Perspectives in Biodiversity Accounting

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Abstract

Biodiversity loss represents a critical global sustainability challenge with significant ecological, economic, and social implications. Despite its importance, biodiversity accounting remains an emerging and underdeveloped area within environmental accounting literature and practice. This paper examines the conceptual foundations, philosophical orientations, and theoretical underpinnings of biodiversity accounting to clarify its scope and relevance in contemporary corporate reporting systems. Drawing on extant literature, the study conceptualizes biodiversity accounting as a multidimensional system involving measurement, valuation, disclosure, and management of biodiversity-related impacts. The analysis identifies two dominant philosophical orientations—anthropocentric and ecocentric perspectives—alongside emerging hybrid approaches such as extinction accounting and ecosystem-based accounting frameworks. The study further integrates stakeholder theory, legitimacy theory, and natural capital theory to explain organizational biodiversity disclosure behaviour. Empirical evidence indicates that while biodiversity reporting is increasing, it remains inconsistent, non-standardized, and largely qualitative. The paper concludes that effective biodiversity accounting requires an integrated framework that balances economic valuation with ecological integrity, supported by standardized measurement systems and stronger regulatory governance.

Keywords: Biodiversity accounting; natural capital accounting; ecocentric perspective; anthropocentric perspective; environmental disclosure; sustainability reporting; ecosystem services; corporate biodiversity reporting; extinction accounting; environmental governance; stakeholder theory; ecological sustainability.

Introduction

Biodiversity refers to the variability of living organisms across ecosystems and constitutes the foundation of ecological stability and economic development. It supports essential ecosystem services such as food production, climate regulation, water purification, pollination, and cultural value. These services are estimated to contribute between USD 125 and 140 trillion annually, exceeding global GDP (OECD, 2019). Despite this value, biodiversity is declining rapidly due to anthropogenic pressures such as industrialization, urban expansion, deforestation, and resource overexploitation (Watts, 2010).

Environmental degradation has been further intensified by ecological disasters, including oil spills and industrial accidents, which have demonstrated the fragility of ecosystems and exposed weaknesses in environmental governance and corporate accountability systems (Rimmel & Jonäll, 2013). In response, stakeholders—including regulators, investors, and civil society—are demanding greater transparency regarding biodiversity-related risks and impacts (CBD, 2018, 2019).

This shift has positioned biodiversity accounting as an emerging component of sustainability reporting. Biodiversity accounting extends traditional accounting by incorporating ecological impacts into organizational reporting systems, enabling firms to identify, measure, and disclose biodiversity-related risks. Although its relevance is increasingly recognized by professional bodies such as ACCA (2020), the field remains conceptually fragmented, with limited standardization and unclear measurement frameworks.

Accordingly, this paper examines the conceptual and philosophical foundations of biodiversity accounting to provide clarity on its scope, theoretical grounding, and practical implications.

Conceptual Foundation of Biodiversity Accounting

Biodiversity accounting is conceptualized as an integrated system for measuring, valuing, disclosing, and managing biodiversity impacts within organizational and policy frameworks. It bridges ecological science and accounting practice by translating biodiversity dynamics into structured information for decision-making.

Unlike traditional financial accounting, biodiversity accounting incorporates non-financial ecological indicators alongside monetary valuation where appropriate. However, there is no universally accepted definition, reflecting its evolving nature and overlap with natural capital accounting and ecosystem accounting frameworks (McDonald, 2016; Remme, 2016).

Biodiversity accounting is closely aligned with global policy frameworks such as the Convention on Biological Diversity (CBD, 2018), which emphasizes conservation, sustainable use, and equitable benefit-sharing. Increasingly, it is embedded within sustainability reporting systems and ESG frameworks, reinforcing its role in corporate accountability and environmental governance.

Philosophical Foundations of Biodiversity Accounting

Biodiversity accounting is shaped by two dominant philosophical orientations that influence how biodiversity is perceived and measured.

Anthropocentric Perspective

The anthropocentric perspective views biodiversity in terms of its instrumental value to humans. It emphasizes ecosystem services and economic benefits derived from natural systems. Within this framework, biodiversity is incorporated into accounting systems through valuation, risk assessment, and financial reporting mechanisms aligned with corporate decision-making and ESG frameworks.

