

Biodiversity reporting: standardization, materiality and assurance

Introduction

The planet is undergoing transformation, driven by human activities that threaten biodiversity, with profound consequences for ecosystems and human well-being (Diaz et al., 2019). In response, international efforts have sought to instigate transformation across all sectors of society, emphasizing sustainable and responsible practices. This includes an expectation for corporations to play a pivotal role in mitigating the adverse effects of their operations on biodiversity and nature (Zhang, 2023). In this context, corporate biodiversity reporting emerges as an instrument for enhancing transparency, encouraging responsible behavior, and fostering environmental stewardship (Boiral et al., 2019; Morrison et al., 2022; Quattrone, 2022). This paper examines the evolving landscape of biodiversity reporting standards, describes their underlying rationale and anticipated effects, and highlights unresolved issues that impede the provision of 'good' information to markets and other report users.

Corporate engagement with environmental preservation has gained prominence in the last decade as the ramifications of biodiversity loss have become apparent (Cosma et al., 2023; Karolyi & Tobin-de la Puente, 2023; Roberts et al., 2023). International agreements, such as the Convention on Biological Diversity (CBD), underscore the importance of biodiversity in global sustainability agendas and highlight the expected role of corporations. As a result, the corporate sector faces growing expectations to contribute to biodiversity preservation and to provide relevant information on their actions and outcomes (Österblom et al., 2022).

Numerous initiatives and standards aim to guide corporate biodiversity reporting (Steuer & Tröger, 2022). Prominent among these are the European Sustainability Reporting Standards (ESRS) under the European Union's Corporate Sustainability Reporting Directive (CSRD)¹, the Global Reporting Initiative (GRI), the International Sustainability Standards Board (ISSB), ISO/TC 331, and the Task Force on Nature-related Financial Disclosures (TNFD). These standards (some are still under development) reflect a growing recognition of the need for systematic, transparent, and comparable disclosure of corporate dependencies and impacts on biodiversity.

¹ Directive (EU) 2022/2464

The rationale underlying these standards is multifaceted (Schaltegger et al., 2022). In the first instance, materiality of biodiversity issues drives the demand for standardized and reliable information (Adams et al., 2021; Abhayawansa, 2022; Baumüller & Sopp, 2022; Jørgensen, Mjøs, & Pedersen, 2022). Furthermore, the alignment with international frameworks, such as the CBD, provides a powerful norm for corporations to adhere to. Anticipated effects are equally manifold. Enhanced biodiversity reporting can stimulate corporate accountability, influence investment decisions, facilitate stakeholder engagement, and promote a culture of environmental stewardship within organizations.

Despite this, several challenges persist (Alsahali & Malagueño, 2022; Hassan et al., 2021). The measurement and quantification of corporate biodiversity impact remains complex, often involving the identification and characterisation of ecological interactions over a long period of time. Determining materiality, a cornerstone of reporting, is challenging due to varying perspectives on what is material (Benameur et al., 2023; Blanco-Zaitegi et al., 2022; Cosma et al., 2023; Hassan et al., 2021; Karolyi & Tobin-de la Puente, 2023; Liu & Wu, 2023; Pan et al., 2020). Moreover, ensuring the accuracy, reliability, and comparability of reported data poses significant hurdles, demanding rigorous methodologies and data validation. Without confidence in the data presented, biodiversity information cannot be assured and without assurance its credibility is undermined.

We contribute within this context by providing an analysis of emerging standards, probing into their rationale, and delineating their expected effects on corporate behavior and market dynamics. Additionally, we examine the unresolved issues that undermine the provision of 'good' information through corporate reporting. By examining the complexities and challenges associated with reporting on biodiversity, this study aims to offer insights that inform the development of robust biodiversity reporting standards that cater to the needs of markets and other report users.

The remainder of the paper is organized thus. First, the fundamental principles underlying corporate biodiversity reporting standards are presented. Second, we review literature on materiality and characterise the approach to materiality adopted by each of these standards. Third, the significance of assurance is examined along with a discussion of how assurance

varies depending on different types of assurance providers (e.g. traditional accounting firms² that audit financial reports or other more technically oriented assurance providers³) and the level of assurance sought (which includes assurance of full reports or a limited number of data points (Bakarich, Baranek, & O'Brien 2022; KPMG 2015).

Evolving biodiversity standards and related policies

Beyond the well-established Global Reporting Initiative (GRI), newer biodiversity reporting initiatives have emerged. Table 1 outlines the five most relevant corporate biodiversity standards, categorized by their (i) application area and target audience, (ii) focus areas and objectives, (iii) measurement approach, (iv) reporting requirements, and (v) voluntary or mandatory nature.

