

Application of Biodiversity Accounting to Financial Reporting in Modern Business

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ARTICLE INFO

Article history:

Received October 08, 2024

Revised October 15, 2024

Accepted October 23, 2024

Available online October 23, 2024

Keywords:

Biodiversity Accounting,
Financial Reporting, Modern
Business



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ABSTRACT

Biodiversity accounting has emerged as an important tool for companies to manage their environmental impacts and contribute to global sustainability. This systematic literature review examines recent developments in biodiversity accounting practices, including reporting standards, measurement methodologies, and their implementation across industry sectors. The study identifies key approaches such as the use of Global Reporting Initiative (GRI) standards, Biodiversity Footprint Analysis, and Natural Capital Accounting in reporting and measuring biodiversity impacts. Key challenges include limitations in measurement methodologies, gaps in reporting, and difficulties in integrating biodiversity into business strategies. The study also analyzes the benefits of implementing biodiversity accounting for companies, including improved risk management, corporate reputation, and operational efficiency. Using a literature review research method that focuses on the analysis, synthesis, and evaluation of documents or text sources related to the research topic, the study discusses the concept and definition of biodiversity accounting and its benefits for companies. Recommendations for future developments include the need for better standards, further research in measurement methodologies, and stronger integration into business practices. Case studies and best practices demonstrate how companies can successfully manage and report their impacts on biodiversity by implementing effective strategies such as habitat restoration and conservation area management. Thus, biodiversity accounting is not only an ethical obligation but also a strategic step to ensure the long-term sustainability of business and the environment.

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INTRODUCTION

Biodiversity, which includes genetic, species, and ecosystem variation, is the foundation of life on earth and plays a vital role in maintaining ecosystem balance and global climate stability (Roberts et al., 2021a) . As a provider of essential ecosystem services such as pollination, water cycle regulation, and carbon sequestration, biodiversity contributes directly to human well-being and economic sustainability (Mengist et al., 2019) . However, uncontrolled human activities have caused socio-economic and environmental damage with increasing pressure on health care systems, transportation infrastructure, energy infrastructure, and land-use changes that threaten the survival of various species and habitats (Merida et al., 2022) . This phenomenon not only impacts the environment but also penetrates the business sector and wider society, creating complex and interrelated risks. Therefore, understanding and protecting biodiversity is becoming increasingly critical in the context of modern business and sustainable development (Lubis et al., 2023) .

Biodiversity degradation has reached alarming levels, with the rate of species extinction marking the loss of native species and destabilizing the delicate balance of ecosystems (Sales, 2023) . Habitat loss, climate change, pollution, and overexploitation of natural resources are the main driving factors (Díaz et al., 2019) . The impact of this phenomenon on businesses is significant, with companies dependent on natural resources facing major operational and financial risks, such as raw material shortages, increased production costs, and supply chain disruptions. Meanwhile, communities are facing threats to food security, health, and socio-economic stability. This situation calls for a new approach to assessing and managing the impact of businesses on biodiversity, in which corporate governance systems and reporting activities play a key role in redirecting business decisions and actions (Comoli et al., 2023) .

In the face of these challenges, accounting has emerged as an important tool for measuring, monitoring and reporting business impacts on biodiversity (D'Amato et al., 2024) . Biodiversity accounting enables companies to quantify and evaluate their interactions with ecosystems, and integrate environmental considerations into strategic decision-making (Cuckston, 2018) . Through the development of specific metrics and indicators, accounting can help identify biodiversity-related risks and opportunities, driving innovation in more environmentally friendly business practices. Furthermore, comprehensive reporting on biodiversity performance increases corporate transparency and accountability, meets stakeholder demands for more detailed sustainability information and supports the transition to more environmentally responsible business models (Atkins et al., 2018) . This approach also facilitates collaboration between business, government and civil society sectors in a joint effort to conserve biodiversity and achieve sustainable development.

The implementation of biodiversity accounting in corporate financial reporting is an important step towards a more sustainable business (Skouloudis et al., 2019) . This approach allows companies to internalize environmental costs that were previously

considered externalities, which provides a more accurate picture of the company's long-term value and risks. By integrating biodiversity values into financial statements, companies can better manage their environmental impacts, thereby increasing the efficiency of resource use, and developing more environmentally responsible business strategies (Faiqoh & Mauludy, 2019) . It also helps investors and other stakeholders make more informed decisions based on the company's sustainability risk profile and opportunities, thereby encouraging more efficient and sustainable capital allocation in today's global economy (Soesanto, 2022a) .

However, the application of biodiversity accounting in business practices still faces various challenges. The complexity of measuring and assessing biodiversity, the lack of uniform standards, and limited data and methodology are the main obstacles (Heniwati & Asni, 2019) . In addition, there is a knowledge and capacity gap among business actors in understanding and applying this concept (Addison et al., 2019) . These challenges emphasize the importance of collaboration between the business sector, academics, policy makers, and non-governmental organizations in developing frameworks and best practices for biodiversity accounting (Feger et al., 2019) . Innovations in measurement and reporting technologies, as well as harmonization of international standards, are also needed to support wider adoption of this approach. In this context, a literature review becomes very relevant to understand recent developments and identify areas that require further research.

