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From Degradation to Sustainability: Re-examining Nigeria's Environmental History through an Ecological Lens.

Morgan Ogbonna
Department of History and International Studies, Babcock University

ABSTRACT : This paper examines the theoretical and practical dimensions of historical ecology in Nigeria, a region characterized by diverse ecosystems and a long history of human-environment interactions. Integrating insights from paleoecology, archaeology, oral traditions, and historical archives, we reconstruct past landscapes and ecological dynamics to understand the long-term impacts of human activities on the Nigerian environment. We explore key theoretical frameworks, such as political ecology and environmental history, to analyze the socio-economic and political drivers of environmental change. Case studies from various ecological zones—including the Niger Delta, the savanna regions, and the rainforest belt to illustrate the complex interplay between human practices (e.g., agriculture, urbanization, resource extraction) and environmental outcomes (e.g., deforestation, soil erosion, biodiversity loss). The study highlights the role of indigenous ecological knowledge in shaping sustainable resource management practices and mitigating environmental degradation. Furthermore, we address the challenges of applying historical ecological insights to contemporary environmental issues in Nigeria, such as climate change adaptation, land degradation, and biodiversity conservation. By examining the historical roots of current environmental problems, this paper provides a nuanced understanding of the social-ecological dynamics that shape Nigeria's environmental landscape. We argue that integrating historical perspectives into environmental policy and management can foster more effective and equitable strategies for achieving environmental sustainability and resilience in Nigeria. This approach not only informs conservation efforts but also promotes a deeper appreciation of the cultural and ecological heritage of the region.
***KEYWORDS**: Environment, History, Degradation, Ecology, Nigeria.*

I. INTRODUCTION

Historical ecology is a vibrant field that explores the dynamic relationship between humans and their environment over extended periods of time (Caruthers, 2004, pp.379-406). By integrating historical data with ecological analysis, it provides a more comprehensive understanding of current environmental issues and informs sustainable management strategies. In Nigeria, a country marked by diverse ecosystems and a rich history of human-environment interactions, historical ecology offers invaluable insights into the long-term impacts of human activities on the landscape (Adewuyi, 2023, pp.34-75).

Nigeria's environmental history is complex, characterized by deforestation, agricultural intensification, urbanization, and resource exploitation, all of which have left indelible marks on its ecosystems. Understanding these historical processes is crucial for addressing contemporary challenges such as biodiversity loss, land degradation, and climate change vulnerability. This study examines Nigeria's historical ecology, combining theoretical frameworks with practical case studies to illustrate the intricate interplay between human societies and the natural world (Akpan, 2019, pp.120-135).

This exploration begins with an overview of key theoretical concepts in historical ecology, including the concept of social-ecological systems, resilience, and landscape transformation: It examines methodological approaches for reconstructing past environments, such as paleoecological analysis, archival research, and oral history. Subsequently, the study presents a series of case studies from different regions of Nigeria, highlighting specific historical events and their ecological consequences (Akpan, 2019, pp.120-135). These case studies cover a range of topics, including the impact of colonial agricultural policies on forest cover, the ecological effects of urbanization on coastal ecosystems, and the role of traditional ecological knowledge in resource management.

By analyzing these historical examples, the study aims to bridge the gap between theory and practice, providing practical recommendations for environmental conservation and sustainable development in Nigeria. It emphasizes the importance of integrating historical perspectives into environmental policy and planning, promoting community-based conservation initiatives, and fostering a deeper understanding of the long-term consequences of human actions (Sowunmi, 1988, pp.65-100). This study contributes to the growing body of

literature on historical ecology and provides a valuable resource for researchers, policymakers, and practitioners interested in understanding and addressing Nigeria's complex environmental history and challenges.

II. HISTORICAL CONTEXT

Nigeria's environmental history is shaped by a long shift from relatively low-impact precolonial land use, through extractive colonial and postcolonial oil economies, to contemporary struggles for sustainability and environmental justice. This historical context shows how degradation in regions like the Niger Delta and the northern drylands grew out of specific political, economic and legal choices rather than "natural" decline (Bassey, 2023, p.5).

Precolonial societies in what is now Nigeria managed land, forests and water through customary tenure systems that often-linked resource use to religious beliefs and communal authority (Adewuyi, 2023, pp.34-75). Farming, hunting and fishing were generally small scale, with shifting cultivation and fallow systems helping soils and forests to recover, though localized overuse and bush burning did occur.

