

Biodiversity, Indigenous Knowledge, and Governance in Africa: An In-Depth Review

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Abstract

This review synthesizes the recent literature (2023–2025) at the intersection of biodiversity conservation, international relations, and local knowledge systems, with a special focus on Nigeria and Africa more broadly. Six core studies are examined, covering thematic areas such as climate policy alignment, indigenous ecological knowledge (IEK), sacred forests and religious belief systems, biodiversity monitoring, and pan-African conservation agendas (notably the "30 by 30" target). Across these works, several recurring tensions emerge: the disjunction between global environmental commitments and local realities; the under-recognition of indigenous/local knowledge in law and policy; issues of equity, participation, and governance; data and monitoring deficits; and funding limitations. The review highlights how conservation effectiveness in Africa, and in Nigeria in particular, depends upon integrating local cultural / spiritual practices, securing indigenous rights, improving data infrastructures, and designing governance frameworks that bridge levels (local, national, regional, international). Recommendations are forwarded for future research and policy design, including the need for comparative case studies, participatory approaches, legal reforms that respect customary systems, and long-term capacity building.

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Introduction

Biodiversity loss remains one of the most pressing global challenges, not only from ecological and environmental standpoints but also because of its implications for human well-being, livelihoods, equity, and international relations. In the African context, biodiversity is deeply entwined with cultural heritage, livelihoods (especially rural), climate resilience, and national development goals. Nigeria, with its high species richness, multiple biomes (mangroves, forests, savannahs), and large rural populations depending directly on ecosystem services, provides a particularly illustrative case for exploring how biodiversity governance operates at the intersection of global agreements (e.g., Convention on Biological Diversity, Paris Agreement), national policy, local customary laws, and indigenous knowledge.

This review analyses six recent studies (2023-2025) that address different but overlapping themes: how Nigeria and Africa more generally are navigating conflicts and synergies between climate policy and biodiversity; the roles of indigenous ecological knowledge; legal/policy reform; sacred and religious belief systems; the challenge of biodiversity monitoring; and large continental conservation targets. By critically engaging with these works, this review aims to uncover policy-relevant insights, identify gaps, and suggest directions for further research that can support more equitable, effective, and sustainable biodiversity conservation in the region.

Detailed Analysis of Core Studies

Below is a more in-depth summary and critique of each of the six articles, followed by cross-cutting themes and gaps.

Article Summaries and Critiques

1. “Biodiversity conservation and socio-economic development for Africa’s harmonious future: A scoping review” (Ngongolo & Kyando, 2025)

Summary: This scoping review synthesizes conservation efforts across Africa over the past two decades (2000–2024), with attention to community-based conservation, protected areas, and socio-economic development. It examines the trade-offs between conservation and livelihood needs, evaluates what forms of interventions have achieved co-benefits (biodiversity + local development), and suggests that many conservation projects struggle with insufficient local engagement, funding, and policy coherence.

Strengths: Broad scope; useful aggregation of what works/what doesn't; good for identifying regional trends. It is also useful for recognizing the diversity of governance contexts across African states and the importance of tailoring interventions.

Weaknesses: Because of its scope, it lacks depth for individual country cases; evaluation of effectiveness is sometimes descriptive rather than quantitatively comparative; less attention to cultural dimensions (belief systems, sacred sites) than legal and economic factors.

Relevance to Nigeria: Offers concrete lessons about how socio-economic pressures (e.g. agriculture, livelihood dependence on forest products) impact conservation. Suggests that Nigerian conservation policies must integrate livelihood planning, ensure benefit sharing, and adapt models of community-based conservation effectively.

2. "Aligning Climate Action and Biodiversity Conservation in Nigeria: Implications of the Paris Agreement" (Ajaero et al., 2025)

Summary: This work explores how Nigeria's international climate obligations (under the Paris Agreement) are or are not aligned with domestic biodiversity policies/practices. It identifies key mismatches, such as national climate action that emphasizes afforestation without ensuring biodiversity richness or climate-mitigation projects that do not consider impacts on local ecosystems. The authors recommend institutional reforms, cross-sectoral coordination, and integrating biodiversity into Nationally Determined Contributions (NDCs).

Strengths: Direct engagement with legal/institutional policy; clear linkage to international agreements; provides empirical examples in Nigerian ecosystems (wetlands, forests). Emphasis on policy coherence is particularly useful.