These standards exhibit variation across all dimensions (i-v) and address diverse aspects of biodiversity reporting, encompassing impacts and dependencies, risks and opportunities, management approach and governance. The measurement approaches employed range from primary and secondary biodiversity data collection to the assessment of financial exposure. While some of the standards entail specific reporting requirements, others adopt a more flexible "comply or explain" approach⁴. The intended audience for these standards comprises internal and external company stakeholders including auditors, shareholders, governments, banks and other investors, and financial analysts.

<Table 1 about here>

A frequently reported problem associated with these frameworks is the lack of standardized metrics and consistent ways to measure biodiversity interactions (Smith et al., 2020). If one take this perspective, the heterogeneous approaches recommended by these standards are likely to generate diversity in reporting practices, making it challenging for the companies' stakeholders to interpret and assess the quality of biodiversity reporting. At the same time, given the heterogeneity of the operating contexts within which companies are seeking to act it is hard to imagine that any single standard could enumerate all the possible

² For instance PwC, KPMG, Deloitte, E&Y, etc.

³ For instance British Standards Institute, Carbon Verification Service LLC, Earthcon, etc.

⁴ The "comply or explain" approach allows companies to either comply with a set of guidelines or, if they choose not to comply, to provide a detailed explanation for their non-compliance. This approach is commonly used in areas like corporate governance codes, sustainability reporting, and sometimes financial reporting.

disclosures of relevance, nor the methods that should be used to achieve these outcomes. Moreover, each standard adopts a particular perspective on corporate – biosphere connections. Creating a framework which demonstrate each standards' focus and role is likely to be more valuable. Such a framework would offer greater clarity of what is being reported, highlight if comparisons are possible, and enhance transparency of the reporting landscape. Relatedly, the "Align"⁵ project seeks to integrate and harmonize reporting initiatives on broader sustainability issues with nature and biodiversity-focused reporting standards. Higher level framing of reporting requirements are essential for achieving a more cohesive reporting landscape that supports the collective goals of sustainability and biodiversity.

To further this goal, the next subsection examines materiality, which is treated differently in these standards. Materiality approaches will determine the scope of an account, determining what aspects of biodiversity firms analyze and report on including dependencies, impacts, risks and opportunities. Given that corporate biodiversity reporting is intended to portray material actions, this is the basis from which all other judgements are made.

Materiality

Materiality is widely discussed in the literature (Adams, Alhamood, He, Tian, Wang, & Wang 2021; Baumüller & Schaffhauser-Linzatti 2018; Baumüller & Sopp 2022; Betti, Consolandi & Eccles 2018; Boissinot, Goulard, Salin, Svartzman, & Weber 2022; Consolandi, Eccles, & Gabbi 2022; Cooper & Michelon 2021; Fiandrino, Tonelli, & Devalle 2022; Jørgensen, Mjøs, & Pedersen 2022; Ortar 2018; Puroila & Mäkelä 2019; Raith 2022; Torelli, Balluchi, & Furlotti 2020; Wu, Shao, & Chen 2018; Zhou, Lambertson, & Charles 2023) and two types of materiality have been identified (Cooper and Michelon 2021; TNFD 2022), namely:

- *Financial* materiality – which relates to implications of sustainability on financial performance from the perspective of owners' and creditors' decision-making.
- *Impact* materiality – which relates to social and environmental impacts created by corporate activities on stakeholders and the natural environment

In addition, existing and forthcoming frameworks (such as the ESRS and the TNFD), use the idea of double materiality. For example, the ESRS offers guidance for evaluating materiality across various domains and levels (e.g. type of stakeholder, type of materiality [financial or

⁵ The Aligning accounting approaches for nature (Align) project.
https://knowledge4policy.ec.europa.eu/publication/align-project-recommendations-standard-corporate-biodiversity-measurement-valuation_en

impact], and level of disaggregation [country, site, or individual asset]). On the other hand, the TNFD framework implicitly applies the concept of double materiality by recommending disclosures pertaining to nature-related dependencies, impacts, risks, and opportunities. These standards differ from the International Sustainability Standards Board (ISSB) and the Global Reporting Initiative (GRI) actively embrace a more dynamic approach to materiality. Although GRI recognizes impact materiality as a foundational principle, both ISSB and GRI's standards on materiality demonstrate a focus on entity-specific financial considerations. ISSB's materiality threshold is customized to each entity, with materiality judgments influenced by the impact on the decision-making of financial stakeholders, leaning towards a single financial materiality perspective (Abhayawansa, 2022; IFRS S1, 2023). Conversely, the European Sustainability Reporting Standards (ESRS), similarly to the GRI, employ a stakeholder focused materiality model as opposed to the ISSB's entity-specific materiality model more centred on the entity's decision-making of specific stakeholders.