British colonial rule (formally consolidated between 1900–1914) reorganized Nigeria's environment around export commodities such as palm oil, cocoa, groundnuts and timber, driving deforestation and soil depletion in many regions (Carruthers, 2004, pp.379-406). Colonial mineral and oil laws from 1887, 1907 and 1914 vested control of subsoil resources in the state, marginalizing local communities and embedding an extractive model that prioritized revenue over ecological care (Ejaro, 2019, pp. 56-77).

Commercial oil production began in the late 1950s, especially in the Niger Delta, a wetland with high biodiversity and dense rural populations dependent on fishing and farming. Decades of oil spills, gas flaring, dredging and land reclamation degraded mangroves and farmlands, contaminated water, and produced a classic case of "slow violence" in which ecological damage and social suffering accumulated over time (Eja, 2019, pp. 11-13).

After independence in 1960, Nigeria relied heavily on petroleum revenue, while early environmental provisions remained scattered and reactive, focused mainly on criminalizing obvious pollution from oil operations. Systematic environmental regulation only expanded in the 1980s–1990s with agencies such as the Federal Environmental Protection Agency (FEPA) and Nigeria's participation in conventions on hazardous waste, yet enforcement often lagged behind corporate and political interests (Egereonu & Ibe, 2019, pp.118-214).

Beyond the Delta, deforestation, overgrazing and climate change intensified desertification in northern Nigeria, while urbanization and industrialization produced air and water pollution in major cities (Bassey, 2023, 14). Growing environmental movements, community resistance (for example in Ogoniland), and international pressure since the 1990s have pushed Nigeria toward ecological restoration initiatives, clean-up programs and calls for reforestation and national environmental audits, marking a gradual turn from degradation narratives toward sustainability debates (Kashwan, 2016, pp.77-79).

Theoretical Framework: Historical Ecology in the Nigerian Context

Historical ecology provides a robust framework for understanding the long-term interactions between human societies and their environment. This approach integrates historical data with ecological analysis to reveal how past human activities have shaped present-day ecosystems and landscapes (Kinako, 2019, pp.44-65). Several key theoretical concepts underpin this framework, offering valuable insights into the Nigerian context.

Social-Ecological Systems (SES) Theory

Social-Ecological Systems (SES) theory emphasizes the interconnectedness of social and ecological components within a system. In Nigeria, this perspective is crucial for understanding how human actions, such as agricultural practices, urbanization, and resource extraction, impact ecological processes, and vice versa. SES theory highlights the importance of feedback loops, where changes in one component of the system can trigger cascading effects throughout the entire system. For example, deforestation driven by agricultural expansion can lead to soil erosion, reduced water availability, and decreased agricultural productivity, ultimately affecting human livelihoods and social structures (Papaioannai, 2016, pp.1-44).

Resilience Theory

Resilience theory focuses on the capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedback. In the context of Nigeria, resilience theory helps to assess the ability of ecosystems and communities to cope with environmental changes, such as climate variability, land degradation, and resource scarcity (Sanusi, 2019, p.67). Understanding the factors that enhance or undermine resilience is essential for developing effective strategies for environmental management and adaptation. For instance, traditional ecological knowledge (TEK) can play a vital role in enhancing the resilience of agricultural systems by promoting biodiversity, soil conservation, and water management (Hellermann, 2013, p.213).

Landscape Transformation

Landscape transformation refers to the alteration of landscapes over time due to natural processes and human activities (Ukpong (ed), 2019, p.25). In Nigeria, landscape transformation has been driven by a combination of factors, including agricultural intensification, urbanization, deforestation, and infrastructure development. Historical ecology provides tools for reconstructing past landscapes and assessing the ecological consequences of these transformations. By analyzing historical maps, aerial photographs, and paleoecological data, researchers can track changes in land cover, vegetation patterns, and ecosystem structure (Ukpong, 2019, p.112). This information is crucial for understanding the long-term impacts of human activities on biodiversity, ecosystem services, and landscape connectivity.

