

ENVIRONMENTAL DEGRADATION AND SUSTAINABILITY IN ISOKO NORTH AND SOUTH, DELTA STATE, NIGERIA: THE DEFORESTATION FACTORS

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Abstract

Preserving our planet's vitality remains a foremost priority for the international community. Sustaining a viable global ecosystem heavily depends on forest environments, which are indispensable for maintaining ecological balance. Consequently, this research investigates the elements driving deforestation and their broader implications for environmental sustainability across the Isoko North and South regions of Delta State, Nigeria. Analytical results yielded a computed F-value of 23.818 from the regression model, surpassing the critical t-value of 2.25 at a 0.05 significance threshold. This statistical outcome necessitated the rejection of the null hypothesis in favor of the alternative, verifying that variables such as agricultural expansion, localized bush burning, demographic pressures, commercial logging, petroleum extraction, sand mining, and the gathering of firewood significantly propel regional deforestation. Furthermore, findings demonstrate that plant life (flora) suffers a more pronounced impact from these activities than animal populations (fauna). To counter these destructive trends, the investigation strongly advocates for prioritizing the robust management and conservation of green spaces, ensuring that proactive environmental preservation outweighs ongoing degradation to mitigate the severe consequences of ecological loss.

1.0 Introduction

Human existence is intricately bound to the natural world and completely reliant on the earth's bountiful resource provisions.

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provided in the final section of
this article.*

Within Nigeria's tropical rainforest zone, the rich forest canopy stands out as a particularly crucial ecological asset. Over recent decades, the rapid clearing of these woodlands in both Isoko North and South has emerged as a critical ecological crisis. This challenge is paradoxically worsened by the region's favorable geographic characteristics; while consistent rainfall, ample sunlight, optimal temperatures, and fertile soils should theoretically support robust forest vitality, these very conditions obscure the severity of the ongoing destruction. As highlighted by contemporary research, this dynamic renders deforestation in such lush zones exceptionally perilous. The danger is amplified by the slow pace of natural forest recovery when unaccompanied by intentional, sustainable reforestation efforts.

Scholars widely agree that maintaining planetary health is inextricably linked to the preservation of forest ecosystems. Historical observations reveal that the degradation of natural environments and the clearing of woodlands have accelerated dramatically over the past two centuries, reaching unprecedented rates in recent years. This rampant destruction is fundamentally rooted in human (anthropogenic) behaviors, which directly degrade environmental integrity through the severe depletion of vital carbon reservoirs. Specifically within the Niger Delta, agricultural expansion has been identified as the primary catalyst, reportedly responsible for approximately 80% of forest loss at both regional and global levels. Acknowledging this, it is evident that intact forests remain absolute prerequisites for life sustenance and the continued provision of essential ecosystem services.

In our current era, curbing environmentally destructive practices to secure a habitable planet is a universal imperative. Experts warn that without a fundamental shift in modern civilization's trajectory, humanity faces a looming ecological catastrophe driven by widespread environmental negligence. The global alarm surrounding the Amazon rainforest's depletion serves as a cautionary tale, illustrating how unchecked human actions—ranging from uncontrolled fires and farming to urbanization, logging, and resource extraction—can initiate massive ecological decline.

Furthermore, widespread poverty exacerbates this crisis, acting as a profound barrier to conservation. When populations lack basic survival necessities, immediate economic needs inevitably overshadow long-term ecological objectives. This reality directly challenges the global Sustainable Development Goals (SDGs). While the short-term economic gains of clearing land are evident, safeguarding biologically diverse forest estates must become a supreme priority to prevent future calamities. If current consumption patterns persist, vital conservation mandates will continue to be marginalized within developmental frameworks.

In Nigeria specifically, forest depletion is responsible for an estimated 3.5% reduction in native species, accompanied by a myriad of severe environmental risks. The cascading negative impacts of these actions leave the environment increasingly vulnerable, underscoring an urgent need for heightened preservation tactics. This is particularly critical given the compounding threat of ozone layer depletion, where human-driven land cover changes inflict profound damage on the biosphere and its resident flora and fauna.