Given the complexity and urgency of this issue, this literature review aims to comprehensively analyze the literature related to biodiversity management and reporting from an accounting perspective (Feger et al., 2019) . The main focus of the literature review is to identify and evaluate recent developments in biodiversity accounting practices, including measurement methodologies, reporting standards, and their implementation in various industry sectors (Boiral, 2016) . Through a systematic analysis of academic research, industry reports, and case studies , this literature review seeks to map the current knowledge landscape, identify gaps in the literature, and formulate directions for future research. The scope of the review includes the conceptual evolution of biodiversity accounting, challenges in its implementation, and its impact on financial and non-financial performance of companies (Reade et al., 2015) . In addition, this literature review will also examine policy implications, risk mitigation strategies, and innovation opportunities in biodiversity accounting to promote business sustainability and environmental conservation.

This literature review will also examine the various approaches and frameworks used in biodiversity accounting, such as Natural Capital Accounting, Biodiversity Footprint Assessment, and Ecosystem Services Valuation (Unerman et al., 2018) . In addition, this review will explore the role of regulation and global initiatives such as the Task Force on Nature-related Financial Disclosures (TNFD) in encouraging the adoption of biodiversity accounting practices (Gibassier et al., 2018) . Thus, this literature review is expected to provide valuable insights for academics, business practitioners, and policy

makers in developing and implementing more effective accounting practices to conserve biodiversity (Sobkowiak et al., 2020) . The results of this review will not only contribute to the development of biodiversity accounting theory and practice, but also support global efforts in maintaining ecosystem balance and achieving sustainable development goals.

This article describes accounting for biodiversity, particularly the application of biodiversity accounting to financial reporting in modern business .

METHODOLOGY

1. Research Approach

This study uses a Literature Review approach to collect and analyze data related to the application of biodiversity accounting in modern business financial reporting. Literature review is a systematic and transparent method for identifying, evaluating, and synthesizing research that has been done on a topic. This approach is very suitable for examining the latest developments in biodiversity accounting practices and their impact on corporate financial reporting (Hassan et al., 2020) .

2. Research Object

The data for this study were taken from leading journal databases such as Google Scholar, Scimago and Sinta. The selection of these databases ensures a broad representation of relevant academic literature. The search focus is on journal articles discussing biodiversity accounting, environmental financial reporting and the integration of biodiversity value in business financial reporting. The selected articles will be further identified based on predetermined criteria to ensure data relevance and quality (Linnenluecke et al., 2020) .

3. Data Types and Sources

The data in this study are articles relevant to the topic of biodiversity accounting. The article search was conducted using specific keywords such as "Biodiversity Accounting", "Environmental Financial Reporting", and "Sustainability in Modern Business " . The search technique uses logical operators such as "AND" and "OR" to narrow the search results to be relevant to this study. The selected articles were limited to publications from 2015 to 2024 to ensure the freshness of the information. The main data sources include leading journals in the fields of environmental accounting, environmental management, and business sustainability (Haque & Jones, 2020) .

4. Research Stage

In this research, several main stages were followed which provided a systematic methodology such as (Massaro et al., 2016) :

1) Review planning: At this stage, the research question is formulated and the search protocol is established. The main focus is to identify current methods and practices in biodiversity accounting and the challenges of their implementation in modern business financial reporting.

2) Review development: A search protocol was applied to collect relevant articles. Article selection was performed based on predetermined inclusion and exclusion criteria.

3) Review results: At this stage, the search results are analyzed and synthesized to answer the research questions. The analysis includes identifying trends, best practices, and gaps in the implementation of biodiversity accounting.

5. Data Collection Techniques

Data collection was carried out in three stages: first, selection of articles based on title; second, selection through abstract; and third, evaluation of the full content of the selected articles. This selection process aims to ensure that the articles analyzed have high relevance to the research topic. After the articles are collected, the researcher will conduct a more in-depth review to verify their quality and contribution to the research topic (Page et al., 2021) .

6. Data Validity Techniques

To ensure data validity, this study applied triangulation techniques. Information from various article sources was compared and confirmed to ensure consistency and accuracy. In addition, the use of various reputable journal databases (Scopus, Google Scholar, Sinta) helped in triangulating data sources. To meet the confirmability criteria, the researcher ensured that the findings were supported by the data collected, not by personal preferences (Nowell et al., 2017) .

7. Data Analysis Techniques

Data analysis begins with a demographic analysis to map the country of origin of the reviewed studies. Next, key themes in biodiversity accounting and financial reporting are identified and classified. The researchers integrate the findings to produce a comprehensive understanding of current practices, challenges, and opportunities in the application of biodiversity accounting. The analysis also includes comparisons between articles to identify trends and gaps in the literature (Massaro et al., 2016) . The results of the analysis are then synthesized into a discussion that provides theoretical and practical contributions to the development of biodiversity accounting for modern business financial reporting.

