**BIODIVERSITY CONSERVATION AND BUSINESS IN NIGERIA: EVALUATING PRIORITIES ACROSS KEY BUSINESS SECTORS**

**ABSTRACT**

Biodiversity loss presents an escalating threat to ecological stability and economic resilience, particularly in developing economies such as Nigeria, where land-use pressures from business operations are intensifying. This study critically examines how biodiversity conservation is prioritized and integrated within corporate sustainability disclosures across five key business sectors in Nigeria: Oil & Gas/Power, Agriculture, Infrastructure, Manufacturing, and Financial Services, selected based on their ecological footprint and prominence in Nigeria’s economy. Drawing on content analysis of 100 publicly available sustainability reports, the research evaluates biodiversity inclusion using a custom framework aligned with international standards such as the Global Reporting Initiative (GRI 304) and the Kunming-Montreal Global Biodiversity Framework. Six criteria with 30 Attributes were applied to assess sectoral performance. The findings reveal a systemic underperformance in the overall biodiversity disclosure, with only 14% of attributes fully addressed, 21.5% partially addressed, and a striking 64.5% not addressed at all. While the agriculture and oil & gas/power sectors demonstrated comparatively stronger integration, performance across infrastructure, manufacturing, and financial services was consistently weak. Key areas such as biodiversity monitoring, restoration, and institutional investment were largely absent from corporate reporting. This study concludes that biodiversity remains a marginal concern in Nigerian corporate ESG frameworks and sustainability reports. To address this gap, the research advocates for enforceable, sector-specific biodiversity disclosure requirements, improved access to ecological data, and incentive-based mechanisms to encourage biodiversity-positive business practices. Embedding biodiversity as a core pillar of corporate sustainability is critical not only for ecological preservation but also for long-term economic resilience.

**Keywords:** Biodiversity Conservation, Sustainability Reporting, Environmental, Social, and Governance (ESG), Global Reporting Initiative (GRI 304), Biodiversity Conservation Metrics, Business Sectors.

**1.0 INTRODUCTION**

Biodiversity, the variety of life on Earth, from genes to species to ecosystems, is a cornerstone of global ecological and economic stability. It underpins essential ecosystem services such as food production, climate regulation, and water purification, while also contributing to cultural identity, human health, and sustainable livelihoods (IPBES, 2019; Dasgupta, 2021). Globally, over one million species face extinction, with ecosystem degradation now ranked among the most severe threats to business and economic development (World Economic Forum, 2023).

Nigeria’s biodiversity richness is particularly notable. As the most populous country in Africa, it encompasses four ecological zones: coastal, rainforest, savanna, and Sahel, and is home to over 4,700 vascular plant species, 1,000 bird species, and a diverse array of mammals, amphibians, and reptiles (IUCN, 2024). Despite its environmental richness, it remains extremely vulnerable to numerous threats. Extended periods of harmful developmental practices he seen widespread destruction of habitats, pollution, deforestation, and reduction in population levels across several species. Infrastructure projects, like the Lagos–Ibadan Expressway, have seen the expansion and fragmentation of forest edges and increased forest clearance in surrounding areas by 28% between 2010 and 2020 (Unegbu et al., 2024). In the Niger Delta, continued events of oil spills, gas flaring, and industrial effluents continue to compromise mangrove ecosystems and poison freshwater sources (UNEP, 2011).

Among several processes, corporate actions have proven influential catalysts. Sectors like oil and gas, agriculture, real estate, and manufacturing have been major contributors to environmental degradation; yet, biodiversity remains often as an afterthought in corporate investment decisions concerning environmental, social, and governance (ESG) issues (Nwankwo et al., 2023). Though carbon emissions and social indicators mostly prevail in the sustainability disclosures landscape, biodiversity hardly crops up in quantifiably or transparently expressible terms. This relative inattention comes despite mounting evidence that now shows that losses in biodiversity represent critical risks in corporate entities, value chains, and long-term profitability and sustainability (World Economic Forum, 2023).

In light of the factors mentioned above, the current study aims to assess how biodiversity conservation is included and prioritized as part of the sustainability reporting practices utilized by major business sectors in Nigeria.

**2.0 LITERATURE REVIEW**

Nigeria has earned the name of one of the most ecologically rich nations in West Africa due to the wide variety of environments it boasts. Some of them are grasslands, freshwater wetlands, and coastal mangroves (Oyekunle, 2024).

They are teeming with numerous plant and animal species, consisting of 864 avian species, 285 mammals, 203 reptiles, 117 species of amphibians, 775 fish species, and more than 4,700 species of higher plants (Oyekunle, 2024). In addition to the value they hold in nature, they offer crucial services such as regulating the climate through control of weather and temperature, cleaning water, ensuring healthy soil, and creating employment and food for numerous Nigerians.

Nigeria has numerous animals and plants, yet it is losing numerous species now. This is primarily because trees are being felled, homes of animals are being destroyed, the environment is being polluted, and excessive natural resources are being consumed. Farming, logging, constructing new sites, and urban expansion are the major causes of tree loss, and Nigeria has one of the highest levels of tree felling in the world (Awojulugbe, M., 2024; UNEP, 2024). Coastal forests, which are highly significant in fishing, carbon storage, and shoreline protection, are increasingly damaged through oil spills, industrialization, and reckless alteration of their habitats (Oyekunle, 2024).