The materiality approach embraced by the ISSB provides continuation between financial and non-financial reporting with its focus on matters that affect investors' and creditors' willingness to invest/lend money in the reporting enterprise, with the interests of society not being comprehensively addressed (Michelon et al., 2020).⁶ Adopting the materiality approach proposed in the ESRS encompass the broader societal implications arising from environmental damage. However, it introduces challenges in determining the extent of disclosure requirements. For instance, the ESRS materiality model includes adverse environmental impacts beyond normal enterprise contractual relationships. This might be conceptually robust (after all there is a shared responsibility for environmental harm) but it is operationally difficult to enact (and may result in different companies reporting on the same impacts). This also has the problem of raising uncertainty about who might have responsibility to act to address the impact. It is likely that both approaches to materiality will be present in corporate reporting, making navigating what the reporting means and what actions should follow the reporting difficult to specify clearly.

Assurance

The incidence of independent assurance of sustainability information produced by the world's biggest companies (N100) has increased from 30% in 2005 to 63% in 2015.⁷ The

⁶ An illustrative case example of this problem is provided in Appendix A.

⁷ The N100 refers to a global sample of 4,900 firms constituting the top 100 companies by revenue in 49 countries.

current sustainability assurance market is dominated by the Big-4⁸ accounting firms, engineering firms, and consulting firms (Alsaahli & Malagueño 2021; Bakarich, Baranek, & O'Brien 2023). The Big-4 firms provide global networks and extensive experience in financial auditing, the engineering firms are renowned for their technical expertise and comprehension of complex processes, and consulting firms offer subject-matter expertise in assuring sustainability reports (Alsaahli & Malagueño 2021; Bakarich, Baranek, & O'Brien 2023). Alsaahli & Malagueño (2021) argued that despite being a sizeable, and rapidly growing market, assurance of corporate biodiversity reporting is still in its infancy and in contrast to broader sustainability assurance, biodiversity reporting assurance is dominated by NGOs. More research is needed to understand the evolving market dynamics for corporate biodiversity reporting, in order to understand what actors that will dominate this market in the future.

Assurance of sustainability information seeks to enhance reporting credibility (Clarkson, Richardson, & Tsang, 2019, KPMG 2015) in the face of criticisms that sustainability reports project a more sustainable image than is the reality (greenwashing – see Glavas, Grolleau & Mzoughi, 2023; Wu, Zhang, & Xie 2020). At the same time, there is also concerns that companies are failing to disclose all their activities (greenhushing – see Ettinger et al., 2021). Moreover, some companies deliberately highlight trivial sustainability efforts in their reports, while conveniently ignoring major environmental concerns (so called green spotlighting). All of these omissions creates false perceptions (Yu, Luu and Chen, 2020).

Assurance of sustainability reporting seeks to ensure greater reliability, as stakeholders perceive assured reports as more dependable (Du & Wu, 2019; Velte, 2021). Nevertheless, concerns have been raised regarding the reliability of sustainability assurance (Michelon et al., 2019; Farooq & De Villiers, 2020). One concern pertains to the reliance of assurance providers on their professional judgment to determine materiality (Moroney & Trotman, 2016), with differences between assurance providers' definitions of materiality (Edgley et al., 2015). Moreover, Boiral and Heras-Saizarbitoria (2020) conducted an analysis of 337 assured sustainability reports from the mining and energy sectors and concluded that assurance opinions often lack a meaningful and credible verification process. Instead, they characterise assurance as superficial exercises detached from sustainability and stakeholder concerns. Thus, trustworthy assurance mechanisms, including third-party audits and verification

⁸ Big-4 refers to the globally largest accounting firms PwC, KPMG, Deloitte, and E&Y.

processes, are a pivotal part in the informational governance surrounding biodiversity disclosures. These measures evaluate the methodologies, data sources, and reporting processes employed by organizations, verifying that they align with established standards and best practices. Such assurance might not only foster transparency but also build trust among stakeholders, investors, and the wider public, ultimately driving greater corporate accountability and commitment to preserving biodiversity.

Concluding remarks

Using corporate disclosure as a way of governing behaviour is common place with demands for corporate biodiversity reporting becoming prevalent. The challenge is how to ensure robust data collection on management action that is useful to a broad group of stakeholders and support changes in biodiversity impacts. Ideally, reporting (appropriately verified) should enhance transparency and cultivate trust among stakeholders and investors. Moreover, it could empower companies to make informed decisions, set meaningful biodiversity goals, and contribute to global efforts to address biodiversity loss.