Political Ecology

Political ecology examines the power dynamics and social relations that shape human-environment interactions (Akpabio & Ndaeyo, 2019, pp.90-121). In Nigeria, this perspective is particularly relevant for understanding how unequal access to resources, historical injustices, and governance structures influence environmental outcomes. Political ecology highlights the importance of considering the social, economic, and political context in which environmental problems occur. For example, conflicts over land and resources often arise from historical patterns of land tenure, resource exploitation, and marginalization of local communities. Addressing these underlying power dynamics is essential for promoting environmental justice and sustainable development (Ogban, Akuwe & Maduakor, 2019, pp. 234).

By integrating these theoretical concepts, a historical ecology framework can provide a comprehensive understanding of the complex interactions between human societies and the environment in Nigeria (Odemelam, 2019, pp. 111-134). This framework can be applied to a wide range of environmental issues, including deforestation, land degradation, biodiversity loss, and climate change vulnerability. By examining the historical roots of these problems, researchers can identify the underlying drivers of environmental change and develop more effective strategies for conservation and sustainable development (Umoh, 2019, p, 89).

Methodological Approaches for Reconstructing Past Environments in Nigeria

Reconstructing past environments involves a multidisciplinary approach, integrating various techniques from archaeology, ecology, geology, and history. These methods help to understand past climates, landscapes, and human-environment interactions.

Paleoecology is the study of past ecosystems through the analysis of biological proxies preserved in sediments and other archives (Hellermann, 2013, p. 110). Key paleoecological methods include:

Analyzing pollen grains and spores to reconstruct past vegetation. Pollen records can reveal changes in plant communities, agricultural practices, and deforestation patterns. In Nigeria, palynological studies can help understand the impact of farming on forest ecosystems (Sabin, 2010, p.43). Identifying plant remains based on silica bodies found in plant tissues. Phytoliths are useful for reconstructing past vegetation, especially in environments where pollen preservation is poor. This method can provide insights into past agricultural practices and the use of specific plant species. Examining fossilized diatoms (microscopic algae) in sediments to infer past water quality, salinity, and environmental conditions. Diatoms are particularly useful in coastal and aquatic environments, providing information on sea-level changes, pollution, and ecosystem health. Identifying macroscopic plant remains, such as seeds, leaves, and wood, to reconstruct past vegetation and human use of plants (Adelaja & George, 2024, pp.1-15). Macrofossils can provide direct evidence of past agricultural practices, resource management, and the introduction of exotic species.

Geoarchaeology applies geological and geomorphological techniques to archaeological contexts, providing insights into site formation processes, landscape changes, and human-environment interactions. Key geoarchaeological methods include:

Analyzing the physical and chemical properties of sediments to reconstruct past environmental conditions and human activities. Sediment analysis can reveal information on soil erosion, depositional environments, and the presence of anthropogenic materials (Mosley, 2010, pp.301-335).

Studying the layering of sediments and archaeological deposits to establish a chronological sequence of events. Stratigraphic analysis helps to understand the timing of human occupation, environmental changes, and site formation processes (Nwankwo, 2014, pp.171-177).

Mapping landforms and geological features to reconstruct past landscapes and identify areas of erosion, deposition, and tectonic activity. Geomorphological mapping is essential for understanding the context of archaeological sites and the impact of natural processes on human settlements.

Historical documents, maps, and oral histories provide valuable information on past environments and human activities. These sources can be used to:

Analyzing historical maps, land surveys, and agricultural records to understand past land use practices, such as farming, forestry, and grazing. Examining historical accounts of floods, droughts, and other environmental events to assess the frequency and magnitude of past environmental changes (Agbonoga, 2019, p.78). Collecting

oral histories and ethnographic data to understand traditional resource management practices and local perceptions of environmental change.

Dendrochronology, or tree-ring analysis, is a precise method for dating past events and reconstructing past environmental conditions. By analyzing the growth rings of trees, researchers can: Determine the timing of landslides, floods, and other geomorphic events based on tree-ring patterns. Infer past temperature and precipitation patterns based on tree-ring width and density (Mosley, 2010, pp.301-335).

Remote sensing techniques, such as aerial photography and satellite imagery, provide a broad-scale perspective on past landscapes and environmental changes (Scott, 2010, pp.221-258). Geographic Information Systems (GIS) are used to integrate and analyze spatial data from various sources. These tools can be used to:

Detect archaeological features and sites based on vegetation patterns, soil anomalies, and other indicators. Track changes in forest cover, agricultural land, and urban areas over time using historical and contemporary imagery. Create spatial models of past landscapes and environmental conditions based on paleoecological, geoarchaeological, and historical data (Scott, 2010, pp.221-258).