This approach underpins natural capital accounting, which integrates biodiversity into economic systems as a form of capital asset. While this enhances policy relevance and financial integration, it risks reducing ecological complexity to monetary terms and underrepresenting non-market ecological values.

Ecocentric Perspective

The ecocentric perspective assigns intrinsic value to biodiversity independent of human use. It is grounded in ecological ethics and emphasizes conservation, ecological balance, and long-term planetary sustainability. This orientation prioritizes non-monetary ecological indicators such as species diversity, habitat integrity, and ecosystem resilience.

Unlike the anthropocentric approach, ecocentric accounting emphasizes ecological thresholds and sustainability limits rather than financial valuation, thereby promoting conservation-oriented reporting systems.

Integrated Perspective

Modern biodiversity accounting increasingly adopts a hybrid approach that integrates both perspectives. This reflects recognition that purely economic or purely ecological models are insufficient. Emerging approaches such as extinction accounting and ecosystem accounting frameworks under the SEEA system reflect this integration by combining ecological indicators with risk-based and policy-relevant information systems.

Although biodiversity accounting and natural capital accounting (NCA) are closely related, they differ significantly in conceptual scope, methodological orientation, and application focus. Both frameworks aim to integrate environmental considerations into decision-making, but they reflect different philosophical and operational priorities.

Table 1:
Comparative Analysis of Biodiversity Accounting and Natural Capital Accounting

Dimension	**Biodiversity Accounting**	**Natural Capital Accounting (NCA)**
Core Focus	Measurement and reporting of biodiversity (species, ecosystems, habitats)	Broad valuation of natural assets including biodiversity, water, land, and ecosystem services
Conceptual Basis	Ecological integrity and conservation science	Economic valuation of natural resources as capital assets
Primary Objective	Biodiversity conservation, risk disclosure, and ecological sustainability	Integration of natural assets into economic planning and policy
Measurement Approach	Primarily non-monetary ecological indicators	Combination of physical and monetary valuation methods
Frameworks/Standards	CBD guidelines,	UN SEEA framework,

Dimension	Biodiversity Accounting	Natural Capital Accounting (NCA)
	biodiversity indicators, sustainability reporting frameworks	national accounting systems, ESG frameworks
Philosophical Orientation	Ecocentric with hybrid extensions	Predominantly anthropocentric
Application Level	Corporate sustainability reporting, ecological assessment, conservation planning	National accounts, macroeconomic policy, corporate sustainability integration
Strengths	Captures ecological complexity and conservation priorities	Facilitates integration of environment into economic systems
Limitations	Lack of standardization and measurement difficulty	Over-reliance on monetization and economic reductionism
Recent Developments	Growth of extinction accounting and biodiversity risk disclosure	Expansion into green recovery policies and sustainability transition strategies

Source: Authors, 2025

Theoretical Framework

Biodiversity accounting is conceptually anchored in multiple complementary theories that collectively explain organizational behaviour, disclosure incentives, and environmental responsibility. These theories provide a structured lens for understanding why firms engage in biodiversity-related reporting and how such practices influence accountability and sustainability outcomes.

Stakeholder Theory

Stakeholder theory posits that organizations are responsible not only to shareholders but also to a broader network of stakeholders, including regulators, host communities, civil society groups, and environmental advocacy organizations. Within this framework, corporate disclosure is driven by the need to respond to diverse and sometimes competing stakeholder expectations. In

relation to biodiversity accounting, firms disclose environmental information as a means of addressing stakeholder concerns regarding ecological degradation, resource depletion, and sustainability performance.

The theory provides a useful explanation for the increasing integration of biodiversity considerations into corporate sustainability and ESG reporting systems. As environmental awareness intensifies globally, organizations are compelled to enhance transparency regarding their ecological impacts in order to maintain stakeholder trust and support long-term organizational legitimacy.

Legitimacy Theory

Legitimacy theory argues that organizations continuously seek to ensure that their operations are perceived as legitimate within the norms, values, and expectations of society. When there is a perceived gap between organizational actions and societal expectations, firms engage in disclosure strategies to restore or maintain legitimacy.