Weaknesses: The paper could deepen empirical data on specific case studies; more attention to power dynamics (who decides, whose knowledge is valued) could enrich the analysis; limited discussion of financing mechanisms that could support alignment.

Relevance to Nigeria: Offers a roadmap for adjusting Nigeria's policy architecture to better integrate biodiversity with climate action, something of high relevance with Nigeria's climate vulnerability and biodiversity richness.

3. “Indigenous Ecological Knowledge: a Transformative Approach to Biodiversity Legislation in Nigeria” (Ibe & Okonkwo, 2024)

Summary: Focuses on how IEK is undervalued in Nigeria’s legal and policy frameworks. Argues for “transformative legal change”: incorporating IEK explicitly into legislation, respecting customary institutions, recognizing sacred groves/sites, ensuring free prior & informed consent (FPIC) for indigenous/local communities, and reforming enforcement mechanisms to take into account local practices.

Strengths: Strong normative and legal approach; clear arguments for rights, agency, justice. Highlights the importance of culture and local knowledge in conservation efficacy. Persuasive in revealing gaps in current law.

Weaknesses: Less empirical quantitative evaluation of impact of IEK (e.g. how much biodiversity is preserved via IEK vs standard protected areas). Implementation challenges are acknowledged but not deeply explored (e.g. conflicts among local groups; changes over time; how to integrate with national law).

Relevance: Critical for policy reform; for NGOs/international actors, the article signals the need to engage more deeply with local institutions and legal pluralism in Nigeria.

4. “The Influence of African Traditional Religion on Biodiversity Conservation in Anambra East LGA: A Geospatial Analysis” (Okafor & Eze, 2023)

Summary: Uses geospatial techniques alongside qualitative data to assess how sacred forests underpinned by African Traditional Religion (ATR) in Anambra East (Nigeria) have lower rates of deforestation / land cover change compared to surrounding non-sacred forests. Also examines threats from urbanization, land conversion, and how belief systems are weakening under modern pressures.

Strengths: Combines spatial data with cultural / religious analysis; gives strong empirical evidence of the conservation value of belief systems / sacred sites. Local, concrete, and quantifiable.

Weaknesses: Focus is narrow (one LGA); scaling up/s extrapolating findings to wider Nigeria or across diverse biomes requires care. Also, little discussion of governance or legal protection for sacred sites; what happens when belief weakens or population pressure increases.

Relevance: Emphasizes that conservation policies should not ignore spiritual / religious dimensions; suggests opportunities to formalize protection of sacred sites; calls for downstream policy or legal recognition of sacred sites.

5. “An African Perspective to Biodiversity Conservation in the Twenty-First Century” (Challender et al., 2025)

Summary: This article provides a continent-level reflection on how Africa is managing biodiversity conservation in light of the global 30×30 target. It discusses funding challenges (dependence on external funding, need for domestic financing), governance gaps, need for local participation, indigenous rights, data capacity, and innovative funding (e.g. payment for ecosystem services, carbon credits). Also offers case studies of successful community-based governance (CREMAs etc.).

Strengths: Broad, yet anchored in specific examples; comparative; forward-looking; includes policy recommendations; strongly emphasizes equity, inclusion, and integrating local knowledge.

Weaknesses: Some of the recommendations are aspirational; the political, institutional, and social barriers are acknowledged but solving them is complex; fewer detailed Nigeria-specific case studies in this paper.

Relevance: Provides context for Nigeria within pan-African conservation; useful for guiding Nigeria’s strategy for the 30×30 commitment; helps identify funding & governance pathways.

6. “Monitoring biodiversity loss in rapidly changing Afrotropical ecosystems: An emerging imperative for governance and research” (Achieng et al., 2023)

Summary: Focuses on data/monitoring: availability, quality, usability of biodiversity data; identifies the drivers of biodiversity loss and the critical need for harmonized indicators, better observation systems, funding to support monitoring, and evidence-based policy. Emphasizes that

without good monitoring, efforts of conservation are handicapped. Also calls for databases, capacity building, cross-national and transdisciplinary collaboration.

Strengths: Fills an important gap; clearly maps out where data is deficient; strong on methodology; emphasizes urgency. Good balance between identifying problems and suggesting solutions.

Weaknesses: Less focus on cultural/spiritual dimensions; legal/policy integration is more in the background; might overstate the capacities of some governments to implement the monitoring systems in the near term without external support.