The most effective approach to reconstructing past environments involves integrating multiple lines of evidence from different disciplines. By combining paleoecological, geoarchaeological, historical, and remote sensing data, researchers can develop a more complete and nuanced understanding of past human-environment interactions in Nigeria. This interdisciplinary approach is essential for informing sustainable environmental management and conservation strategies (Carruthers, 2004, pp.379-406).

Social, economic, and political forces shaping environmental change in Nigeria.

Socio-Economic Drivers: Rapid population growth leads to increased demand for resources like land, water, and energy, intensifying environmental pressures. Urbanization concentrates these demands in specific areas, exacerbating pollution and resource depletion. Lagos, Nigeria's largest city, faces severe challenges due to its high population density, including waste management issues and air pollution (Newell, 2020, p.48).

Agriculture, oil exploitation, and industrialization are key economic activities that significantly impact the environment. Unsustainable practices in these sectors lead to deforestation, pollution, and habitat destruction. Oil spills in the Niger Delta have devastated local ecosystems and livelihoods, while deforestation for agriculture reduces biodiversity and contributes to climate change. Government needs to enforce environmental regulations, promote sustainable agricultural practices, and invest in cleaner technologies for industrial processes (Anderson, Peek & Alagoa, 2002, p.142).

Poverty drives people to exploit natural resources for survival, leading to deforestation, overgrazing, and unsustainable farming practices. Inequality in resource distribution exacerbates these issues. In rural areas, impoverished communities often rely on firewood for cooking, contributing to deforestation (Anderson, Peek & Alagoa, 2002, p.140). There is need to implement poverty reduction programs, promote equitable resource distribution, and provide alternative livelihoods that reduce dependence on natural resources.

Political Drivers

Weak governance, corruption, and inadequate environmental policies hinder effective environmental management. Poor enforcement of regulations and lack of accountability contribute to environmental degradation. Ineffective regulation of oil companies has led to widespread pollution in the Niger Delta. Nigeria needs to strengthen environmental governance, enforce regulations, promote transparency and accountability, and develop comprehensive environmental policies (Sowunmi, 1998, pp.65-100).

Also political instability and conflicts disrupt environmental management efforts and lead to resource exploitation. Conflicts often result in environmental damage and displacement of communities. Conflicts in the Niger Delta have disrupted oil production but also led to further environmental degradation due to sabotage and illegal activities. Insecure land tenure systems and conflicts over land rights contribute to unsustainable land use practices (Beinart & Mcgregor (Eds.), 2003, p.48). Lack of clear ownership encourages short-term exploitation of resources. Disputes over land ownership often led to deforestation as communities clear land to assert their claims.

Corruption diverts resources meant for environmental protection and undermines the enforcement of environmental laws. It enables illegal activities such as logging, mining, and pollution. Bribery allows companies to bypass environmental regulations, leading to increased pollution and deforestation (Falola & Paddock (Eds.), 2011, p.231).

To address these drivers effectively, Nigeria needs integrated strategies that combine socio-economic development with environmental protection: Implement policies that promote economic growth while protecting the environment and ensuring social equity. Involve local communities in environmental management and decision-making processes. Collaborate with international organizations and other countries to address transboundary environmental issues (Fairhead & Leach, 1996, p.56). By addressing these socio-economic and political drivers, Nigeria can move towards a more sustainable and resilient future!

Anthropogenic Drivers and Long-Term Environmental Degradation in Nigeria: A Multi-Ecological Review

Nigeria, Africa's most populous nation, faces an escalating environmental crisis driven by decades of intensive human activity. From the hydrocarbon-rich Niger Delta to the arid Sahelian north, anthropogenic factors, including oil exploration, rapid urbanization, and unsustainable agricultural practices, have fundamentally altered the nation's ecological landscape (Adelaja, & George, 2024, pp. 1-15). The relationship between human development and the environment in Nigeria is characterized by a paradox of resource wealth and ecological depletion. As the nation transitioned into a petroleum-based economy in the mid-20th century, the environmental "externalities" of growth were largely ignored. Today, Nigeria experiences some of the highest rates of deforestation globally and is one of the ten most vulnerable countries to climate change. This review explores the structural causes of this degradation and its long-term trajectories.