In the context of biodiversity accounting, environmental disclosure serves as a strategic mechanism through which firms demonstrate conformity with societal expectations concerning environmental stewardship and biodiversity protection. This is particularly evident in environmentally sensitive industries such as extractive sectors, manufacturing, and agriculture, where ecological impacts are more visible and subject to public scrutiny. Biodiversity reporting therefore becomes a symbolic and strategic tool for managing reputational risk and reinforcing social acceptance of corporate activities.

Natural Capital Theory

Natural capital theory conceptualizes biodiversity and ecosystems as forms of capital assets that generate essential goods and services for both economic systems and human well-being. From this perspective, biodiversity is not merely an environmental concern but an economic resource base that supports production processes, consumption activities, and long-term sustainability.

This theory provides a strong foundation for integrating biodiversity into accounting systems through measurement, valuation, and reporting frameworks. It supports the development of accounting approaches that treat natural resources as capital stocks, whose depletion or enhancement should be systematically recorded and incorporated into organizational decision-making. Accordingly,

biodiversity accounting becomes an extension of conventional accounting systems, expanding their scope to include ecological assets and ecosystem services.

Integrated Conceptual Framework

The conceptual framework of this study positions biodiversity accounting as an outcome of interacting philosophical orientations and corporate governance mechanisms. It explains how underlying belief systems, organizational practices, and institutional pressures jointly shape biodiversity reporting and accountability outcomes.

Core Constructs

Independent Variables

Anthropocentric Perspective: Represents economically driven biodiversity accounting practices that prioritize financial valuation, risk disclosure, and cost–benefit considerations of environmental resources.

Ecocentric (Deep Ecology) Perspective: Reflects conservation-oriented approaches that emphasize intrinsic ecological value, biodiversity preservation, and non-monetary environmental assessment.

Mediating Variables

Corporate Biodiversity Disclosure: Refers to the extent, quality, and transparency of biodiversity-related information communicated through corporate reports.

Environmental Management Practices: Encompasses organizational policies, systems, and operational strategies aimed at reducing biodiversity loss and enhancing ecological performance.

Dependent Variable

Biodiversity Accountability: Represents the overall outcome of biodiversity accounting processes, captured through disclosure quality, conservation initiatives, environmental performance, and biodiversity-related risk reporting.

Moderating Variables

Regulatory Framework: Includes international and national guidelines such as the Convention on Biological Diversity (CBD) and related sustainability reporting standards.

Stakeholder Pressure: Refers to demands from investors, communities, regulators, and advocacy groups for improved environmental transparency.

Institutional Strength: Captures the effectiveness of environmental governance structures, enforcement mechanisms, and organizational compliance culture.