Relevance: Nigeria faces precisely these data challenges: in many regions weak monitoring, underfunded environmental agencies, fragmented data; this work reinforces that international funding or technical partnerships should prioritize monitoring infrastructure in Nigeria.

Cross-Cutting Themes & Critical Discussion

From comparison of the above, along with supplementary literature, the following key themes, tensions, and research gaps emerge:

1. Local / Indigenous Knowledge & Cultural / Religious Systems as Conservation Assets

Several studies assert that IEK, sacred forests, belief systems (ATR) play concrete roles in conserving biodiversity. For example, the geospatial analysis in Anambra East shows lower deforestation rates in sacred sites. The systematic reviews (e.g. Sinthumule 2023) show forms of TEK: taboos, customs, rituals, rules/regulations, forests protected by local social norms. Yet, belief systems are under pressure: modernization, changing religions, land-use pressures, urbanization. IEK is often not codified; legal frameworks often fail to recognize customary rights or sacred groves. The transformative legislations are needed but rare.

2. Governance, Legal Pluralism, Institutional Gaps

There is a consistent call for legal reform: integrating IEK into biodiversity legislation; recognizing customary land tenure; ensuring participation, FPIC; protecting sacred sites. Institutional capacity is often weak: environmental agencies may lack staff, training, financial means. Coordination among sectors (forestry, environment, agriculture, traditional institutions) is often fragmented. Policy incoherence (between climate mitigation, biodiversity protection,

agriculture expansion) is a continuing problem. From Ajaero et al., the mismatch between climate commitments and biodiversity policy is one example.

3. Data, Monitoring & Evidence Base

A critical obstacle is data: availability, quality, spatial/temporal resolution. Without good baseline data, trends, drivers, and effectiveness of conservation are hard to assess. Achieng et al. (2023) emphasizes this strongly.

Another aspect: comparison between sacred / culturally protected areas vs non-protected areas often missing; many studies are small scale or qualitative; few large cross-country or biome-level analyses. Synonymously, the literature shows many studies in West Africa but fewer in Central, North Africa, etc.

4. Funding, International Agreements, and Global Goals vs Local Realities

Africa has committed (through CBD, 30×30, etc.) to ambitious conservation targets. There is increasing demand for innovative funding (domestic funding, private sector, carbon markets, payments for ecosystem services) to reduce dependence on foreign aid. But aligning these global goals with local priorities, ensuring that local communities benefit, avoiding displacement or disadvantaging the poor, or cultural loss, is challenging. Some conservation projects (even well-intentioned) have negative social impacts.

5. Equity, Participation, and Rights

Indigenous rights, tenure, and participation are central for legitimacy and sustainability. The literatures argue that conservation is more effective and just when local communities are involved as equal stakeholders. IEK must be respected not merely as input but as integral.

Also gender dimensions, youth involvement, intergenerational transmission of knowledge: often under-studied. Many knowledge holders are older, traditions are eroding.

Gaps, Challenges, and Opportunities

From this literature, key gaps or challenges emerge, along with opportunities:

Gaps / Challenges

Scalability: Many empirical studies and case studies are small scale (single LGAs, sacred forests, etc.). Scaling to national or regional frameworks while preserving local specificity is not straightforward.

Legal enforcement: Even where legislation exists, enforcement is weak; sacred sites may lack formal protection; customary norms may be overridden by economic or political pressures.

Knowledge erosion: IEK is declining due to urbanization, education systems that do not value local knowledge, religious conversion, migration.

Funding mismatches: Projects often rely on external funding with limited sustainability; domestic financial mechanisms or private sector involvement remain underutilized.

Data gaps: Many biodiverse regions have little long-term monitoring; inconsistent metrics; lack of harmonized databases; sometimes absence of local capacity to collect / analyze data.

Conflicts of land use: Agriculture expansion, mining, infrastructural development, urbanization often conflict with conservation; markets and global demand drive land conversion; balancing food security, development, and conservation is fraught.

Opportunities

Legal reform & policy innovation: Integrating IEK, customary rights, sacred sites into formal law; mandating FPIC and benefit-sharing; recognizing customary tenure.

Funding innovation: Carbon markets, payments for ecosystem services, biodiversity credits; encouraging private sector and domestic investment; aligning conservation to climate mitigation to access climate finance.

Participatory monitoring and citizen science: Empower local communities to monitor ecosystems; using affordable technologies (e.g. remote sensing, mobile apps, community based sensors) to fill data gaps.