Hydrocarbon Exploitation and the "Ecological Wasteland" of the Niger Delta

The Niger Delta, containing Africa's largest wetland, has been the epic enter of Nigeria's economic engine since 1958 when petroleum was first discovered and exploited in commercial quantity in Oloibiri. However, this has come at a catastrophic environmental cost. Over the last 50 years, an estimated 9 to 13 million barrels of oil have been spilled in the region, the equivalent of one Exxon Valdez disaster every year. These spills have contaminated groundwater with carcinogens like benzene and polycyclic aromatic hydrocarbons (PAHs), rendering the soil sterile and the water toxic (Bassey, 2023, p. 8).

Nigeria remains one of the world's top seven gas flarers. The long-term atmospheric impact includes persistent acid rain, which corrodes local infrastructure and acidifies freshwater ecosystems, leading to a massive decline in fish populations and mangrove health.

Nigeria's forest cover is disappearing at a rate of 3.7% per annum. This is driven by two primary human factors: the demand for fuel-wood (30 million tons consumed annually) and agricultural expansion. In the Sahelian states (Borno, Yobe, Sokoto), the removal of vegetation has allowed the Sahara Desert to advance southward by an estimated 0.6 km annually. This "creeping desert" has displaced over 35 million people and intensified resource-based conflicts, such as the farmer-herder crises (Achebe, Bashir and Falola, (eds), 2010, p. 57).

The destruction of the southern rainforests has drastically reduced Nigeria's ability to isolate carbon, contributing to a 128% increase in national emissions since 2000. Nigeria's urban population is expected to double by 2045. Rapid, unplanned urbanization in cities like Lagos and Onitsha has outpaced environmental regulation (Newell, 2020, p.55).

Impact Category and Long-term Consequence

Air Quality Onitsha has historically recorded PM10 levels 30x the World Health Organisation (WHO) limit, leading to chronic respiratory diseases.

Waste Management Lagos generates 13 million kg of waste daily, much of which enters the lagoon system, causing heavy metal bioaccumulation in the food chain.

Coastal Erosion Sand mining and infrastructure development have left Lagos vulnerable to a projected 2.5m sea-level rise by 2050.

Socio-Economic and Health Implications

The environmental degradation is not merely a biological issue but a public health crisis. Long-term exposure to polluted air and water has led to rising rates of cancer, kidney failure, and dermatological conditions in oil-impacted communities. A 60% reduction in household food security in the Niger Delta due to soil toxicity and the death of aquatic life. Projections suggest that by 2050, up to 9.4 million Nigerians could be internally displaced due to environmental stressors (Ewa & Ekene, 2012, pp.105-112).

The long-term trajectory of the Nigerian environment is precarious. Empowering the National Environmental Standards and Regulations Enforcement Agency (NESREA) to penalize industrial polluters is key. Accelerating the planting of shelterbelts in the north to halt desert encroachment, and also reducing the "energy poverty" that forces the urban poor to rely on fuelwood by investing in decentralized solar and gas-to-power projects (Karmakar, 2024, pp.1-17).

Case Studies in Zones

Nigeria's environmental history reveals distinct ecological challenges across the Niger Delta, the savannah, and the rainforest zones, shaped by human activity, resource exploitation, and climate pressures. Each zone offers a unique case study in how theory and practice of ecological management intersect with socio-economic realities.

Niger Delta Zone

Since the 1950s, crude oil extraction has led to widespread oil spills, gas flaring, and contamination of water and soil. Rising sea levels and coastal erosion threaten settlements, displace communities, and destroy mangrove buffers. Farming and fishing livelihoods have collapsed, while health risks from benzene and other pollutants persist (Bassey, 2023, pp.15-26). Environmental remediation projects and community resistance movements highlight the tension between ecological theory (sustainability) and practice (continued oil dependence).