The government in Nigeria has designated over 1,160 forest reserves and numerous national parks, but the protected sites do not function very well. There are issues with inadequate funds, inadequate personnel, and weak administration that have contributed to the continued degradation of the environment (Fitz et al., 2022). Although there are regulations and blueprints for the conservation of nature, they do not function very well due to weak enforcement, ambiguously defined roles for agencies, and inadequate resources (Oyekunle, 2024).

Biodiversity loss is harmful to the environment and also poses severe economic challenges. Disturbance in the ecosystem has implications for food systems, increases society's vulnerability to climate change, and damages livelihoods (Awojulugbe, M., 2024; UNEP, 2024). For companies, this implies greater risks in asset management, problems in their value chain, and losses in reputation. Thus, conserving biodiversity remains critical for national resilience and long-term business prosperity. It frequently gets omitted in national strategies and business strategies, which implies that when decisions regarding the use of land, construction of important infrastructural developments, and industrialization take place, conservation remains overlooked (EnviroNews, 2017; Climate Policy Initiative et al., 2021).

**Biodiversity Conservation Legal Frameworks in Nigeria**

Nigeria has developed a layered biodiversity governance framework comprising both national legislation and institutional frameworks, supported by its commitment towards International Environmental Agreements. Those steps act as important means for balancing the interplay between the economy and the environment, in particular in sectors that make major environmental impacts, namely oil and gas, agriculture, forestry, infrastructure, and tourism.

**National Legislative Systems**  
At the national level, several legislative acts govern the governance of biodiversity:

* **The National Biodiversity Strategy and Action Plan (NBSAP)** provides Nigeria's leading domestic policy in harmony with the Convention on Biological Diversity (CBD). It outlines 14 strategic goals intended for promoting conservation, the sustainable use of resources, and private sector involvement in practices that take biodiversity in land use into account (Federal Ministry of Environment, 2015).
* **The Environmental Impact Assessment (EIA) Act (Cap E12 LFN 2004)** provides that all major developments must go through environmental screening before they can be granted approval and thus enabling the inclusion of biodiversity considerations in the planning process (Adebayo & Okonkwo, 2023).
* **The National Park Service Act (Cap N65 LFN 2004)** outlines the legislative basis for the creation and running of protected sites. It encourages the adoption of sustainable tourism methods and provides funds for backing conservation efforts in and around national parks (Babarinde, J. A., & Ojo, O. T., 2023).
* **The Wildlife Conservation Act (Cap 57 LFN 1985)** gives directives towards the conservation of wildlife habitats and species, thus directly aiming at forestry, agriculture, and tourism practitioners whose operations overlap with sensitive systems (Izah, S. C., & Seiyaboh, E. I., 2018).
* **Forestry Act (Cap 51 LFN 1958)** controls forest resources utilization and encourages sustainable forestry through mechanisms like permit systems, enforceable law and regulations, and replanting incentives (FAO, 2015).
* **The Endangered Species Act (Cap E9 LFN 2004)** harmonises its provisions with the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), thus regulating the trade and commercial use of protected species (NESREA, 2011).

**International Legislative Framework**

Nigeria’s conservation frameworks are further reinforced by participation in key international agreements:

* **Convention on Biological Diversity (CBD):** Nigeria ratified the CBD in 1994 and aligns national policies with its three objectives—biodiversity conservation, sustainable use, and equitable benefit sharing.
* **CITES (1973):** Domesticated through the Endangered Species Act, this treaty controls international trade in endangered species to prevent over-exploitation.
* **United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement:** While primarily climate-focused, both indirectly influence biodiversity through mechanisms like REDD+ (Reducing Emissions from Deforestation and Forest Degradation).
* **Convention on Wetlands of International Importance (Ramsar Convention):** Nigeria is a contracting party and has designated several Ramsar sites, highlighting the importance of wetland conservation for migratory birds and ecosystem services.
* **Convention on Migratory Species (CMS):** This convention supports Nigeria’s efforts to protect transboundary species and promotes cross-border conservation coordination.

These instruments obligate Nigeria to harmonize its biodiversity laws and sectoral policies with global conservation targets, such as the Kunming-Montreal Global Biodiversity Framework adopted in 2022.

**Institutional Frameworks**

**Several national and subnational institutions are tasked with implementing biodiversity policy:**

* **Federal Ministry of Environment (FME**): The central authority for biodiversity policy, housing key departments like Forestry and Wildlife, and responsible for permitting, policy oversight, and public-private conservation partnerships (Altıparmak, S. O., 2022).
* **National Environmental Standards and Regulations Enforcement Agency (NESREA):** Enforces environmental laws, particularly biodiversity-related standards in high-impact sectors like oil and gas, manufacturing, and agriculture (NESREA, nd).
* **National Park Service (NPS):** Oversees national parks and wildlife reserves, promoting eco-tourism and community conservation initiatives (William, J. V., 2025).
* **State Ministries of Environment and Forestry Departments:** At the subnational level, these bodies ensure compliance with forest laws and conservation programs, especially in rural and resource-rich regions (Aondoakaa et al., 2023).
* **Nigerian Sustainable Banking Principles (NSBP):** Introduced by the Central Bank of Nigeria (CBN), this framework guides financial institutions to incorporate ESG and biodiversity risks into their decision-making processes (CBN, 2012).
* **Civil Society and NGOs:** Organizations like the Nigerian Conservation Foundation (NCF), WildAid Nigeria, WWF, and Green Recovery Nigeria contribute through biodiversity research, CSR partnerships, and advocacy for nature-positive business models

**Business Operation Impacts on Biodiversity Conservation in Nigeria**

The conservation of biodiversity in Nigeria is increasingly undermined by sector-specific economic activities, particularly those involving large-scale land use change, pollution, and resource extraction (Anwadike, B. C., 2020). Industries such as oil and gas, manufacturing, agriculture, power/energy, and real estate development are among the most ecologically disruptive due to their extensive environmental footprints and weak integration of biodiversity considerations in operational planning (Hald-Mortensen, C., 2023).

