the largest change among all land-cover classes. Likewise, bare surfaces increased steadily from 4,340.07 ha (1.53%) to 6,160.55 ha (2.17%), indicating an additional 1,820.48 ha of exposed land caused by vegetation removal and land disturbance. The simultaneous decline in forest ecosystems and expansion of built-up and bare surfaces clearly demonstrates that the extent of forest degradation in Boki was severe and progressive, with natural landscapes increasingly replaced by anthropogenic land uses over the 20-year period. These findings support the Intergovernmental Panel on Climate Change (IPCC, 2023), which emphasised that land-use conversion remains one of the leading indicators of forest degradation globally. They also align with the United Nations Environment Programme (UNEP, 2024), which reported that rapid settlement expansion and infrastructure development are accelerating forest degradation across Sub-Saharan Africa, while Aju et al. (2023) concluded that continued forest loss in southern Nigeria is occurring at a rate that threatens biodiversity conservation, carbon sequestration, and the long-term sustainability of forest-dependent communities.



Plate 1: Deforestation Activities in the Study Area

Source: Author Fieldwork; 2025



Plate 2: Deforestation and Truck Loading Timbers in the Study Area
Source: Author Fieldwork; 2025

4. Conclusion

This study assessed the extent of land degradation resulting from deforestation activities in Boki Local Government Area of Cross River State, Nigeria, between 2005 and 2025, using Landsat satellite imagery and Geographic Information Systems. The findings revealed a continuous decline in forest and vegetation cover during the study period. Forest land decreased from 102,133.68 hectares in 2005 to 93,101.97 hectares in 2025, representing a loss of 9,031.71 hectares. Similarly, vegetation cover declined by 15,287.30 hectares, from 149,478.47 hectares to 134,191.17 hectares. In contrast, built-up areas increased by 22,617.74 hectares, while bare surfaces expanded by 1,820.48 hectares. These changes indicate increasing pressure on the natural environment and the progressive conversion of vegetated land to other land uses.

The study concludes that deforestation and associated land-use changes have contributed to the growing extent of land degradation in Boki LGA. The continuous reduction in forest and vegetation cover threatens soil protection, biodiversity, water regulation and the ecological functions that support agricultural production and local livelihoods. The expansion of built-up areas and bare surfaces further highlights the need for improved land-use planning and sustainable management of natural resources. Therefore, protecting the remaining forests, promoting agroforestry, restoring degraded land and involving local communities in forest conservation are necessary steps towards addressing land degradation and maintaining the environmental and socioeconomic well-being of Boki Local Government Area.

5. Recommendations

Based on the findings of the study, the following recommendations are made:

i. The Cross-River State Government and relevant forestry agencies should strengthen forest monitoring and enforce existing regulations to control illegal logging, indiscriminate tree felling and other activities contributing to forest degradation in Boki Local Government Area.

ii. Farmers should be encouraged to integrate trees into cocoa farming and other agricultural activities. Tree planting and the restoration of degraded land should also be promoted to protect the soil, conserve biodiversity and reduce pressure on natural forests.

iii. Relevant authorities should ensure that settlement expansion, road construction and other infrastructure projects are properly planned to minimise unnecessary forest clearance and protect environmentally sensitive areas.

References

Agomobi, M. D., & Ambe, B. (2025). Agroforestry and afforestation: Enhancing sustainable forest resource management in Boki Local Government Area, Cross River State, Nigeria. Transdisciplinary Journal of Education & Sustainable Development Studies, 1(1), 1–12. https://tjesds.org.ng/index.php/home/article/view/6

Cross River State Government. (2025). *2024 consolidated financial statements*. Office of the Auditor-General for Local Governments, Cross River State.

Curtis, P. G., Slay, C. M., Harris, N. L., Tyukavina, A., & Hansen, M. C. (2018). Classifying drivers of global forest loss. Science, 361(6407), 1108–1111. https://doi.org/10.1126/science.aau3445

Food and Agriculture Organization of the United Nations. (2024). The State of the World's Forests 2024: Forest-sector innovations towards a more sustainable future. https://www.fao.org/publications/fao-flagship-publications/the-state-of-the-worlds-forests

Intergovernmental Panel on Climate Change. (2023). Climate change 2023: Synthesis report. https://doi.org/10.59327/IPCC/AR6-9789291691647

Offiong, E. E., Ayuk, J. A., & Odu, J. B. (2025). Ecological survey of commercially valued rainforest trees in cocoa plantations in Cross River State, Nigeria. *Journal of Agriculture, Forestry & Environment, 9*(1), 84–105.

Oniah, M. O., Kuye, O. O., Edem, T. O., Osim, O. O., Udama, P. I., & Ochang, M. E. (2024). Assessment of farm resources use by small scale farmers for cocoa production in Boki Local Government Area, Cross River State, Nigeria. *Nigerian Journal of Agricultural Economics, 14*(1), 88–95. https://doi.org/10.22004/ag.econ.358616

UNESCO. (2020). [Exact title of the source on the Okwangwo Division, Cross River National Park, and Nigeria–Cameroon rainforest biodiversity required].

United Nations Convention to Combat Desertification. (2024). The global land outlook. UNCCD. https://www.unccd.int/resources/global-land-outlook

United Nations Environment Programme. (2024). Raising ambition, accelerating action: Towards enhanced nationally determined contributions for forests. https://www.unep.org/resources/report/raising-ambition-accelerating-action-towards-enhanced-nationally-determined