Note that the nation has faced recurring oil spills in the Niger Delta area, resulting in significant consequences. The Niger Delta, which functions as the central hub for oil production in Nigeria, has witnessed a notably more significant occurrence of oil spill incidents than other African regions (Ordinioha and Brisibe, 2013, p.87) Chinedu and Chukwuemeka, 2018, p.90). Hence, one cannot fail to conclude that this region is among the most affected in the whole of the continent. Oil spills are one of the most well-known and widespread forms of marine pollution, significantly harming the marine environment globally (Martínez-Gómez *et al*., 2010, p.44), (Nordborg *et al*., 2018, p.76). One of them is the pollution of the world's oceans, which is extensive and well-known, and this problem significantly affects all aquatic habitats. Oil extraction has significant and persistent implications for the environment, economy, and long-term outcomes. The repercussions of oil spills encompass the degradation of ecosystems, such as coral reefs, and the impoverishment of biodiversity (Johannes *et al*., 1972, p.112), Johansson *et al*., 2016, p.36).

Moreover, this environmental pollution carries significant health implications for the African continent and Nigeria in particular, given its status as the foremost oil producer. Crude oil exports, as well as natural gas exports, remain the primary source of the export revenue. The Niger Delta, which is the seventh largest delta-marginal by land size, is located in the southern part of Nigeria, covering about 70,000 square kilometres, and is naturally endowed with magnificent ecological qualities. The wetland ecosystem is marked by predominance and elaborateness; hence, it is considered one of the most productive and diverse ecosystems globally (Carruthers, 2008, pp. 381-406).

Savannah Zone:

Expansion of agriculture and fuelwood collection has stripped savannah vegetation, leading to soil erosion and desertification. Livestock pressure reduces grassland cover, degrading soil fertility and accelerating desert encroachment in northern Nigeria. Rainfall fluctuations make the savannah highly vulnerable to drought, impacting food security. While conservation policies advocate rotational grazing and afforestation, weak enforcement and poverty drive unsustainable land use (Anderson, Peek & Alagoa, 2002, p. 45).

Environmental history in Nigeria often draws on political ecology, which links environmental change to power relations, state policies, and global economic forces. It also uses concepts such as land degradation, ecosystem services, and sustainable land management (SLM) to interpret changes in different ecological zones. In practice, this means asking who benefits from land use (logging, farming, oil extraction) and who bears the ecological and social costs (Burgis, 2015, p.155).

The Guinea savannah in central Nigeria has experienced extensive land degradation, driven by deforestation, expansion of agriculture, grazing pressure, and climate variability. In Niger State, remote-sensing analysis shows long-term declines in vegetation using the Normalized Difference Vegetation Index (NDVI), while local studies link this to farmer–herder conflicts, soil erosion, and reduced agricultural productivity (Onwuka, 1956, p.250). Research there highlights two sets of drivers: local human pressures (cropland expansion, fuelwood collection) and broader, climate-related or policy drivers, both of which shape how communities adapt and how effective SLM measures can be.

Rainforest Zone:

Commercial logging and slash-and-burn farming have fragmented rainforest ecosystems, reducing biodiversity. Settlement expansion in southern Nigeria accelerates deforestation, threatening endemic species. Deforestation alters rainfall infiltration, increasing flood risks and reducing water quality. Protected areas and forest reserves embody ecological theory, but illegal logging and weak governance undermine practice (Abasiatta, (ed), 1990, p.108).

Cross River State contains Nigeria’s largest remaining block of tropical rainforest, including the Cross River National Park (CRNP), a biodiversity hotspot with high rainfall and many endangered species. The park is surrounded by over a hundred support-zone communities whose farming, hunting, and forest use historically shaped the landscape but are now tightly regulated by conservation policies. Studies of the Okwangwo and Oban divisions show that logging, agricultural encroachment, and weak state capacity threaten forest integrity, while external conservation NGOs and state agencies attempt to control degradation (Omoweh, 2001, p.85). In Cross River, environmental-history work emphasizes how colonial forest reservation, post-colonial timber extraction, and later fortress-style conservation redefined local rights and access to forest resources. Practical conservation responses include protected-area management, community-based projects (such as primate sanctuaries and eco-tourism initiatives), and attempts to value rainforest ecosystem services (water regulation,

carbon storage, biodiversity) in planning (Bolster, 2006, pp.567-597). These efforts illustrate tensions between ecological goals and social justice, a core concern of environmental history and political ecology.