While a variety of reporting regulations exist they do no point to a common ground for reporting. Rather, they address different aspects of corporate biodiversity impact and adopt different conceptions of what is material to report. Given the early stage of this field further research is needed on what best practice informational governance may entail. It is our firm belief that the establishment of a framework that ensures clarity as to what notion of materiality informs reporting alongside robust assurance is part of the solution. However, empirical work illustrating challenges and success-stories are much needed in this field.

References

Abhayawansa, S. 2022. Swimming against the tide: back to single materiality for sustainability reporting. *Sustainability Accounting, Management and Policy Journal*, 13, 1361-1385.

The paper examines the concept of materiality in sustainability reporting, proposing a new conceptualization that aims to benefit society, the environment, and investors. Further, it scrutinizes the Exposure Draft IFRS S1 General Requirements for Disclosure of Sustainability-Related Financial Information, suggesting how financial materiality can be reconceptualized to include "double materiality."

Adams, C. A., Alhamood, A., He, X., Tian, J., Wang, L. & Wang, Y. 2021. The Double-Materiality Concept: Application and Issues.

Alsahali, K. F. & Malagueño, R. 2022. An empirical study of sustainability reporting assurance: current trends and new insights. *Journal of Accounting & Organizational Change*, 18, 617-642.

The study investigates global trends in the assurance practices of sustainability reports and finds that the growth in assurance practices is not keeping pace with the growth in sustainability reporting. The study also reveals that companies frequently switch assurance providers and that accounting firms dominate this market, although engineering firms are gaining ground.

Bakarich, K. M., Baranek, D., & O'Brien, P. E. 2022. The current state and future implications of ESG assurance. *Current Issues in Auditing*, 17:1, A1-A21.

Baumüller, J. & Schaffhauser-Linzatti, M.-M. 2018. In search of materiality for nonfinancial information—reporting requirements of the Directive 2014/95/EU. *NachhaltigkeitsManagementForum | Sustainability Management Forum*, 26, 101-111.

Baumüller, J. & Sopp, K. 2022. Double materiality and the shift from non-financial to European sustainability reporting: review, outlook and implications. *Journal of Applied Accounting Research*, 23, 8-28.

Benameur, K. B., Mostafa, M. M., Hassanein, A., Shariff, M. Z. & Al-Shattarat, W. 2023. Sustainability reporting scholarly research: a bibliometric review and a future research agenda. *Management Review Quarterly*.

Beske, F., Haustein, E. & Lorson, P. C. 2020. Materiality analysis in sustainability and integrated reports. *Sustainability Accounting, Management and Policy Journal*, 11, 162-186.

Betti, G., Consolandi, C. & Eccles, R. G. 2018. The Relationship between Investor Materiality and the Sustainable Development Goals: A Methodological Framework. *Sustainability*, 10, 2248.

Blanco-Zaitegi, G., Álvarez Etxeberria, I. & Moneva, J. M. 2022. Biodiversity accounting and reporting: A systematic literature review and bibliometric analysis. *Journal of Cleaner Production*, 371, 133677.