Geographically situated in the Niger Delta's rainforest belt, Isoko North and South currently possess merely the remnants of their original primary forests, having been reduced to secondary successional landscapes by relentless resource exploitation. Fortunately, reversing this damage is achievable; forest ecosystems retain the capacity for regeneration provided that exploitative practices are drastically curtailed. Consequently, this research aims to meticulously identify the localized drivers of deforestation to protect these environments for future generations, drawing urgent lessons from the precarious state of global tropical reserves. Aligning with international environmental mandates, this study champions the defense of biodiversity as a necessary remediation for unchecked human interference. Decisive interventions are required immediately to neutralize the extensive fallout of forest loss. The United Nations explicitly embeds these imperatives—forest defense and sustainable land management—within its core development goals.

Despite being naturally endowed with vibrant vegetation, the reckless clearing of land continues to undermine regional stability. In response to such unsustainable extraction, adopting sustainable harvesting paradigms is highly recommended to cushion the ecological blow. To provide essential context, it is vital to review the broader status of Nigeria's forests and their economic significance. Table 1 details the estimated historical expanse of native forests alongside the stark percentages that survive today. It clearly illustrates the pressing necessity to confront deforestation with enduring, sustainable solutions.

Table 1: Historical Estimates of Nigerian Forest Cover and Remaining Percentages

VEGETATION TYPE	ORIGINAL AREA (KM)	PERCENTAGE REMAINING %
Lowland Rainforest (Wet)	60,000	10
Lowland Rainforest (Dry)	37,000	10
Swamp Forest	18,800	20
Mosaic Forest and Grassland	2,53,100	20
Forest Woodland and Grassland	23,100	50
Montane Vegetation	3,700	50
Mangrove	24,400	20

Hibiscus Swamp Vegetation	2,100	20
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Source: World Conservation Monitoring Centre (2018)

2.0 Conceptual Clarification

Academic discourse generally categorizes the fundamental drivers of deforestation into three distinct conceptual frameworks:

2.1 The Impoverishment Perspective: This paradigm posits that widespread poverty is the primary engine of forest loss. In many developing regions, economically disadvantaged populations exert immense, unsustainable pressure on local ecosystems simply to survive. For these demographics, immediate subsistence requirements are far too critical to allow for the consideration of long-term environmental consequences. Operating at the margins of survival, they lack the financial capacity to engage in deliberate, sustainable forestry management. Consequently, entire communities are driven toward relentless resource extraction, including aggressive logging and extensive firewood harvesting. These survivalist behaviors rapidly exhaust local environmental assets, culminating in severe ecological degradation devoid of any sustainability measures. Ultimately, economic destitution traps these communities in an inescapable cycle of natural resource depletion.

2.2 The Neoclassical Framework: Proponents of this view argue that deforestation stems primarily from the existence of unregulated, open-access property regimes. This framework underscores the reciprocal relationship between economic productivity and environmental impact. Theoretical models suggest that when natural resources lack clearly defined ownership rights, they become freely available for unchecked public exploitation. This phenomenon is famously termed "the tragedy of the commons". Unrestricted access practically guarantees the indiscriminate harvesting of plant life and other critical ecosystem components. Without stringent regulatory moderation, this unrestricted accessibility inevitably unleashes a multitude of destructive forces upon the forest landscape.

2.3 The Political Ecology Approach: This school analyzes the socio-political and economic motivations driving humanity's transformation of the natural world. It argues that commercial enterprises and capitalists, perpetually seeking territorial and operational expansion, subject forest ecosystems to massive strain with minimal regard for ensuing ecological damage. The core assumption here is that access to natural wealth dictates societal welfare, meaning that factors like political influence, class, and ethnicity directly dictate who controls and exploits the land.

Ultimately, this perspective asserts that environmental outcomes are directly determined by prevailing economic accumulation strategies and dominant methods of production.