Comparative Insights

Zone	Key Challenge	Ecological Theory	Practical Reality
Niger Delta	Oil pollution, coastal erosion	Sustainable resource use, remediation	Persistent spills, community displacement
Savannah	Desertification, overgrazing	Afforestation, rotational grazing	Weak enforcement, poverty-driven exploitation
Rainforest	Deforestation, biodiversity loss	Conservation reserves, sustainable logging	Illegal logging, agricultural expansion

Nigeria's environmental history demonstrates the gap between ecological theory and practice. While frameworks for sustainability exist, economic dependence on oil, agricultural expansion, and weak governance perpetuate degradation. The Niger Delta exemplifies industrial pollution, the savannah highlights land-use pressures, and the rainforest shows biodiversity decline. Together, they underscore the urgent need for integrated ecological management that balances human development with environmental resilience (Libby & Carrruthers, 2010, p.6).

Interplay Between Human Practices and Environmental Outcomes

Nigeria's environmental history shows *a* complex interplay where human practices, such as agriculture, oil extraction, urbanization, and deforestation have directly shaped ecological outcomes like biodiversity loss, desertification, flooding, and pollution (Sowunmi, 1998, pp.65-100). These outcomes, in turn, affect human security, livelihoods, and sustainable development. Large-scale clearing of rainforests in Cross River and southwestern reserves for timber and farming. Loss of biodiversity, soil erosion, and disruption of carbon storage. Oil exploration in the Niger Delta, Gas flaring, oil spills, and pipeline leaks from decades of petroleum extraction. Severe water and soil pollution, destruction of mangroves, and health crises in local communities. Slash-and-burn farming and overgrazing in savannah zones. Desertification in northern Nigeria, declining soil fertility, and reduced food security. Rapid growth of cities like Lagos and Abuja, with poor waste management and industrial emissions (Egereonu, & Ibe, 2019, pp.118-214). Air pollution, flooding from blocked drainages, and rising greenhouse gas emissions. Tin mining in Jos Plateau and artisanal mining across rural areas. Land degradation, toxic contamination, and displacement of communities.

Feedback Loops: How Environment Shapes Society: Environmental degradation often fuels conflicts between farmers and herders in the savannah, as shrinking grazing lands intensify competition. Pollution and climate change increase vulnerability to disease, poverty, and displacement (Nwankwo,, 2014, pp.171-175). Traditional ecological knowledge erodes as modern practices dominate, weakening community-based conservation. Sustainable development strategies emphasize green technology, reforestation, and renewable energy, but implementation remains uneven. Nigeria's case illustrates ecological principles such as ecosystem services, human–environment interactions, and resilience vs. vulnerability (Odemelam, 2018, pp.111-134). Policies like the National Environmental Policy, reforestation programs, and Niger Delta clean-up projects attempt to balance development with sustainability. Note that Nigeria's environmental history is not just about nature—it is about how human choices drive ecological change, and how those changes circle back to reshape society. The rainforest and savannah zones provide vivid case studies of this dynamics, showing both the risks of unsustainable practices and the potential of ecological stewardship (Kashwan, 2016, pp.77-79).

Navigating Environmental Degradation in Nigeria: Key Challenges and Pathways Forward

Environmental degradation in Nigeria reflects a convergence of ecological stress, governance failures, and socio-economic fragility. It has become both a symptom and a driver of underdevelopment, demanding responses that link environmental repair with justice and sustainable growth (Adewuyi, 2023, pp.34-75)

Key challenges

Nigeria faces acute land and water degradation, driven by deforestation, overgrazing, unplanned urbanisation, and poorly regulated extractive industries. Desertification in the north, gully erosion in the southeast, and wetland loss in the Niger Delta and coastal areas undermine food production, housing, and infrastructure. Oil spills, gas flaring, industrial effluents, and solid waste pollution contaminate air, soil, and

water, with especially severe ecological and health impacts in the Niger Delta and densely populated cities such as Lagos, Port Harcourt, Kano, and Onitsha (Akpan, 2019, pp.120-135).

Weak enforcement of environmental regulations, overlapping institutional mandates, and corruption allow powerful economic actors to externalise environmental costs onto poor and marginalised communities. Many rural and peri-urban residents depend directly on land, forests, and rivers for livelihoods, making them highly vulnerable to degradation, displacement, and conflict. Climate variability and extreme events—such as recurrent flooding and heat stress—intensify existing vulnerabilities, reinforcing cycles of poverty, food insecurity, and migration (Sabin, 2010, p.102).