1. **Infrastructure Sector**

The rapid expansion of Nigeria’s infrastructure sector, including expressways, gas corridors, bridges, and the booming real estate market, is significantly reshaping land use and accelerating biodiversity loss. This trend now rivals the long-standing ecological impacts of oil and gas operations (Olaniyan, O., & Adegoroye, A., 2024). In contrast to oil and gas projects, which are geographically confined to licensed zones in the Niger Delta, real estate development is spatially unbounded. It extends into forest edges, riparian zones, and Key Biodiversity Areas, contributing to widespread ecological disruption.

Infrastructure development in Nigeria has been shown to cause significant and lasting ecological disruption. The expansion of major projects such as the Lagos–Ibadan Expressway has intensified forest-edge effects, while the construction of gas pipelines and high-tension pylons has fragmented habitats and facilitated the spread of invasive species (Toriola-Coker et al., 2022). In urban centres, unchecked sprawl around Abuja has led to the loss of over 24,000 hectares of woodland and a 38 percent decline in bird diversity, while hospitality and resort developments have driven substantial mangrove depletion in Lekki (Aniekwe, S., & Igu, N., 2019).

These environmental impacts are further compounded by weak regulatory oversight and the proliferation of medium-scale projects that often proceed without adequate environmental safeguards, placing Nigeria’s ecologically sensitive regions at increasing risk.

1. **Oil and Gas/ Power Sector**

The oil and gas sector remains a cornerstone of Nigeria’s economy, contributing the largest share of export revenues and serving as a driver of national infrastructure development. Despite its economic significance, the sector is also one of the most ecologically damaging, particularly in the Niger Delta, an area globally recognized for its high biodiversity and ecological sensitivity (Njoku et al.,2025).

Oil and gas operations in Nigeria are known to cause serious environmental degradation. Activities such as oil spills, gas flaring, and pipeline construction have led to habitat fragmentation, contamination of groundwater, mangrove destruction, and population declines in fish and bird species (Onyena, A. P., & Sam, K., 2020). Although these impacts are severe, they are spatially concentrated in licensed zones, mostly in the Niger Delta and offshore regions. In contrast, the power sector, closely tied to gas infrastructure, has a much broader geographic footprint. Power plants, transmission lines, and blending facilities cut across forest and savanna ecosystems, threatening Key Biodiversity Areas (Chukwuka et al., 2018).

The power sector is not left out, as its hydropower infrastructure also contributes to ecological disruption. Dams such as Kainji and Jebba have significantly altered natural flood regimes, reduced fish diversity, and degraded downstream wetlands (Diji, C. J., 2019). While oil and gas projects are generally more regulated and better documented than sectors like real estate, enforcement of biodiversity safeguards remains inconsistent. The expanding footprint of gas-powered energy infrastructure, if left unchecked, may rival or even surpass upstream oil activities in its cumulative impact on Nigeria’s biodiversity, particularly as the country accelerates its electrification agenda (Oyedepo, S. O., 2012).

1. **Manufacturing Sector**

Nigeria's manufacturing sector plays a vital role in the country’s economic diversification efforts, encompassing industries such as cement, food and beverages, textiles, chemicals, and packaging (Cookey, I. F., 2025). While this sector contributes significantly to industrial growth, it is increasingly associated with habitat loss and environmental degradation, particularly in areas surrounding industrial parks and free-trade zones.

Manufacturing operations in Nigeria are known to exert considerable ecological pressure. The establishment of factories along urban and peri-urban fringes frequently converts wetlands, riparian buffers, and secondary forests into impermeable surfaces. In addition, upstream quarrying for raw materials, especially limestone, contributes to soil erosion and the suppression of native vegetation (Ohwo, O., 2015), thereby fragmenting habitats and weakening ecosystem resilience. These spatial impacts are further compounded by pollution arising from industrial processes. Water-intensive food and beverage plants discharge nutrient-rich effluents, while textile and dye industries release persistent organic pollutants and heavy metals that diminish aquatic invertebrate diversity and contaminate downstream ecosystems (Randhawa, J.S., Gupta, P., & Das, A., 2020). Moreover, many medium-sized manufacturers continue to operate using outdated Environmental Impact Assessments (EIAs) and without biodiversity management plans, resulting in cumulative ecological impacts that frequently escape regulatory monitoring and intervention (Alade, K. T., Ojo, O. J., & Adejuwon, A. A., 2025).

**d. Agricultural Sector**

Agriculture remains a foundational pillar of Nigeria’s economy, employing over 70 percent of the rural population and contributing more than a quarter of the national GDP (National Bureau of Statistics, 2022). While vital for livelihoods and food security, the sector’s continuous expansion, driven by both subsistence farming and commercial agribusiness, is now a major driver of biodiversity loss across the country (IPBES, 2019).