- Boiral, O., Heras-Saizarbitoria, I., Brotherton, M.-C. & Bernard, J. 2019. Ethical Issues in the Assurance of Sustainability Reports: Perspectives from Assurance Providers. *Journal of Business Ethics*, 159, 1111-1125.
- Boiral, O., & Heras-Saizarbitoria, I. 2020. Sustainability reporting assurance: Creating stakeholder accountability through hyperreality?. *Journal of Cleaner Production*, 243, 118596.
- Boissinot, J., Goulard, S., Salin, M., Svartzman, R. & Weber, P.-F. 2022. Aligning financial and monetary policies with the concept of double materiality: rationales, proposals and challenges. LSE Research Online Documents on Economics.
- Clarkson, P., Li, Y., Richardson, G., & Tsang, A. 2019. Causes and consequences of voluntary assurance of CSR reports: International evidence involving Dow Jones Sustainability Index Inclusion and Firm Valuation. *Accounting, Auditing & Accountability Journal*, 32(8), 2451-2474.
- Consolandi, C., Eccles, R. G. & Gabbi, G. 2022. How material is a material issue? Stock returns and the financial relevance and financial intensity of ESG materiality. *Journal of Sustainable Finance & Investment*, 12, 1045-1068.
- Cooper, S. M. & Michelon, G. 2021. Conceptions of materiality in sustainability reporting frameworks: Commonalities, differences and possibilities. *Handbook of Accounting and Sustainability*. Edward Elgar Publishing.
- Cosma, S., Rimo, G. & Cosma, S. 2023. Conservation finance: What are we not doing? A review and research agenda. *J Environ Manage*, 336, 117649.
- Díaz, S., Settele, J., Brondízio, E. S., Ngo, H. T., Agard, J., Arneth, A., ... & Zayas, C. N. 2019. Pervasive human-driven decline of life on Earth points to the need for transformative change. *Science*, 366(6471), eaax3100.
- Du, K., & Wu, S. J. 2019. Does external assurance enhance the credibility of CSR reports? Evidence from CSR-related misconduct events in Taiwan. *Auditing: A Journal of Practice & Theory*, 38(4), 101-130.
- Edgley, C., Jones, M. J., & Atkins, J. 2015. The adoption of the materiality concept in social and environmental reporting assurance: A field study approach. *The British Accounting Review*, 47(1), 1-18.
- Ettinger, A., Grabner-Kräuter, S., Okazaki, S., & Terlutter, R. (2021). The desirability of CSR communication versus greenhushing in the hospitality industry: The customers' perspective. *Journal of Travel Research*, 60(3), 618-638.
- Farooq, M. B., & De Villiers, C. 2020. How sustainability assurance engagement scopes are determined, and its impact on capture and credibility enhancement. *Accounting, Auditing & Accountability Journal*, 33(2), 417-445.
- Farooq, M. B., Zaman, R., Sarraj, D. & Khalid, F. 2021. Examining the extent of and drivers for materiality assessment disclosures in sustainability reports. *Sustainability Accounting, Management and Policy Journal*, 12, 965-1002.

- Fiandrino, S., Tonelli, A. & Devalle, A. 2022. Sustainability materiality research: a systematic literature review of methods, theories and academic themes. *Qualitative Research in Accounting & Management*, 19, 665-695.
- Glavas, D., Grolleau, G., & Mzoughi, N. 2023. Greening the greenwashers—How to push greenwashers towards more sustainable trajectories. *Journal of Cleaner Production*, 382, 135301.
- Guix, M., Font, X. & Bonilla-Priego, M. J. 2019. Materiality: stakeholder accountability choices in hotels' sustainability reports. *International Journal of Contemporary Hospitality Management*, 31, 2321-2338.
- Hassan, A., Elamer, A. A., Lodh, S., Roberts, L. & Nandy, M. 2021. The future of non-financial businesses reporting: Learning from the Covid-19 pandemic. *Corporate Social Responsibility Environmental Management*, 28, 1231-1240.
- The paper show that non-financial activities, including biodiversity, are linked to human behavior and impacts on the financial situation of businesses. It emphasizes that businesses should pay attention to biodiversity (to mitigate future financial and economic crises) and that accounting has evolved from producing financial statements to communicating with the broader society by incorporating environmental information.
- Jain, A., Islam, M. A., Keneley, M. & Kansal, M. 2022. Social contagion and the institutionalisation of GRI-based sustainability reporting practices. *Meditari Accountancy Research*, 30, 1291-1308.
- Jørgensen, S., Mjøs, A. & Pedersen, L. J. T. 2022. Sustainability reporting and approaches to materiality: tensions and potential resolutions. *Sustainability Accounting, Management and Policy Journal*, 13, 341-361.
- Karolyi, G. A. & Tobin-De La Puente, J. 2023. Biodiversity finance: A call for research into financing nature. *Financial Management*, 52, 231-251.
- KPMG 2015, “Currents of changes: KPMG survey of corporate social responsibility reporting 2015”, KPMG International Cooperative 2015, available at: <https://www.google.com/search?client=firefox-b-e&q=Currents+of+changes%3A+KPMG+survey+of+corporate+social+responsibility+reporting+2015> (accessed August 24, 2023).
- Lakshan, A. M. I., Low, M. & De Villiers, C. 2022. Challenges of, and techniques for, materiality determination of non-financial information used by integrated report preparers. *Meditari Accountancy Research*, 30, 626-660.
- Liu, C. & Wu, S. S. 2023. Green finance, sustainability disclosure and economic implications. *Fulbright Review of Economics and Policy*, 3, 1-24.
- Michelon, G., Paananen, M. & Schneider, T. 2020. Black box accounting: Discounting and disclosure practices of decommissioning liabilities. *ICAS*.
- Michelon, G. Patten, D.M. & Romi, A.M. 2019 Creating Legitimacy for Sustainability Assurance Practices: Evidence from Sustainability Restatements, *European Accounting Review*, 28(2), 395-422.