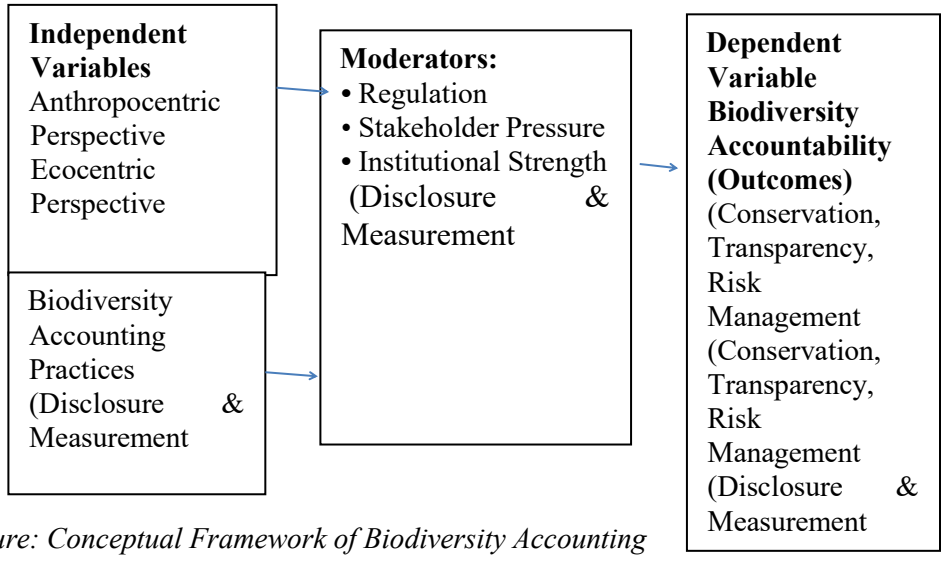

Figure: Conceptual Framework of Biodiversity Accounting

Empirical Literature Review

Empirical research on biodiversity accounting has expanded considerably in recent years, driven by increasing global concern over biodiversity loss, climate-related risks, and the evolving role of corporate sustainability reporting. Despite this growth, the literature remains highly fragmented across disciplines, methodological traditions, and regional contexts, resulting in uneven theoretical consolidation and empirical maturity (Cuckston, 2018; Vardon et al., 2015). Recent studies (2023–2025) further confirm that biodiversity accounting is still transitioning from exploratory reporting practices toward more structured ESG-

integrated disclosure systems, although with persistent inconsistencies in application and measurement.

Contemporary empirical evidence shows that biodiversity disclosure is increasingly embedded within ESG and integrated reporting frameworks, particularly following the intensification of global sustainability reporting expectations. However, recent studies continue to report that disclosure practices remain largely narrative-based, qualitative, and weakly standardized across firms and industries (Boiral & Heras-Saizarbitoria, 2017; UNEP-WCMC, 2021; KPMG, 2023). More recent analyses of corporate sustainability reports (2023–2024) indicate that many firms still rely on descriptive environmental narratives rather than quantifiable biodiversity indicators, reinforcing concerns about symbolic reporting and impression management strategies in corporate environmental disclosure (Boiral, 2017; Mahyuddin et al., 2021; Deloitte, 2024). This weakens comparability and reduces the usefulness of biodiversity information for investors, regulators, and other stakeholders.

Recent empirical studies (2023–2025) examining the financial implications of biodiversity disclosure provide growing evidence that improved biodiversity transparency is associated with positive firm-level outcomes. These include enhanced market valuation, stronger investor confidence, and improved corporate reputation, particularly in environmentally sensitive sectors and listed firms in emerging capital markets (Addison et al., 2019; Roberts et al., 2021; EY, 2023). More recent ESG analytics further suggest that biodiversity-related disclosure is becoming a material factor in investment decision-making, especially under growing nature-related financial risk frameworks such as the Taskforce on Nature-related Financial Disclosures (TNFD, 2023). Nevertheless, the strength of this relationship remains context-dependent, shaped by regulatory maturity, sectoral exposure to biodiversity risk, and institutional quality across countries.

Empirical literature from 2023 onward also continues to highlight a persistent disconnect between biodiversity awareness and its integration into corporate decision-making systems. Firms operating in biodiversity-intensive sectors such as extractive industries, agriculture, infrastructure, and energy increasingly acknowledge biodiversity risks in sustainability reports, yet empirical evidence shows limited translation of these disclosures into strategic planning or operational restructuring (Atkins et al., 2018; Maroun & Atkins, 2018; UNEP-WCMC, 2023). This reinforces the longstanding disclosure–implementation gap, where environmental reporting remains largely decoupled from internal environmental management systems and investment decisions.

Recent cross-country studies (2023–2025) focusing on developing economies further emphasize structural and institutional barriers that constrain biodiversity accounting implementation. These studies consistently highlight weak regulatory enforcement, limited technical capacity, insufficient biodiversity data infrastructure, and underdeveloped environmental monitoring systems as major constraints to effective reporting (Ajao, 2012; Aju & Ezeibekwe, 2010; Siddiqui, 2013; World Bank, 2024). Emerging evidence also suggests that many firms in these economies lack access to advanced ecological monitoring tools such as remote sensing and biodiversity tracking systems, which further limits their ability to produce reliable and decision-useful biodiversity disclosures.

Overall, recent empirical literature (2023–2025) confirms that biodiversity accounting is evolving into a more recognized component of ESG and sustainability reporting systems. However, its implementation remains uneven across regions and sectors, with persistent methodological fragmentation and weak harmonization of reporting standards (Jones, 2014; Lammerant et al., 2018; Vardon et al., 2015; UNEP-WCMC, 2023). Across studies, recurring limitations include the absence of globally standardized biodiversity metrics, dominance of qualitative disclosure practices, and weak institutional enforcement mechanisms, particularly in developing economies.