Agricultural activities in Nigeria are widely recognized for their ecological footprint. The conversion of natural habitats into farmland is the most immediate threat, displacing native species and disrupting ecological processes. In regions such as North Central and the Southwest, both smallholder farms and large-scale plantations, especially for cassava, maize, and oil palm, have replaced significant stretches of forest and woodland, leading to declines in pollinators, birds, and small mammals (Ikuemonisan, E.S., 2024). In Cross River State, for instance, agricultural encroachment accounted for over half of the forest loss observed near conservation zones between 2000 and 2020 (Ikuemonisan, E.S., 2024).

The sector also threatens biodiversity through the excessive use of agrochemicals. Poorly regulated application of fertilizers, herbicides, and pesticides contributes to soil degradation and contaminates adjacent water bodies, diminishing populations of invertebrates, amphibians, and other aquatic organisms vital to ecosystem balance (Uwazuruike et al., 2023). Runoff from farmlands has been linked to increased nutrient loads in rivers and wetlands, driving eutrophication and the decline of freshwater biodiversity. As Nigeria’s demand for food and agricultural land intensifies, the sector’s unchecked expansion risks further undermining the country’s already vulnerable biodiversity.

**e. Financial Service Sector**

Although the financial sector does not directly alter habitats, it enables biodiversity loss through its financing decisions. Investments in agriculture, real estate, and infrastructure projects often proceed without robust environmental safeguards, indirectly supporting habitat destruction and species loss (Azizi, L., Scope, C., Ladusch, A., & Sassen, R., 2025). Despite the Central Bank of Nigeria’s Sustainable Banking Principles (CBN, 2012), biodiversity considerations remain poorly integrated across the sector (Adebiyi et al., 2025). Most banks and institutional investors provide limited disclosures on biodiversity risks or funding for nature-positive initiatives (Adebiyi et al., 2025). Yet the sector holds transformative potential through green bonds, biodiversity credits, and ESG-linked financing tools, which remain underutilized despite some uptake by institutions like InfraCredit and the Development Bank of Nigeria**.**

**3.0 MATERIALS AND METHODS**

This study used a desk-based document analysis method to assess how well biodiversity conservation is incorporated into business operations in Nigeria. To determine the current level of biodiversity commitment and action, we reviewed the sustainability reports of 100 companies across five sectors in Nigeria (20 reports per sector) to see how biodiversity conservation is integrated into their operations, decision-making, and external reports. We selected five sectors — Oil and Gas/Power, Manufacturing, Agriculture, Infrastructure, and Financial Services based on their ecological significance, operational scope, reporting frequency under national and international biodiversity frameworks, and their exposure to different levels of biodiversity risk throughout their operational lifespan (as defined by F&C, 2004).

**3.1 Data Source & Evaluation Method**

A comprehensive desk study was undertaken on the 100 corporations' sustainability disclosures in Nigeria's five major sectors, examining 20 reports in each sector. Addison, P. F. E., Bull, J. W., and Milner-Gulland, E. J. (2019) maintain that the very basic idea behind the sustainability report lies in the communication of a wide array of unrelated corporate information. This information can include Environmental Impact Assessments (EIAs), Environmental Management Plans (EMPs), reports about Corporate Social Responsibility (CSR), Environmental, Social, and Governance (ESG) reports, and other non-financial or financial disclosures reflecting environmental responsibility.

The research methodology used systematic web surveys through Google, using specifically targeted descriptors including "Sustainability," "ESG," and "CSR," together with corporate names, industry codes, and the word "Nigeria." Where possible, the search results were narrowed to include documents in readily available PDF format. Additionally, apart from reports, corporate websites were scanned and included in the analysis if they included time-stamped and verifiable claims or actions that unveiled relevant information regarding biodiversity.

Content analysis was conducted to detect concepts and selected keywords related to biodiversity, for example, "Biodiversity," "Biodiversity Action Plan" (BAP), "Conservation," "GRI 101," "GRI 304," "Biodiversity Conservation," "Ecosystem," "Species," and "Sustainable Development Goals" (SDGs). This analysis follows the broad definition introduced by the Convention on Biological Diversity (CBD, 2017). In particular, some terms regarding habitats, for instance, "Wetlands," "Water Bodies," and "Forests," were used because they are often used as indicators of biodiversity in corporate environmental disclosures.

In cases in which biodiversity was mentioned in reports, additional information was assessed in terms of characteristics and indicators in line with the Global Reporting Initiative (GRI) Biodiversity Standard, as well as in reporting guidelines used by Boiral (2016) and the United Nations Sustainable Development Goals (SDGs) as outlined by Addison et al. (2019).