3.0 Study Area

This research centers on Isoko North and Isoko South, two interconnected administrative zones within Nigeria's Niger Delta that originally functioned as a unified Local Government Area prior to 1991. Geographically, the territory is positioned between latitudes $5^{\circ} 15'$ and $5^{\circ} 41'$ North, and along longitude $6^{\circ} 15'$ East. Encompassing roughly 1,097.1 square kilometers, Isoko shares its borders with Ndokwa to the North, the Ase Creek to the East, the Urhobo region to the West, and the Ijo territory to the South. Topographically, it is a low-elevation expanse situated approximately 20 meters above sea level upon the lower Niger Delta's gently undulating plains.

3.1 Vegetation: Ecologically, the district falls squarely within the Niger Delta's tropical rainforest zone. Historically, before widespread human intervention, the landscape was distinguished by a dense, thriving diversity of premium timber, including Iroko, Mahogany, Ebony, Opepe, and Obeche trees. Unfortunately, sustained anthropogenic disturbance has heavily fragmented the indigenous fresh water swamp and lowland rainforest ecosystems. Today, the region only hosts the scattered secondary remnants of its former ecological canopy.

3.2 Climate: Regional weather patterns are dictated by latitudinal positioning and dominant air masses. From November to March, the dry, dusty North-East trade winds travel across the Sahara, ushering in the Harmattan season. Conversely, the moisture-heavy South-West winds from the Atlantic Ocean generate the rainy season, lasting from April through October. The climate is strictly bifurcated into these two seasons, maintaining a baseline temperature range between 25°C and 28°C . Like much of the globe, Isoko is actively experiencing the effects of global climate change. This manifests as increasingly unpredictable rainfall patterns, featuring either delayed onsets or unseasonal prolongations following the dry months. The rainy season itself is characteristically paused by a short arid interval commonly known as the August break.

3.3 Drainage: Hydrologically, the terrain is dominated by the Owhe and Bethel swamp networks. These wetlands generally flow along North-North East and South-South West axes. The primary aquatic arteries are rainfall-dependent streams, alongside the Ase and Owodokpokpo Umeh creeks, which act as tributaries feeding into the lower River Niger. Heavy precipitation during the wet months drastically swells these waterways, frequently resulting in

