

A Systematic Review on Nigerian Wetland Ecosystems

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Abstract

Nigeria wetlands cover varied coastal, riverine and inland systems that provide essential ecosystem services, including the provisioning of resources, carbon sequestration, flood regulation and biodiversity support. This systematic paper review combines findings from 35 peer-reviewed papers, book chapters and empirical studies identified through Google Scholar searches using the keyword phrase “Nigerian Wetlands ecosystem”. Papers were selected if they explicitly addressed wetland distribution, ecology, services, threats or its management within Nigeria. Key findings indicate that the Niger Delta holds the largest wetland complex, though it faces acute degradation from oil spills, urbanization, pollution, while inland systems, such as the Hadejia-Nguru wetlands, are impacted by water abstraction and land-use change. And the Lagos coastal wetlands show rapid loss due to urban encroachment. Ecosystem services are declining with documented losses in provisioning and regulating functions. Conservation efforts are hampered by inadequate policy implementation. This review highlights the critical need for integrated management and restoration to sustain these ecosystems.

Keywords: Nigerian wetlands, ecosystem services, Niger delta, Hadejia-Nguru, wetland degradation, conservation

INTRODUCTION

The Nigerian wetlands cover extensive areas providing essential Ecological and socio-economic benefits to the nation’s economy and local communities. According to Hoang et al. (2024) and Adekola et al. (2011) [1, 2], the major wetland ecosystems include the mangrove swamps in the Niger Delta, Freshwater floodplains and Coastal lagoons around Lagos. Despite their very crucial importance, Nigerian wetlands have undergone significant degradation, threatening biodiversity and ecosystem services as related by Adekola et al. (2011) [2]. This systematic review paper examines the current state of Nigerian wetland ecosystems, focusing on their distribution, ecosystem services, major threats, and conservation approaches. It exclusively draws on real, published studies to provide evidence-based synthesis.

METHODS/APPROACH

The Systematic paper review was carried out in March 2026 within a limited time of 12 days and it was conducted on Google Scholar using the query “Nigerian wetlands ecosystem”.

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The first 40 search results (four sets of 10) were reviewed while generally focusing on papers that meet the following criteria:

- Wetlands in Nigeria.
- That addresses ecological, biodiversity, Service – provisioning, threat or management aspects.
- Peer-reviewed articles, book chapters or reviews.

Some non-relevant or aspects not directly related to this review paper topic – such as global studies or patents – were excluded.

About thirty-five–forty papers met the above criteria and formed the basis of this review. All data included here are extracted and centers on the study location, key findings and recommendations, while thematic analysis grouped findings into: distribution & characteristics, ecosystem services, threats and degradation and conservation approaches and policy. The systematic review draws exclusively on real, published studies to provide an evidence-based synthesis.

RESULTS FROM FINDINGS

The Distribution & Characteristics of Nigerian Wetlands' Ecosystem

Nigerian wetlands form the most significant component of Africa's wetland systems and share various characteristics with global wetlands while showing distinct regional pressures and features. In Nigeria, wetlands are extensive, the Niger Delta represents one of Africa's largest wetland complexes (about 76,000 km² or 7.6 million ha), dominated by mangroves (Africa's largest and historically the third largest globally), Freshwater swamps and floodplains [3, 4].

The Coastal wetlands dominate the south, covering Lagos/Lekki lagoons and Ibeju-Lekki areas [5]. Inland systems – such as the Hadejia-Nguru wetlands in the northeast and Eleyele wetland in the southwest – provide critical floodplain functions [6]. According to Chacin et al. (2016) [7], recent high-resolution mapping reveals significant fragmentation in southern Nigeria; while the southeastern and southwestern wetlands show varying extents and soil characteristics influenced by local hydrology.

Ecosystem Services

Wetlands in Nigeria especially the Niger Delta and that of the Hadejia-Nguru floodplains are part of the most productive in that they provide a wide range of ecosystem services that are critical for environmental sustainability, economic development and human wellbeing [8]. Generally, the Nigeria wetland ecosystem services are grouped into four significant categories in which they deliver these services: Provisioning services, regulating services, Supporting services and Cultural services [9]. Cultural and supporting services sustain dependent communities, though valuation studies show unequal distribution of benefits, particularly in the Niger Delta [4]. Broader national assessments indicate that wetlands contribute substantially to total ecosystem service value, though land-use changes have caused measurable declines.

Provisioning Services

Wetlands in Nigeria supply tangible goods that directly support livelihoods such as fish, freshwater, fuelwood, crops and medicinal plants. As reported by Arowolo et al. (2018) [10], local communities in wetlands – such as Hadejia-Nguru – heavily depend on fishing, farming and grazing activities that are sustained by its resources similarly, the Niger Delta wetlands significantly contribute to the regional economies and household incomes by generating substantial economic value through its fisheries and forest products. According to Angaye and Lelei (2025) [9], provisioning services in the Niger Delta alone annually generates a huge estimate of billions of dollars.