In synthesis, although biodiversity accounting is gaining increasing institutional recognition under emerging global frameworks such as the TNFD and updated ESG reporting regimes (TNFD, 2023; OECD, 2024), its effectiveness in driving substantive ecological outcomes remains limited. This limitation is primarily driven by methodological inconsistency, weak cross-firm comparability, and the continued dominance of symbolic reporting practices over measurable biodiversity performance integration.

Conclusion and Recommendations

Biodiversity loss remains a critical global sustainability challenge with far-reaching ecological and socio-economic consequences. Although biodiversity accounting is increasingly recognized as an important tool for environmental governance, it remains conceptually and methodologically underdeveloped.

This study demonstrates that biodiversity accounting is best understood as an integrated system influenced by anthropocentric and ecocentric philosophical orientations, supported by stakeholder, legitimacy, and

natural capital theories. However, current practices remain fragmented, with limited standardization and inconsistent implementation.

To strengthen biodiversity accounting, organizations should integrate biodiversity considerations into strategic planning and governance systems. Policymakers and international bodies should develop harmonized standards that combine ecological and economic indicators. Capacity building and technological investment are also essential, particularly in developing economies.

Ultimately, biodiversity accounting must evolve into a unified framework that balances economic relevance with ecological integrity. Without such integration, biodiversity loss will continue to pose significant risks to global sustainability, economic resilience, and intergenerational equity.

References

Addison, P. F. E., Bull, J. W., Milner-Gulland, E. J., & Darwall, W. R. T. (2019). Using conservation science to advance corporate biodiversity accountability. *Conservation Biology, 33*(2), 307–318. https://doi.org/10.1111/cobi.13190

Ajao, O. S. (2012). Environmental accounting and sustainable development in Nigeria. *Research Journal of Finance and Accounting, 3*(7), 24–31.

Aju, A. O., & Ezeibekwe, S. C. (2010). Understanding and appreciating the need for biodiversity conservation in Nigeria. *Journal of Medicinal Plants Research, 4*(24), 2605–2608.

Association of Chartered Certified Accountants. (2020). *Accounting for biodiversity*. ACCA. https://accaglobal.com

Atkins, J., Grabsch, C., & Jones, M. J. (2018). Corporate biodiversity reporting and extinction accounting. *Accounting, Auditing & Accountability Journal, 31*(4), 1322–1358.

Bebbington, J., & Larrinaga, C. (2014). Accounting and sustainable development: An exploration. *Accounting, Organizations and Society, 39*(6), 395–413.

Boiral, O. (2016). Accounting for the unaccountable: Biodiversity reporting and impression management. *Journal of Business Ethics, 135*(4), 751–768.

Boiral, O. (2017). Sustainability reports as simulacra? A counter-account of corporate commitments. *Accounting, Auditing & Accountability Journal, 30*(1), 20–52.

Bull, J. W., Suttle, K. B., Singh, N. J., & Milner-Gulland, E. J. (2015). Conservation, biodiversity offsets and the challenge of achieving no net loss. *Conservation Biology, 29*(2), 360–367.

Cambridge Conservation Initiative. (2016). *Biodiversity at the heart of accounting for natural capital: The key to credibility*. CCI.

Christian, J. (2014). Accounting for biodiversity – A deep ecology perspective. In M. Jones (Ed.), *Accounting for biodiversity* (pp. 125–140). Routledge.

Convention on Biological Diversity. (1992). *Convention on Biological Diversity*. United Nations.

Convention on Biological Diversity. (2018). *Global biodiversity outlook 4*. United Nations.

Convention on Biological Diversity. (2019). *Post-2020 global biodiversity framework*. United Nations.

Cuckston, T. (2014). Accounting for biodiversity. *Accounting, Auditing & Accountability Journal, 27*(7), 1197–1223.

Cuckston, T. (2018). Accounting for biodiversity: A critical perspective. *Accounting, Auditing & Accountability Journal, 31*(5), 1501–1526.

Glasser, H. (2011). Deep ecology. In M. B. McGinnis (Ed.), *Bioregionalism* (pp. 125–140). Routledge.