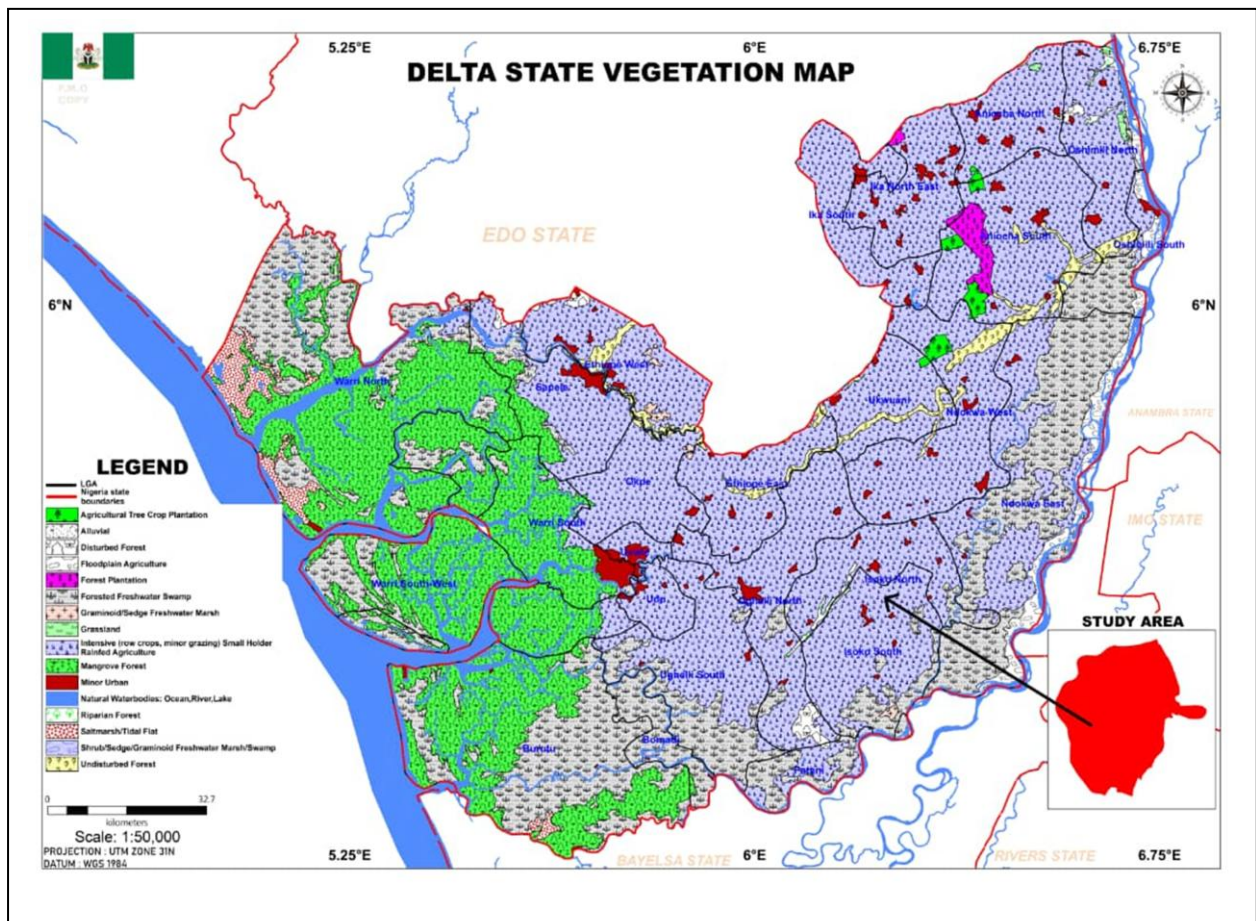


Fig.2, Map of Delta State Showing its Vegetation with the Study Area (inset)

Source- Author's Fieldwork 2025

4.0 Materials and Methods

This investigation relies entirely on empirical field research and direct observational data. The primary mechanism for information gathering was a meticulously designed, open-ended questionnaire, supplemented by comprehensive photographic documentation. To ensure a representative sample, the study purposefully targeted five key communities that currently function as expanding urban hubs within the designated geographic scope.

4.1 Zones Delimitation Table 2 outlines the specific communities selected for analysis:

Table 2: Delimited Communities for the Study

Zone	Community	Local Government Area
A	Ozoro	Isoko North
B	Oleh	Isoko South
C	Ellu/Ofagbe	Isoko North
D	Emede/Igbide	Isoko South
E	Owhe/Emevor	Isoko North

Source: Fieldwork (2025)



Fig. 3, Bush burning at Ellu (Isoko North)

North)

Source- Author's Fieldwork, 2025



Fig. 4. Oil spill site at Ozoro (Isoko

Source- Author's Fieldwork, 2025



Fig. 5, Sand dredging along Ozoro Owhelogbo Road (Isoko

North) Source- Author's Fieldwork, 2025

5.0 Discussion of Results/Findings Table 3 outlines the field survey data regarding the primary catalysts of forest loss in the region.

Table 3: Factors Responsible for Deforestation of the Study Area

Causes of Deforestation	Number of Respondents	% of Respondents
Bush burning	121	28.5
Arable farming	105	24.8
Population	73	17.3
Logging	46	10.8
Crude oil exploration	41	9.4
Sand Dredging	24	5.8
Firewood collection	14	3.4
Total	424	100

Source: Fieldwork 2025

The empirical evidence derived from the survey confirms that these seven distinct mechanisms—bush burning, farming, demographic growth, logging, oil extraction, sand mining, and wood gathering—serve as the fundamental drivers of regional ecological degradation.