**3.2 Validity/Reliability of Evaluation Instrument**

In-depth assessment of biodiversity conservation, prioritization, actions, and stakeholder engagement was undertaken throughout the sectors identified using criteria and attribute frameworks inductively developed (Patton, 2002; Global Reporting Initiative (GRI), 2016a; Addison et al., 2019; Michael et al., 2023). Frameworks utilized throughout this analysis include important research studies conducted by Boiral, O. (2016), Addison et al. (2019), Bunnefeld, N., Hoshino, E., & Milner-Gulland, E. J. (2011), and by Michael et al. (2023). Individually, the studies selected have laid the foundation for assessing the degree to which biodiversity conservation has been integrated into corporate sustainability frameworks, most especially through accounting and reporting processes. A total of 100 sustainability reports were reviewed based on a framework comprising six criteria, each with five attributes:

1. Integration of Biodiversity into Business Strategy
2. Management and Prevention of Biodiversity Impacts
3. Protection, Restoration, and Enhancement
4. Monitoring, Evaluation, and Use of Scientific Data
5. Engagement, Participation, and Capacity Building
6. Investment in Biodiversity and Accountability

In total, **thirty (30)** distinct attributes were developed and applied to assess the extent and quality of biodiversity conservation inclusion in business sector operations (see **Appendix B** for the full attributes).

**3.3 Method of Data Analysis**

Each biodiversity-related attribute (**Appendix B**) was evaluated across 100 sustainability reports from five key sectors using a binary-weighted scoring system.

Each report received a score of **1** if the attribute was fully addressed, demonstrated by clear strategies and measurable indicators, typically fulfilling 4–5 attributes; **0.5** if moderately addressed, with partial or vague references (1–3 attributes fulfilled); and **0** if the attribute was not mentioned at all. To enhance objectivity and minimize evaluator bias, the assessments were conducted independently by multiple reviewers and subsequently harmonized through group discussions to ensure inter-rater consistency.

Following this, the Biodiversity Conservation Inclusion Index (BII) formula was applied to generate the respective index scores.

**Biodiversity Conservation Inclusion Index (BII)** is calculated as:

BII=A+0.5B/N

**Where:**

* **A** = Number of attributes fully addressed
* **B** = Number of attributes moderately addressed
* **N** = Total number of biodiversity-related attributes assessed (30)

To statistically evaluate differences in biodiversity conservation prioritization and inclusion across the five sectors, a one-way Analysis of Variance (**ANOVA**) was conducted using the Statistical Package for the Social Sciences (SPSS).

**4.0 RESULTS**

The results are organized by thematic criteria and analyzed for sectoral differences through descriptive statistics, percentage distributions, ANOVA, post-hoc tests, and graphical illustrations. These findings provide insight into the degree of biodiversity mainstreaming within corporate sustainability disclosures in Nigeria**.**

**4.1 Overview of Biodiversity Conservation Across Sampled Key Business Sectors**

**Table 1: Biodiversity Conservation Inclusion in Sampled Sustainability (n=100)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Criteria** | **Attributes** | **Sampled Report by Sector** | | | | | |
|  |  | **Oil & Gas/Power Sector** | **Agriculture**  **Sector** | **Infrastructure**  **Sector** | **Manufacturing**  **Sector** | **Financial Service Sector** | **Total** |
| 1. Integration of Biodiversity into Business Strategy | 1  2  3  4  5 | 1(9)  0.5(5)  0(6) | 1(7)  0.5(8)  0(5) | 1(1)  0.5(8)  0(11) | 1(4)  0.5(3)  0(13) | 1(4)  0.5(8)  0(8) | 1(25)  0.5(32)  0(43) |
|  | **Total** | **20** | **20** | **20** | **20** | **20** | **100** |
| 2. Management and Prevention of Biodiversity Impacts | 6  7  8  9  10 | 1(3)  0.5(9)  0(8) | 1(12)  0.5(3)  0(5) | 1(0)  0.5(1)  0(19) | 1(0)  0.5(3)  0(17) | 1(0)  0.5(2)  0(18) | 1(15)  0.5(18)  0(67) |
|  | **Total** | **20** | **20** | **20** | **20** | **20** | **100** |
| 3. Protection, Restoration, and Enhancement | 11  12  13  14  15 | 1(4)  0.5(7)  0(9) | 1(8)  0.5(7)  0(5) | 1(1)  0.5(0)  0(19) | 1(0)  0.5(1)  0(19) | 1(0)  0.5(2)  0(18) | 1(13)  0.5(17)  0(70) |
|  | **Total** | **20** | **20** | **20** | **20** | **20** | **100** |
| 4. Monitoring, Evaluation, and Scientific Data Use | 16  17  18  19  20 | 1(1)  0.5(8)  0(11) | 1(2)  0.5(9)  0(9) | 1(0)  0.5(0)  0(20) | 1(0)  0.5(4)  0(16) | 1(1)  0.5(0)  0(19) | 1(4)  0.5(21)  0(75) |
|  | **Total** | **20** | **20** | **20** | **20** | **20** | **100** |
| 5. Engagement, Participation, and Capacity Building | 21  22  23  24  25 | 1(6)  0.5(8)  0(6) | 1(10)  0.5(5)  0(5) | 1(0)  0.5(1)  0(19) | 1(1)  0.5(3)  0(16) | 1(0)  0.5(3)  0(17) | 1(17)  0.5(20)  0(63) |
|  | **Total** | **20** | **20** | **20** | **20** | **20** | **100** |
| 6. Investment in Biodiversity and Accountability | 26  27  28  29  30 | 1(1)  0.5(7)  0(12) | 1(5)  0.5(8)  0(7) | 1(0)  0.5(1)  0(19) | 1(0)  0.5(4)  0(16) | 1(4)  0.5(1)  0(15) | 1(10)  0.5(21)  0(69) |
|  | **Total** | **20** | **20** | **20** | **20** | **20** | **100** |
| ***Score = 1:*** *The attribute was fully addressed in the report, including detailed strategies, measurable indicators, or SMART (Specific,*  *Measurable, Achievable, Relevant, and Time-bound) goals.*  ***Score = 0.5:*** *The attribute was partially addressed, evidenced by vague references, general commitments, or one-off activities.*  ***Score = 0:*** *The attribute was not mentioned or implied in the report* | | | | | | | |

**Table** 1 provides a comparative summary of how 100 sustainability reports (20 per sector) addressed biodiversity conservation across six thematic criteria, each with five attributes. Using a binary-weighted scoring system (1 = fully addressed, 0.5 = partially addressed, 0 = not addressed), the analysis reveals that biodiversity integration is uneven across sectors.