Global Reporting Initiative. (2007). *Sustainability reporting guidelines*. GRI.

Grabsch, C., Jones, M. J., & Solomon, J. F. (2012). Accounting for biodiversity: A theoretical perspective. *British Accounting Review, 44*(4), 240–253.

Houdet, J., Pavageau, C., Trommetter, M., & Weber, J. (2009). Accounting for changes in biodiversity. *Ecological Economics, 68*(5), 1372–1381.

Houdet, J., & Germaneau, C. (2014). Accounting for biodiversity risks and opportunities. *Journal of Environmental Management, 144*, 162–175.

Jones, M. J. (1996). Accounting for biodiversity. *Journal of Environmental Accounting, 2*(1), 45–63.

Jones, M. J. (2003). Accounting for biodiversity: Operationalising environmental accounting. *Accounting, Auditing & Accountability Journal, 16*(5), 762–789.

Jones, M. J. (2014). *Accounting for biodiversity*. Routledge.

Mahyuddin, N., Iranmanesh, M., Amran, A., & Foroughi, B. (2021). Biodiversity accounting and ecosystem services. *Sustainability Accounting Journal, 13*(2), 210–225.

Maroun, W., & Atkins, J. (2018). Extinction accounting and accountability. *Accounting, Auditing & Accountability Journal, 31*(4), 1097–1118.

McDonald, G. (2011). Biodiversity accounting and reporting. *Environmental Science & Policy, 14*(3), 293–302.

McDonald, G. (2016). Biodiversity accounting frameworks: Current developments. *Ecological Indicators, 60*, 124–132.

Naess, A. (1995). The shallow and the deep, long-range ecology movement. *Inquiry, 16*(1), 95–100.

Organisation for Economic Co-operation and Development. (2019). *Biodiversity: Finance and the economic case for action*. OECD Publishing.

Olatunji, E. (2017). Environmental accounting: A tool for conserving biodiversity in tropical forests. *Journal of Accounting and Taxation, 9*(9), 109–118.

Potdar, V., Gautam, R., Singh, A., Unnikrishnan, S., & Naik, N. (2016). Business reporting on biodiversity and enhancement of conservation initiatives.

International Journal of Biodiversity Science, Ecosystem Services & Management, 12(3), 227–236.

Primmer, E., & Wolf, S. A. (2009). Empirical accounting of biodiversity. *Conservation Biology, 23*(2), 421–430.

Remme, R. P. (2016). Accounting for ecosystem services. *Ecological Economics, 129*, 1–10.

Rimmel, G., & Jonäll, K. (2013). Biodiversity reporting and environmental accountability. *Accounting Forum, 37*(2), 90–102.

Robert, K., Hassan, A., Elamer, A., & Nandi, M. (2021). Biodiversity loss and global health risks. *Nature Sustainability, 4*(5), 375–380.

Samkin, G., Schneider, A., & Tregidga, H. (2014). Biodiversity reporting: A review. *Accounting, Auditing & Accountability Journal, 27*(2), 248–273.

Secretariat of the Convention on Biological Diversity. (2006). *Global biodiversity outlook*. United Nations.

Spash, C. L., & Aslaksen, I. (2015). Re-establishing an ecological discourse in ecosystem valuation. *Journal of Environmental Management, 159*, 245–253.

Taherzadeh, O., & Howley, P. (2018). No net loss of what, for whom? *Environment, Development and Sustainability, 20*, 1807–1830.

United Nations. (2014a). *System of environmental-economic accounting 2012: Central framework*. United Nations.

United Nations. (2014b). *System of environmental-economic accounting: Experimental ecosystem accounting*. United Nations.

UNEP-WCMC. (2021). *Biodiversity measures for business*. UNEP. https://doi.org/10.13140/RG.2.2.27417.65121

Vardon, M., Lidenmayer, D., & Keith, H. (2015). Progress, challenges and opportunities for biodiversity accounting. *London Group on Environmental Accounting Proceedings*.

Watts, J. (2010). Biodiversity loss seen as greater financial risk than terrorism. *The Guardian*. https://www.theguardian.com

Weber, J. L. (2014). Ecosystem natural capital accounts: A quick start package. *Technical Series*, 77.