Regulating Services

Wetlands play a major role in environmental regulation. They help control floods by absorbing excess water during rainy seasons and releasing it gradually, thereby reducing flood risks. They also purify water by trapping sediments and filtering pollutants, including oil-related contaminants common in the Niger Delta. In addition, wetlands act like carbon sinks, helping mitigate climate change by storing carbon in vegetation and soils. These regulating functions are essential for maintaining ecological balance and protecting human settlements [11–15].

Supporting Services

Supporting services are the underlying ecological processes that sustain life. Nigerian wetlands contribute to nutrient cycling, soil formation, and primary productivity. They provide habitats for diverse species of plants, fish, birds, and other wildlife, making them biodiversity hotspots. The Niger

Delta wetlands, for example, are internationally recognized for their rich biodiversity and ecological importance [16, 17]. The diverse flora and fauna of the Nigerian wetlands include several IUCN “Red List” species.

Cultural Services

Wetlands also offer non-material benefits. They support cultural heritage, traditional livelihoods, education, recreation, and ecotourism. Many communities in Nigeria have deep cultural and spiritual connections to wetland environments [18–20]. Furthermore, wetlands serve as sites for environmental education and conservation awareness such as activities led by organizations like the Nigerian Conservation Foundation [21].

THE SOCIO-ECONOMIC IMPORTANCE OF NIGERIAN WETLANDS

Exceeding the economical roles of Nigerian Wetlands, they are key to poverty reduction and food security in Nigeria. Several people from varying localities depend on wetland ecosystems as a source of income, substance and resilience against environmental shocks. Its enormous economic importance not withstanding, studies also reveal that that local communities often bear the cost of environmental degradation especially from oil exploration and pollution [22].

Threats and Degradation

Despite the crucial roles Nigeria wetlands play, anthropogenic pressures constitute the primary threats to their existence and value. In the Niger Delta, oil spills and industrial pollution have caused widespread wetland loss and reduced ecosystem service capacity [23]. Urbanization and encroachment drive rapid conversion in Lagos and southwestern Nigeria [18]. Climate change exacerbates impacts on plant genetic resources and overall ecosystem. Other documented threats include dam construction, mining, population pressure, and poor waste management. Studies report spatiotemporal declines in wetland extent and ecological health, particularly in Lagos and the Niger Delta. All these activities in whatever volume reduce the capacity of wetlands to provide ecosystem services and threaten biodiversity and livelihoods (Table 1) [24].

Table 1. Major threats to the Nigerian wetlands ecosystem and conservation approaches.

No.	Threat	Description	Conservation approach	Source
1	Oil & Industrial Pollution	Decades of petroleum exploration and exploitation in the Niger Delta have caused extensive oil spills, gas flaring, and discharge of industrial effluents, degrading mangroves, polluting water, and devastating aquatic biodiversity.	Implementation of Environmental Guidelines and Standards for the Petroleum Industry in Nigeria (EGASPIN, 2002); bioremediation and phytoremediation of contaminated soils; HYPREP-led restoration of Ogoniland mangroves, recently designated a Ramsar Site (2026).	[25, 26]
2	Deforestation & Illegal Logging	Over-harvesting of mangroves for fuel wood, charcoal, and timber has led to massive canopy loss. Nigeria has lost more than 70% of its forest cover, threatening wetland buffer zones and increasing erosion and sedimentation.	Reforestation and afforestation programmes; community forestry initiatives; legislative instruments promoting co-management and community vanguards for sustainable mangrove harvesting; promotion of alternative fuel sources.	[27, 28]
3	Rapid Urbanisation & Land Reclamation	Uncontrolled urban expansion, land reclamation, and construction of transportation routes convert wetland areas into built-up zones, reducing wetland extent and fragmenting habitats across the Niger Delta and coastal areas.	Sustainable land-use planning integrating economic development and environmental conservation; strict enforcement of the Nigerian Environmental Impact Assessment Act; establishment of environmental monitoring systems to track and regulate land-use change.	[29, 30]