The Oil & Gas/Power and Agriculture sectors show relatively stronger performance, particularly in strategic integration and impact management, with several reports fully addressing key biodiversity attributes. In contrast, the Infrastructure, Manufacturing, and Financial Services sectors demonstrated limited inclusion, often failing to report on biodiversity monitoring, restoration, or investment. The weakest areas overall were Monitoring and Scientific Data Use and Investment in Biodiversity, where most reports across all sectors scored zero. These findings highlight sectoral disparities in biodiversity disclosure and the need for improved regulatory standards and reporting consistency, especially in sectors with large ecological footprints.

**Figure 1:** Overall Biodiversity Inclusion Across All Sectors

**Source:** Research Data 2025

**Fig. 1** illustrates the overall extent to which biodiversity considerations are integrated into corporate sustainability reporting across five key sectors in Nigeria. Out of all the possible attributes, only 14% were fully addressed with clear strategies and measurable indicators, while 21.5% were partially addressed through vague references or general commitments. A substantial 64.5% of attributes were not mentioned at all. This distribution reflects a critical shortfall in the prioritization and operationalization of biodiversity within corporate sustainability disclosures, underscoring the need for stronger regulatory frameworks, targeted reporting guidelines, and enhanced corporate accountability to address biodiversity loss in Nigeria.

**Figure 2:** Mean Biodiversity Conservation Inclusion Scores Across Sectors

**Source:** Research Data 2025

The agriculture sector recorded the highest mean for full inclusion at 0.37, followed by the oil and gas/power sector at 0.30. Both sectors also showed relatively higher partial inclusion means of 0.31 (agriculture) and 0.27 (oil and gas/power). Conversely, the infrastructure and manufacturing sectors reported the lowest full inclusion means of 0.03 and 0.08, respectively, with a dominant no-inclusion mean of 0.89 and 0.84, indicating minimal engagement with biodiversity concerns. The financial services sector, while slightly better than infrastructure and manufacturing, still showed a high no-inclusion mean of 0.79, suggesting that biodiversity considerations remain largely absent from corporate sustainability disclosures in this sector, as shown in **Fig 2**. These results show the uneven prioritization of biodiversity across Nigeria’s economic sectors and point to a pressing need for enhanced regulatory frameworks and sector-specific ESG requirements, especially for sectors with significant ecological footprint

**Figure 3:** Variation in Biodiversity Performance Across Sectors by Criteria (1-6)

**Source:** Research Data 2025

**Table 2: One‑Way ANOVA: Sectorial Differences in Biodiversity‑Performance Scores**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Source of Variation** | **SS** | **df** | **MS** | **F** | **p‑value** |
| Between groups (Sectors) | 17.34 | 4 | 4.335 | **48.31** | **<** .001 |
| Within groups | 42.65 | 585 | 0.073 |  |  |
| **Total** | 59.99 | 589 |  |  |  |

**Criterion 1: Integration of Biodiversity into Business Strategy**

***Attributes 1–5 of Appendix B address this criterion.***

This criterion assesses how biodiversity is integrated into strategic goals, risk management, and governance. In **Fig. 3,** the Oil & Gas/Power sector led, with 45% of attributes fully addressed, 25% partially addressed, and 30% not addressed, reflecting the sector’s exposure to international ESG standards and corporate sustainability frameworks. Agriculture followed, with 35% of attributes fully addressed and 40% partially addressed, likely influenced by voluntary certification schemes that encourage but do not require biodiversity alignment. In contrast, the Infrastructure sector showed limited integration, with just 5% of attributes fully addressed and 55% not addressed. The reports analyzed for this study also revealed that infrastructure companies prioritized community development, economic value creation, human capital development, and social cohesion over biodiversity conservation and broader environmental protection. Manufacturing and Financial Services also underperformed, with 65% and 40% of attributes, respectively, not addressed, highlighting that biodiversity remains a low strategic priority outside land-intensive sectors

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**Criterion 2: Management and Prevention of Biodiversity Impacts**

***Attributes 6–10 of Appendix B address this criterion.***

This criterion assesses risk management tools, such as avoidance, minimization, and offset strategies. In **Fig. 3** Agriculture sector led the field, with 60% of attributes fully addressed, 15% partially addressed, and 25% not addressed.