5.1 Factors Responsible for Deforestation in the Study Area

Table 4: Contributory Factors to Deforestation (Model Summary)

Model	R	R Square (R ²)	Adjusted R Square	Std error of the estimate
1	.503a	0.253	0.242	2.0159

Predictors: (Constant), Sand dredging, Bush burning, Firewood collection, Arable farming, Oil exploration, Logging, Population. Source: Author's fieldwork 2025

The R^2 value of .253 demonstrates that the combination of these seven independent variables collectively accounts for a 25% variance in the observed deforestation. Furthermore, the derived f-value of 23.818 substantially exceeded the established critical t-value of 2.25 at the 0.05 level of significance. This mathematical correlation unequivocally confirms that the identified factors exert a statistically significant influence on the depletion of local forests.

Table 5: Contribution of Each Factor Responsible for Deforestation

Model	Unstandardized Coefficient (B)	Std Error	Standardized Coefficient (Beta)	T	Sig.
1 (constant)	-8.325	1.035		-8.05	0
Arable farming	0.759	0.163	0.189	4.665	0
Bush burning	0.766	0.16	0.199	4.791	0
Oil Exploration	0.62	0.172	0.144	3.599	0
Firewood collection	4.51	0.048	0.037	0.942	0.35
Sand Dredging	0.428	0.179	0.1	2.384	0.02
Population	0.362	0.141	0.114	2.559	0.11
Logging	0.494	0.141	0.152	3.508	0
<i>Source: Field study (2025)</i>					

Table 5 elaborates on the specific contribution weight of each factor. The analysis produced the following significant t-values: Bush burning (4.79), Arable farming (4.67), Oil Exploration (3.60), Logging (3.51), Population (2.56), and Sand Dredging (2.40), while Firewood collection showed a lesser statistical value (0.94). Because the majority of these computed f-values securely surpass their corresponding critical t-values, a robust, significant relationship is proven between environmental degradation and the aforementioned anthropogenic activities.

Specifically, intentional bush burning, agricultural expansion, demographic pressure, and timber harvesting registered the most dominant impacts on the area's ecological decline. The aggregated survey data and subsequent analytical processing paint a clear picture of severe environmental compromise driven by unchecked human extraction. Conclusively, all seven examined independent variables actively fuel the deforestation crisis. The research additionally highlights that this environmental toll is disproportionately borne by the region's botanical ecosystems rather than its wildlife.

6.0 Policy Implication Identifying the potent forces driving regional forest loss underscores an urgent mandate to construct a rigorous framework for ecological defense and sustainability. This framework must aim to directly neutralize these destructive vectors while buffering the populace from their dangerous aftermath. Existing academic literature emphatically confirms that the fallout from removing vegetation extends far beyond simple tree loss; it actively triggers

cascading catastrophes including severe soil erosion, localized flooding, atmospheric ozone depletion, and the siltation of crucial waterways, species extinction, and the exacerbation of greenhouse gas emissions. Consequently, the empirical findings of this study must serve as the foundation for aggressive, health-centric environmental legislation. Policymakers are tasked with implementing strict regulatory oversight to aggressively curtail unregulated farming, illegal timber harvesting, unmonitored dredging, and other reckless anthropogenic behaviors that continuously amplify ecological peril.

7.0 Conclusion This investigation conclusively demonstrates that practices including arable farming, sand extraction, petroleum operations, wood gathering, intentional bush fires, and commercial logging are the preeminent catalysts of forest eradication in Isoko North and South. To combat this, it is highly recommended that governmental bodies at all tiers launch comprehensive, unrelenting environmental monitoring initiatives aimed at curbing the ecologically destructive habits of both private citizens and commercial entities. Strategic remediation must encompass aggressive ecosystem rehabilitation, highlighted by widespread afforestation campaigns, the rigorous enforcement of conservation statutes, and the imposition of severe penalties for illicit logging. Furthermore, state forestry departments and localized forest guards must be revitalized and fully equipped to identify and intercept illegal resource extraction immediately. Ultimately, a foundational shift toward "green" operational philosophies is required to guarantee biodiversity preservation, firmly aligning regional practices with global standards for environmental monitoring, conservation, and recovery.

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