- Moroney, R., & Trotman, K. T. 2016. Differences in auditors' materiality assessments when auditing financial statements and sustainability reports. *Contemporary Accounting Research*, 33(2), 551-575.
- Morrison, L. J., Wilmshurst, T. & Shimeld, S. 2022. Counting nature: some implications of quantifying environmental issues in corporate reports. *Meditari Accountancy Research*.
- Ortar, L. 2018. Materiality Matrixes in Sustainability Reporting: An Empirical Examination. *SSRN Electronic Journal*.
- Paananen, M., Runesson, E. & Samani, N. 2021. Time to clean up environmental liabilities reporting: disclosures, media exposure and market implications. *Accounting Forum*, 45, 85-116.
- Pan, C., Qiu, J., Chen, Z. & Pan, Y.-C. 2020. Literature Review and Content Analysis: Internet Finance, Green Finance, and Sustainability. *Advances in Economics, Business and Management Research*, 126.
- Puroila, J. & Mäkelä, H. 2019. Matter of opinion. *Accounting, Auditing & Accountability Journal*, 32, 1043-1072.
- Quattrone, P. 2022. Seeking transparency makes one blind: how to rethink disclosure, account for nature and make corporations sustainable. *Accounting, Auditing and Accountability Journal*, 35, 547-566.
- Raith, D. 2023. The contest for materiality. What counts as CSR? *Journal of Applied Accounting Research*, 24, 134-148.
- Roberts, L., Georgiou, N. & Hassan, A. M. 2023. Investigating biodiversity and circular economy disclosure practices: Insights from global firms. *Corporate Social Responsibility and Environmental Management*, 30, 1053-1069.
- Schaltegger, S., Gibassier, D. & Maas, K. 2022. Managing and accounting for corporate biodiversity contributions. Mapping the field. *Business Strategy and the Environment*. 32(5), 2544-2553.
- The paper proposes a framework for identifying and assessing a company's exposure to and impact on biodiversity, setting priorities for corporate biodiversity management, and monitoring the effectiveness of these actions. The authors argue that while biodiversity management is still in its infancy, there is an urgent need for research that develops pragmatic management and accounting approaches to safeguard and re-establish biodiversity.
- Smith, T., Beagley, L., Bull, J., Milner-Gulland, E. J., Smith, M., Vorhies, F., & Addison, P. F. (2020). Biodiversity means business: Reframing global biodiversity goals for the private sector. *Conservation Letters*, 13(1), e12690.
- Steuer, S. & Tröger, T. H. 2022. The Role of Disclosure in Green Finance. *Journal of Financial Regulation*, 8, 1-50.
- TNFD (2022) Nature-related Risk and Opportunity Management and Disclosure Framework Beta v0.3. [online] Available: <https://framework.tnfd.global/wp->

[content/uploads/2022/11/TNFD_Management_and_Disclosure_Framework_v0-3_B.pdf](#) [Accessed 06-07-2023]

- Torelli, R., Balluchi, F. & Furlotti, K. 2020. The materiality assessment and stakeholder engagement: A content analysis of sustainability reports. *Corporate Social Responsibility and Environmental Management*, 27, 470-484.
- Velte, P. 2021. Determinants and consequences of corporate social responsibility assurance: A systematic review of archival research. *Society and Business Review*, 16(1), 1-25.
- Wu, Y., Zhang, K., & Xie, J. 2020. Bad greenwashing, good greenwashing: Corporate social responsibility and information transparency. *Management Science*, 66(7), 3095-3112.
- Wu, S. R., Shao, C. & Chen, J. 2018. Approaches on the Screening Methods for Materiality in Sustainability Reporting. *Sustainability*, 10, 3233.
- Yang, W. E., Lai, P. W., Han, Z. Q. & Tang, Z. P. 2023. Do government policies drive institutional preferences on green investment? Evidence from China. *Environmental Science and Pollution Research*, 30, 8297-8316.
- Yu, E. P.-Y., Luu, B. V. & Chen, C. H. 2020. Greenwashing in environmental, social and governance disclosures. *Research in International Business and Finance*. 52, 101192
- Zhang, Y., Tariq, A., Hughes, A. C., Hong, D., Wei, F., Sun, H., ... & Ma, K. 2023. Challenges and solutions to biodiversity conservation in arid lands. *Science of the Total Environment*, 857, 159695.
- Zhou, Y., Lamberton, G. & Charles, M. B. 2023. An Explanatory Model of Materiality in Sustainability Accounting: Integrating Accountability and Stakeholder Heterogeneity. *Sustainability*, 15, 2700.
- Österblom, H., Bebbington, J., Blasiak, R., Sobkowiak, M. & Folke, C. (2022) Transnational Corporations, Biosphere Stewardship, and Sustainable Futures. *Annual Review of Environment and Resources*, 47(1), 609-635.