This indicates a relatively proactive approach to biodiversity impact management. Oil & Gas/Power recorded 15% of attributes fully addressed, 45% partially addressed, and 40% not addressed. Infrastructure,

Manufacturing and Financial Services had 0% of attributes fully addressed. Of particular concern is the Infrastructure sector, where 95% of attributes were not addressed at all. Manufacturing and Financial Services also showed high levels of non-addressed attributes 85% and 90%, respectively, indicating limited engagement with biodiversity impact considerations across these sectors, as shown in **Fig. 3.**

**Criterion 3: Protection, Restoration, and Enhancement of Biodiversity**

***Attributes 11–15 of Appendix B address this criterion.***

This criterion measures whether firms go beyond mitigation to actively restore or enhance biodiversity. Agriculture was the highest performer, with 40% of attributes fully addressed, 35% partially addressed, and 25% not addressed, reflecting the influence of regenerative practices and donor-supported rehabilitation programs. The Oil & Gas/Power sector followed with 20% full, 35% partial, and 45% not addressed, indicating that while some companies engage in post-extraction restoration, others omit it entirely.

The Infrastructure sector showed minimal inclusion—5% full, 0% partial, and 95% not addressed, suggesting that post-construction land restoration is rarely institutionalized. Manufacturing and Financial Services performed even worse, each recording only 0–5% partial inclusion and over 90% of attributes not addressed, highlighting a striking absence of proactive biodiversity efforts across both industrial and financial landscapes, as shown in **Fig. 3.**

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**Criterion 4: Monitoring, Evaluation, and Use of Scientific Data**

*Attributes 16–20 of Appendix B address this criterion.*

This criterion assesses whether organizations systematically collect and apply biodiversity data. Performance was weak across all sectors. Agriculture led slightly, with 10% of attributes fully addressed, 45% partially addressed, and 45% not addressed, indicating some awareness but limited institutional capacity for monitoring and evaluation. The Oil & Gas/Power sector followed, with 5% full, 40% partial, and 55% not addressed, reflecting reliance on ad hoc biodiversity assessments that are often disconnected from strategic planning. The Infrastructure sector scored 0% for both full and partial inclusion, with 100% of attributes not addressed, suggesting a complete absence of monitoring frameworks. Manufacturing (20% partial, 80% not addressed) and Financial Services (5% full, 95% not addressed) also lack data-driven biodiversity reporting. These findings reinforce that in the absence of clear regulatory obligations, biodiversity measurement remains a blind spot in corporate sustainability efforts, as shown in **Fig. 3.**

**Criterion 5: Engagement, Participation, and Capacity Building**

***Attributes 21–25 of Appendix B address this criterion.***

This criterion evaluates how companies engage stakeholders and build institutional capacity for biodiversity. Agriculture achieved the highest level of engagement, with 50% of attributes fully addressed, 25% partially addressed, and 25% not addressed, likely due to its close interaction with rural communities and participation in environmental stewardship schemes. The Oil & Gas/Power sector followed, with 30% full, 40% partial, and 30% not addressed, suggesting that some companies are moving toward inclusive planning and local partnerships. In contrast, the Infrastructure sector showed significant neglect, with 0% full, 5% partial, and 95% not addressed, highlighting a largely transactional approach to stakeholder involvement. Manufacturing (5% full, 15% partial, 80% not addressed) and Financial Services (0% full, 15% partial, 85% not addressed) reflected only token or project-specific engagement, lacking sustained institutional commitment to biodiversity capacity building, as shown in **Fig. 3.**

**Criterion 6: Investment in Biodiversity and Accountability**

***Attributes 26–30 of Appendix B address this criterion.***

This criterion measures dedicated funding and transparent reporting on biodiversity initiatives. Agriculture showed the strongest performance with 25% full inclusion, 40% partial, and 35% non-addressed, reflecting moderate financial commitment, often linked to CSR or donor funding. Financial Services followed with 20% full, 5% partial, and 75% non-addressed, reflecting nascent efforts to integrate nature into financial instruments, though still limited in scale. Oil & Gas/Power recorded 5% full, 35% partial, and 60% non-addressed, indicating that biodiversity investment remains non-strategic or externalized to offset schemes. Infrastructure and Manufacturing each scored 0% full inclusion, with 95% and 80% of their attributes, respectively, not addressed. This finding reinforces the lack of internal budgeting or tracking for biodiversity performance in capital-intensive and production-driven sectors, as shown in **Fig. 3.**

The ANOVA results reveal a statistically significant difference in biodiversity inclusion scores across sectors in Nigeria. The between-group variation (SS = 17.34, df = 4, MS = 4.335) produced an F-value of 48.31 with a **p-value <** .001, indicating that the mean scores vary significantly among sectors.

The within-group variation (SS = 42.65, df = 585, MS = 0.073) reflects relatively low variability within each sector. Overall, the total variance accounted for was 59.99 across 589 observations. These results confirm that sectoral differences strongly influence biodiversity performance in corporate sustainability reporting, as shown in **Table 2.**

**DISCUSSION**

The findings of this study reflect a deep structural challenge: biodiversity conservation is still marginal in the sustainability agendas of most Nigerian business sectors, despite mounting ecological and regulatory pressures. Among the five sectors analyzed, the agriculture and oil & gas/power sectors demonstrated relatively greater efforts to incorporate biodiversity into strategic frameworks, stakeholder engagement, and, to some extent, operational risk management. These sectors' direct dependence on natural ecosystems may explain their comparatively higher sensitivity to conservation issues.