Interdisciplinary research: Combining ecological sciences, legal studies, anthropology, religious studies, political science to understand the full spectrum of conservation.

Strengthening institutional capacity: Training, building environmental agencies, improving policy coherence across sectors, and promoting collaboration among government, NGOs, local institutions.

Comparative studies: Between different ecosystems (forest, wetlands, mangroves, savannah), different cultural systems, and across countries, to elucidate what works under what contexts.

Implications for International Relations

Given the themes above, there are several implications for how biodiversity intersects with international relations in Africa/Nigeria.

Treaties & global agreements must be designed with sensitivity to local cultural systems, indigenous rights, customary land tenure. Top-down imposition can cause resistance or ineffective implementation. Funding and aid architecture should move toward more flexible, long-term, and locally determined investments. Donor conditionalities should allow for local participation and knowledge systems to shape priorities.

Diplomatic and cross-border collaboration is crucial for transboundary ecosystems; shared monitoring systems; harmonizing legal protections; avoiding “leakage” (where protecting in one country pushes destruction across border).

Climate / biodiversity nexus: As countries pursue climate mitigation/adaptation under Paris Agreement, the Sustainable Development Goals, etc., they should integrate biodiversity into climate planning, so that climate action does not damage biodiversity or undermine ecosystem services.

Soft power, cultural diplomacy: Recognizing religious and spiritual conservation traditions can be part of broader cultural diplomacy or international environmental governance; NGOs, multilateral bodies, international law may do more to respect local belief systems.

Policy and Research Recommendations

Based on the body of work reviewed, the following recommendations for both policy and research, especially in Nigeria are proffered:

For Policy / Practice

1. Codify the protection of sacred sites and customary land tenure into national law; ensure that sacred groves, forests, traditional belief systems have legal status and enforceable protection.
2. Integrate IEK and local ecological knowledge into biodiversity legislation, conservation policy, climate action plans (e.g. NDCs), and environmental impact assessment frameworks.
3. Ensure meaningful participation and rights of indigenous and local communities in conservation programs. Use Free, Prior, and Informed Consent (FPIC); ensure benefit sharing; empower communities to manage their own conservation projects.
4. Improve monitoring capacity: invest in data collection, regular monitoring, harmonized indicators; support environmental agencies; engage with remote sensing, citizen science, local monitoring.
5. Innovate financing mechanisms: establish domestic funding sources; explore carbon finance, biodiversity credits; develop payment for ecosystems services schemes; involve private sector under equitable terms.
6. Strengthen institutional coordination: between ministries of environment, agriculture, forestry, traditional affairs; align policies so that conservation is not undermined by, for example, agricultural expansion or infrastructural development.

For Research

1. Comparative case studies: comparing sacred site effectiveness, IEK integration, across different biomes, states, and cultures in Nigeria; cross-country comparisons in West Africa.
2. Longitudinal studies to track how belief systems, IEK, and sacred site protections change over time, especially under urbanization and religious transformation.
3. Quantitative assessments of biodiversity outcomes from IEK or sacred groves vs conventional protected areas, to measure magnitude of protection.

4. Social science work on equity, power, gender in conservation: who benefits, who is excluded; how knowledge holders are recognized; how expectations are managed.
5. Technological and data innovation research: how remote sensing, GIS, mobile apps, etc., can support local monitoring; how data can be shared across levels; how harmonized metrics can be developed.
6. Policy implementation studies: what legal reforms have succeeded, what barriers; case analyses of policy coherence (e.g. climate-biodiversity-agriculture).

Conclusion

The six studies reviewed paint a picture of both urgency and possibility. Africa, and Nigeria especially, faces multiple pressures on biodiversity—habitat loss, land conversion, weak enforcement, cultural change. Yet local knowledge systems, belief structures, customary land regimes, when properly recognized and integrated, show real potential to contribute strongly to conservation. Global conservation goals and treaties set valuable targets and frameworks, but their success depends on grounding in local contexts—legal, cultural, ecological, institutional. Strengthening monitoring, reforming policies to recognize indigenous rights, attending to equity, creating sustainable finance mechanisms, and fostering genuine community participation are key. For international relations, this means rethinking the relations of donor-recipient, respecting plural legal orders, and designing global policies that are flexible enough to operate with local particularities. Research can support this by filling empirical gaps, producing rigorous comparative data, and exploring the socio-legal dimensions alongside ecological metrics.

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