The biosphere crisis underscores that efforts to stop adverse negative environmental impact have been insufficient and that transformative change is urgently needed. The authors provide suggestions for how to align corporate activities with the biosphere and argue that such corporate biosphere stewardship requires more ambitious approaches taken by corporations, combined with new and formalized public governance approaches by governments

Table 1: Overview of five key environmental reporting standards.

Framework /Standard / Org	Application Area and/or Audience	Focus areas and objectives	Measurement approach	Reporting Requirements	Voluntary/mandatory
<p>European Sustainability Reporting Standards (ESRS) under CSRD</p>	<p>Companies operating in the EU.</p> <p>Audience: Primary users of general financial reporting as well as other users, including business partners, trade unions and social partners, civil society and non-governmental organisations, governments, analysts and academics</p>	<p>Specify what should be disclosed as material.</p> <p>Impacts, risks and opportunities in relation to environmental, social, and governance. Sustainability matters, including impact related to biodiversity.</p> <p>The objective is to enable users to understand: (a) how the undertaking affects biodiversity and ecosystems, in terms of material positive and negative, actual and potential impacts, including the extent to which it contributes to the drivers of biodiversity and ecosystem loss and degradation (b) any actions taken, and the result of such actions, to prevent or mitigate material negative actual or potential impacts and to protect and restore biodiversity and ecosystems, and to address risks and opportunities; and</p>	<p>Three main characteristics:</p> <p>Magnitude (e.g., amount of contaminant, noise intensity),</p> <p>Spatial extent (e.g., area of land contaminated) and</p> <p>Temporal extent (duration of persistence of contaminant).</p> <p>Notably, requires disclosures of targets over time set in relation to EU goals.</p> <p>Primary data: collected in-situ.</p> <p>Secondary data: including geospatial data layers that are overlaid with geographic location data of business activities.</p> <p>Modelled biodiversity state data</p>	<p>Identified actual and potential impacts on biodiversity and ecosystems at own site locations and in the value chain, including assessment criteria applied.</p> <p>Identified and assessed dependencies on biodiversity and ecosystems and their services at own site locations and in the value chain, including assessment criteria applied, and, if this assessment includes ecosystem services that are disrupted or likely to be.</p> <p>Identified and assessed transition and physical risks and opportunities related to biodiversity and ecosystems, including assessment criteria applied based on its impacts and dependencies.</p> <p>Considered systemic risks.</p> <p>Anticipated financial effects of material biodiversity- and</p>	<p>Mandatory for publicly traded firms as well as non-publicly traded larger European firms.</p>

		<p>(c) the plans and capacity of the undertaking to adapt its strategy and business model in line with Regional and Global biodiversity goals</p> <p>(d) the nature, type and extent of the undertaking's material risks, dependencies and opportunities related to biodiversity and ecosystems, and how the undertaking manages them; and</p> <p>(e) the <i>financial effects</i> on the undertaking over the short-, medium- and long-term time horizons of material risks and opportunities arising</p>		ecosystem-related risks and opportunities	
--	--	--	--	---	--

<p>Global Reporting Initiative (GRI)</p>	<p>Global; Companies and organizations of all sizes and industries, including public and private sectors.</p> <p>Audience: Internal and external stakeholders such as shareholders, customers, employees, communities, and governments</p>	<p>To assess and report on the impact of an organization's operations on biodiversity and ecosystems.</p> <p>Identify impact on biodiversity.</p> <p>Actions to protect and conserve biodiversity.</p> <p>Increase awareness of the importance of biodiversity</p>	<p>Conduct biodiversity assessments</p> <p>Implement strategies and programs to preserve and protect biodiversity.</p> <p>GRI 304: Biodiversity. Indicators include:</p> <ul style="list-style-type: none"> - sites in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas. - Significant impacts of activities, products, and services on biodiversity. - Habitats protected or restored 	<p>Organizations are encouraged to report on their impacts on biodiversity using the GRI 304: Biodiversity Standard. This includes reporting on operational sites in or near areas of high biodiversity value, and the impacts of activities on biodiversity</p> <p>Description on biodiversity and ecosystem services Identification of threatened species or threatened ecosystems.</p>	<p>Voluntary, but some countries and regions have incorporated GRI Standards into their regulatory frameworks.</p> <p>GRI is based on comply or explain approach.</p>
--	--	--	--	---	---