Yet, across all sectors, critical biodiversity attributes such as monitoring and evaluation, scientific data use, and investment in conservation efforts remain glaringly underdeveloped. For example, infrastructure and manufacturing companies consistently failed to integrate biodiversity concerns into project planning or restoration strategies, despite their significant land use and ecological disruption. This omission suggests that biodiversity is not yet viewed as a core operational risk or performance indicator in these industries.

Even more concerning is the financial sector's passive role. Although it holds significant leverage through investment policies and loan portfolios, biodiversity risk is scarcely addressed in financing decisions. The potential for biodiversity-positive financing tools such as green bonds or nature-based investment funds remains largely untapped.

The sectoral disparities confirmed by the ANOVA (p < .001) further highlight a fragmented approach to biodiversity governance in Nigeria. Most corporate sustainability efforts are still driven by climate-related metrics (e.g., carbon emissions) and community development targets, with biodiversity sidelined or reduced to symbolic commitments. Without enforced reporting standards and biodiversity-specific ESG requirements, this trend is likely to persist.

A consistent thread across the data is the lack of scientific grounding in biodiversity management. Less than 10% of reports referenced baseline ecological data or biodiversity indicators, reflecting poor alignment with global reporting standards such as GRI 304, GRI 301, and the Kunming-Montreal Global Biodiversity Framework. The near-absence of investment in biodiversity conservation actions, especially ecological restoration, suggests a critical underappreciation of biodiversity’s role in long-term business resilience.

Businesses must recognize that degraded ecosystems undermine not only natural capital but also economic continuity, risk resilience, and market credibility. Conservation must evolve from being a compliance issue to becoming a core business value, embedded in strategic planning, financing, and operational delivery across all sectors.

**CONCLUSION**

Conservation of biodiversity has become a primary rather than a secondary activity. It's important that all sectors in Nigeria make this element run through all their process of operation, from construction all the way through the decommissioning process. The implications for this lack of attention are broad. Businesses that do not take into account biodiversity factors will face not only reputational and regulatory issues but also greater vulnerability to supply chain disruptions, climate change risks, and longer-term financial losses. Businesses that take the lead in biodiversity conservation will be better positioned to attract sustainable capital, meet cross-border ESG standards, and play important roles in support of nationally and globally aligned conservation goals.

In changing the current course, Nigeria needs to apply enforceable biodiversity reporting standards aligned with the international guidelines, including the Global Reporting Initiative (GRI) and the Convention on Biological Diversity (CBD) goals. Initiatives like tax incentives for restoration efforts or financing tied to Environmental, Social, and Governance (ESG) factors should also be introduced as drivers of actions supportive of biodiversity. The achievement of major biodiversity preservation in Nigeria’s commercial landscape requires an overall shift in concept from the disjointed, reactive methods of adherence to a compliance-driven model to a proactive and integrated model of environmental stewardship. By mainstreaming biodiversity into corporate sustainability’s basic principles, Nigeria can unlock the full potential ecologically and economically that lies embedded in its natural capital. Future research should consider incorporating field-level assessments, stakeholder interviews, and independent audits to validate reported claims and gain a more holistic understanding of corporate biodiversity performance in Nigeria

**RECOMMENDATION**

To strengthen biodiversity conservation within Nigeria’s business environment, this study proposes the following actionable recommendations:

1. **Mandate Sector-Specific Biodiversity Disclosures**: Regulatory bodies should enforce mandatory biodiversity reporting, tailored by sector and aligned with global standards like GRI 304 and the Kunming-Montreal Framework.
2. **Provide Incentives for Biodiversity-Positive Actions**: The government should offer tax reliefs, concessional loans, and access to green bonds for companies that invest in conservation, especially in high-impact sectors.
3. **Embed Biodiversity in ESG and EIA Frameworks**  
   Regulatory updates are needed to treat biodiversity as a core risk factor in ESG reporting and Environmental Impact Assessments across all industries.
4. **Promote Collaborative Conservation Partnerships**  
   Encourage joint efforts between companies, communities, NGOs, and the government to support landscape-level biodiversity conservation initiatives.
5. **Build Business Capacity on Biodiversity Integration**  
   Develop training, toolkits, and technical guidance to address knowledge gaps and enhance corporate ability to incorporate biodiversity in strategy and reporting.
6. **Establish a National Biodiversity Accountability Index**  
   Create a public dashboard to track and rank companies’ biodiversity performance, fostering transparency and competition toward better outcomes.
7. **Harness Financial Sector Influence**  
   The Central Bank and commercial banks should integrate biodiversity criteria into lending, investment, and risk assessment frameworks.
8. **Improve Access to Biodiversity Data**  
   Strengthen business access to ecological datasets and impact indicators, and require their use in sustainability planning and reporting.

**Limitation of Study**

This study provides important insights into the integration of biodiversity within corporate sustainability disclosures in Nigeria. However, it is necessary to acknowledge certain limitations that may affect the interpretation of the findings. A key limitation lies in the potential presence of greenwashing within the corporate reports examined. The majority of the sustainability, ESG, and CSR reports reviewed were sourced from publicly available company documents, which may be strategically curated to project a favorable image of environmental responsibility. As a result, corporate organizations may highlight biodiversity-related initiatives while omitting or downplaying practices that could reflect negatively on their environmental performance. Such selective disclosure, whether deliberate or inadvertent, introduces a risk of bias that may misrepresent the actual extent of biodiversity conservation commitment and implementation within these corporations.

COMPETING INTERESTS

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

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