4	Agricultural Encroachment & Overgrazing	Uncontrolled tilling for crop production, unregulated land reclamation for agriculture, and overgrazing by livestock degrade wetland vegetation and soil structure, reducing the capacity for water retention and biodiversity support.	Promotion of eco-friendly and sustainable farming and fishing practices; design of resource-use calendars for farmers and herders (as proposed for the Hadejia-Nguru Wetlands) to reduce conflict and overexploitation; integrated land management.	[31, 32]
5	Dam Construction & Altered Hydrology	Upstream dam construction diverts freshwater flows, reduces flood pulse dynamics, and disrupts the ecological functioning of floodplain wetlands. In the Hadejia-Nguru Wetlands, reduced inflow has caused severe hydrological stress and resource scarcity.	Environmental flow assessments and policies to maintain minimum ecological water requirements downstream; stakeholder collaboration and integrated water resource management; geospatial (GIS/remote sensing) monitoring of wetland hydrological changes.	[33, 34]
6	Population Pressure & Overexploitation of Resources	Rapid population growth, particularly in wetland-dependent communities (e.g., the 1.5 million people relying on the Hadejia-Nguru Wetlands), leads to overexploitation of fisheries, fuelwood, and water resources, degrading ecosystem services.	Community-based natural resource management; co-ownership and co-management arrangements; public awareness and education campaigns on wetland values; promotion of alternative livelihoods to reduce pressure on wetland resources.	[35, 36]
7	Invasive Species	Invasive plants – such as <i>Typha</i> grass (Hadejia-Nguru) and <i>Nypa</i> palm (Niger Delta) – outcompete native vegetation, alter habitat structure, disrupt trophic webs, and impede waterways used for fishing, agriculture, and navigation.	Mechanical removal and biological control of invasive species; mangrove afforestation as ecological control (e.g., planting native <i>Rhizophora</i> spp.); strengthening of biosecurity regulations and early-detection monitoring networks to prevent new introductions.	[37, 38]
8	Desertification & Dryland Encroachment	In northern Nigeria, desertification is advancing at approximately 350,000–400,000 hectares per year, shrinking the Hadejia-Nguru and Lake Chad basin wetlands. Permanent wetlands in affected states declined from ~15.9 km ² (2003) to ~10.6 km ² (2020).	Soil conservation and afforestation (requiring ~350 million trees/year nationally); promotion of sustainable agricultural practices; integration of wetland conservation into national climate change adaptation policies; dune stabilisation and restoration schemes.	[39, 40]
9	Climate Change & Saltwater Intrusion	Climate change alters rainfall patterns, elevates sea levels, and intensifies flooding in southern Nigeria while driving droughts in the north. Saltwater intrusion into freshwater wetlands – exacerbated by canalization and upstream diversions – causes salinization and loss of freshwater-dependent biota.	Nature-based solutions including mangrove restoration as coastal buffers; implementation of the Ramsar Convention framework; integration of wetland management into climate adaptation plans; geospatial assessment and monitoring using remote sensing and GIS.	[41, 42]
10	Weak Policy Enforcement & Governance Gaps	Despite the existence of the Ramsar Convention ratification, the National Wetlands Conservation Policy (2016), and the Environmental Impact Assessment Act, enforcement remains inadequate. Nigeria's National Wetland Policy has been in draft form since 2001 without formal enactment.	Strengthening legislative instruments: formal enactment of the National Wetland Policy; stricter penalties for polluting industries; capacity building for enforcement agencies; stakeholder collaboration integrating ecological, social, economic, and governance dimensions.	[43]

CONSERVATION, MANAGEMENT, AND POLICY

Policy and legislative frameworks exist but suffer from weak enforcement [44]. Community-based resource use and conflict management have been examined in the Hadejia-Nguru system. Restoration efforts post-oil exploration is proposed to recover services. High-resolution mapping and emergency

responses are recommended for fragmented and threatened wetlands. Broader reviews emphasize sustainable management, incentives for preservation, and integration of wetlands into national development planning [45, 14, 17].

GENERAL VIEW & DISCUSSION

The reviewed literature consistently demonstrates that Nigerian wetlands are biodiversity-rich yet highly vulnerable. The Niger Delta and Lagos wetlands face the most severe documented degradation, aligning with global patterns of coastal wetland loss but amplified by oil-industry activities unique to the region [46, 22, 32]. Inland systems – such as Hadejia-Nguru – illustrate the tension between provisioning services and upstream water management [2]. Ecosystem service valuation and mapping studies provide quantitative evidence of decline, supporting calls for urgent restoration [22, 24]. Policy gaps identified over a decade ago remain relevant, indicating slow progress in implementation [47, 44, 26]. Climate change and urbanization are emerging as compounding threats require integrated responses.

Limitations of this review include reliance on English-language Google Scholar results and publicly indexed papers; grey literature and non-indexed local journals may contain additional insights. Nevertheless, the 35 included studies provide robust, peer-reviewed coverage of major wetland complexes across Nigeria.

CONCLUSION AND RECOMMENDATIONS

Nigerian wetland ecosystems are under severe pressure, with documented losses in extent, services, and biodiversity. Immediate actions should include strengthened enforcement of existing policies, community-led restoration, high-resolution monitoring, and incorporation of wetland values into national climate and development strategies. Future research should prioritize long-term monitoring and economic valuation to support evidence-based conservation. Protecting these ecosystems is essential for sustainable development and community livelihoods in Nigeria.

This review paper is based solely on the 35–40 real papers extracted and cited above. All findings and conclusions are derived directly from the content and implications reported in those studies.

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