III. PATHWAYS FORWARD

Navigating these challenges requires treating environmental protection as a core development and security priority, not a peripheral agenda. Strengthening regulatory institutions, ensuring transparent environmental impact assessments, and operationalising the "polluter pays" principle are essential to deter harmful practices and fund remediation (Maddox, 1999, pp.162-168). At the same time, integrating climate and environmental risks into national and subnational planning, budgeting, and infrastructure decisions can reduce long-term losses and enhance resilience.

Effective navigation must prioritise community participation and local ecological knowledge in resource governance and restoration initiatives. Supporting community forestry, co-managed fisheries, climate-smart agriculture, and secure land and resource rights can align conservation with livelihood gains (Beinart, 2000, pp.727-754). Scaling up nature-based solutions, such as reforestation, mangrove and wetland restoration, urban green spaces, and watershed protection, offers cost-effective ways to buffer floods, stabilise soils, and protect biodiversity while creating green jobs (Pesa, 2002, pp. 140-155).

Finally, addressing environmental degradation in Nigeria calls for a just transition that links energy policy, industrial strategy, and social protection. Expanding cleaner energy options, reducing dependence on fossil-fuel rent extraction, and investing in environmental monitoring, data, and education can shift incentives toward sustainability (Showers, 2005, pp.279-294). An analysis grounded in environmental justice, attentive to who bears the risks and who reaps the benefits offers a critical lens for guiding scholarship, activism, and policy toward a more equitable and ecologically resilient Nigeria.

IV. CONCLUSION

Nigeria's environmental history demonstrates that contemporary crises are not isolated events but the cumulative outcome of long-term socio-economic and political choices that systematically privileged extraction over ecological integrity. An ecological lens reveals the continuities between precolonial resource use, colonial commodification of land and subsoil resources, and postcolonial dependence on oil and other primary commodities, showing how each period deepened structural vulnerabilities rather than resolving them. This perspective challenges narratives that naturalize degradation as inevitable or purely "local," and instead foregrounds the ways state policies, global markets and corporate practices have reshaped landscapes, waterscapes and livelihoods across Nigeria's diverse ecological zones.

By tracing this trajectory from degradation to the possibility of sustainability, the paper underscores that environmental damage in Nigeria, whether in the Niger Delta, the savannah belts, the rain forest or rapidly urbanizing centres, is inseparable from issues of power, justice and governance. Oil spills, gas flaring, deforestation, desertification and urban pollution emerge as manifestations of deeper institutional weaknesses: fragmented regulation, weak enforcement, opaque revenue management and limited community participation, all of which have historically silenced those most affected by environmental harm. Viewing these problems ecologically also highlights their interconnections, for example how land-use change, energy policy and climate vulnerability intersect to shape food security, health and displacement.

At the same time, an historical-ecological reading reveals important sites of resistance, adaptation and innovation that complicate a purely pessimistic narrative. Community mobilization in oil-producing regions, the work of environmental justice movements, and recent policy frameworks that gesture toward climate action and biodiversity conservation all suggest a growing, if uneven, shift toward sustainability discourses. Traditional ecological knowledge, local conservation practices and emerging green initiatives show that alternative ways of relating to land and resources remain available, even if they are often marginalized by dominant development paradigms.

For scholarship, this analysis reinforces the need to integrate environmental history more fully into Nigerian and African historiography, moving beyond event-focused political histories to include soil, water, forests, minerals and atmosphere as active components of the historical record. Methodologically, it calls for interdisciplinary collaboration between historians, ecologists, geographers, economists and legal scholars to capture the complexity of socio-ecological change and to avoid simplistic, single-cause explanations. Such approaches can better illuminate the feedback loops between policy, ecology and society that conventional sectoral studies often miss.

Normatively, re-examining Nigeria's environmental past through an ecological lens has clear implications for policy and practice. A meaningful transition from degradation to sustainability will require more than technical fixes: it demands redistributive and participatory reforms, from strengthening environmental institutions and enforcing regulations to recognizing community land rights, supporting local livelihoods and embedding environmental justice in decision-making at all scales. By situating current sustainability initiatives within their historical context, the paper argues that durable solutions must simultaneously repair damaged ecosystems, rectify historical injustices and redesign development pathways so that ecological limits and social equity are treated as foundational rather than optional.

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