			<p>- IUCN Red List species and national conservation list species with habitats in areas affected by operations.</p> <p>Measurement approaches include quantitative data (e.g., number of sites, size of protected areas) and qualitative descriptions of impacts and conservation efforts.</p> <p>Number of threatened species Number of hotspots for biodiversity Proportion of protected areas near facilities</p>	Reporting on implemented measures to protect and conserve biodiversity	
International Financial Reporting Standards Sustainability (IFRS) under International Sustainability Standards Board (ISSB)	<p>Companies and organizations.</p> <p>Audience: Primary users of general financial reporting as well as other stakeholders</p>	<p>Sets our general requirements for sustainability- and climate - related disclosures useful to users of general-purpose financial reports. Including impact related to biodiversity.</p> <p>The objective is to reduce complexity related to sustainability disclosure frameworks and standards, to address the reporting burden</p>	<p>Financial exposures related to sustainability and climate-related exposure.</p> <p>Cross-industry metric categories such as: Proportional value of climate-related transition risks, physical risks, and transition opportunities. Capital deployment towards climate related risks and opportunities, internal carbon prices, and remuneration</p>	Disclosure about sustainability- and climate-related risks and opportunities that could affect enterprise cash flows, access to financing, and cost of capital.	Currently voluntary. Can be made mandatory in individual jurisdictions.

		for companies, and improve reporting efficiency.	linked to climate-related considerations.		
--	--	--	---	--	--

ISO/TC 331 ISO/CD 17298 Biodiversity - Strategic and operational approach for organisations. - Requirements and guidelines	Companies and organizations. Audience : Any type of organization (private, public, NGO, any size).	Identifying and prioritizing actions in favour of biodiversity conservation, restoration, and sustainable use, while considering the equitable sharing of benefits. The objective is to give a biodiversity approach aiming to integrate biodiversity issues into strategy and improve environmental, social, and economic performance.	For each planned action, the organization shall associate performance indicators applying the Pressure-State Response. The organization shall record the biodiversity indicator results at regular intervals. The intervals shall be specific to each indicator and relevant for: - the specific time scale of the indicator and its specific cyclic variations; - the deadlines for achieving the objectives identified in 7.2; . the time scale of the approach and the action concerned by the indicator.	No reporting requirements.	Voluntary.
--	--	--	--	----------------------------	------------

Taskforce for Nature-Related Financial Disclosures (TNFD)	Companies and financial sector.	Risk management Integration of biodiversity and strategies Development of economic indicators and models.	Financial exposures related to biodiversity. Develop models to assess financial risks and opportunities to support	Identification of financial risks and opportunities related to biodiversity. Reporting data on biodiversity-related impacts	Voluntary for all firms and based on loosely held comply or explain approach.
---	---------------------------------	---	---	--	---

<p>Consists of 40 individual Taskforce Members representing financial institutions, corporates and market service providers with over US\$20trn in assets. The TNFD Co-Chairs, David Craig and Elizabeth Mrema, lead the Taskforce.</p>		<p>Provide a risk management and disclosure framework to support a shift in global financial flows away from nature-negative outcomes and toward nature-positive outcomes.</p>	<p>investment and financing of nature-related projects.</p> <p>Implement carbon reduction initiatives and track emissions reduction progress.</p>	<p>and dependency of company operations and financial risks and opportunities.</p>	
---	--	--	---	--	--

APPENDIX A

Case Study: Forico's Materiality Approach to Sustainability Reporting

To elucidate the complexities of sustainability reporting, let's consider a real-world case study of Forico, a forest management company operating in Tasmania.

Financial Materiality Approach

In a financial materiality approach, Forico might primarily focus on disclosing financial metrics such as profitability margins and the increased shareholder value that comes from efficient utilization of forest resources. They could also highlight their compliance with local and international regulations that protect certain tree species and natural habitats. While this approach aligns with Forico's globally certified forests and their prestigious Banksia Foundation National Sustainability Award, it could potentially overlook broader impacts on the ecosystem.

Impact Materiality Approach

Contrast this with an impact materiality approach that also considers societal implications. In this scenario, Forico would go beyond financial metrics and regulatory compliance. They would disclose the potential or actual impact of their logging activities on local biodiversity, perhaps even detailing how they monitor and report on affected species or ecological indicators like soil and water quality. Given their existing Natural Capital Report, Forico might also disclose efforts to engage with Aboriginal communities, who have been custodians of the natural environment for generations, as part of their broader sustainability initiatives.

By comparing these two approaches through the lens of Forico, it becomes apparent that entity-specific materiality may not capture the full scope of a company's impact on biodiversity and societal well-being. A more comprehensive materiality approach would consider the broader environmental and societal implications, advocating for a more inclusive reporting framework that accounts for various stakeholder interests.