RESULTS AND DISCUSSION

1. Biodiversity Accounting: Concepts and Definitions

Understanding Biodiversity Accounting

Biodiversity accounting is a branch of environmental accounting that focuses on disclosing information related to biodiversity (Tarigan & Kawedar, 2020) . Biodiversity accounting is the process of identifying, validating, measuring, disclosing, classifying, combining, summarizing, and presenting basic financial data on company activities related to biodiversity conservation. (Olding, 2024) . The main objective of biodiversity accounting is to ensure that companies are accountable for their impacts on species and habitats. This includes disclosing whether the company's operations are located in protected areas or areas of high biodiversity, as well as the impact of the company's operations on the survival of biodiversity (Khasanah, 2021) .

Biodiversity refers to the variety of life on earth, including the diversity of genes, species, and ecosystems (Maroun & Atkins, 2021) . In general, biodiversity can be divided into three main categories:

1. **Genetic Diversity:** Genetic variation within a species, affecting the appearance and traits of individuals. Examples include differences in skin color in humans or color variations in roses.
2. **Species Diversity:** Differences between species within a genus. For example, lions, tigers, and leopards are included in the genus *Panthera* but have different physical characteristics.
3. **Ecosystem Diversity:** The variation in the biotic (living things) and abiotic (non-living environment) components of an area. An example is the difference between a forest and a desert ecosystem.

Biodiversity accounting is a branch of environmental accounting that focuses on disclosing information related to the existence and impact of a company's operations on biodiversity (Soesanto, 2022b) . The urgency of biodiversity accounting lies in the interrelationships between ecology, economics, law, politics, and culture. A multidisciplinary approach is needed to ensure the sustainability of biological systems that support life on earth. Without attention to any of these aspects, the sustainability of life on earth can be threatened (Büchling & Maroun, 2021) .

Biodiversity accounting is not only important for companies in terms of legal compliance but also as part of their social responsibility towards the environment. By understanding and implementing this concept, companies can play an active role in preserving biodiversity and maintaining the balance of ecosystems that are vital to human life (Maroun & Atkins, 2021) .

The Role of Accounting in Conservation

Accounting can be used as a tool to support biodiversity conservation and management efforts through environmental impact reporting (Blanco-Zaitegi et al., 2022) . The following are the roles of accounting in conservation:

1. Companies must report on the impact of their operations on biodiversity. This includes disclosure of the intrinsic value of biodiversity at the planning and implementation stages of conservation programs.
2. Companies are required to record affected biodiversity in accordance with the IUCN (International Union for Conservation of Nature) Red List and national conservation regulations .

Sustainability reports should include information on how the company contributes to the preservation or degradation of biodiversity. This is important to ensure the transparency and accountability of the organization in managing the environment (Olding, 2024) .

2. Approaches to Biodiversity Management and Reporting

Biodiversity Reporting in Sustainability Reports

Biodiversity reporting in sustainability reports is an important part of corporate transparency and accountability in carrying out social and environmental responsibilities (King et al., 2021) . Here is how companies report their impact on biodiversity and how standards such as the Global Reporting Initiative (GRI) accommodate biodiversity-related reporting (Kopnina et al., 2024) :

1. The Global Reporting Initiative (GRI) has revised its biodiversity standards to improve transparency in reporting. The standards include full transparency across the supply chain, site-specific impact reporting, new disclosures on direct drivers of biodiversity loss, and requirements for reporting impacts on communities.
2. Reporting Categories: The GRI-G4 Standard for biodiversity aspects consists of 4 categories, namely:

EN11: The company's operational locations are managed within, adjacent to, or outside areas of high biodiversity value.

EN12: Significant impacts of the company's activities, products and services on biodiversity.

EN13: Protected and restored habitats.

EN14: IUCN Red List of Species and National Conservation Areas with habitats in affected areas

Biodiversity Impact Measurement Methods

Biodiversity impact measurement methods are used to identify and measure a company's impact on biodiversity (Oorschot et al., 2020) . Here are some of the approaches used:

1. **Biodiversity Footprint Analysis:** This method is used to measure the impact of a company's activities on biodiversity. This analysis can help companies understand and measure the ecosystem losses caused by their activities.
2. **Natural Capital Accounting:** This method involves measuring the value of natural capital used in a company's operations. This helps companies understand the value of the ecosystems they impact and make more sustainable decisions .

Disclosure of Risks and Opportunities Related to Biodiversity

Companies must identify and disclose business risks and opportunities related to biodiversity (Roberts et al., 2021) . Here is how companies identify and disclose risks and opportunities:

1. The loss of vital ecosystems can impact a company's reputation. Companies should disclose the reputational risks associated with environmental degradation and how they plan to address those risks.
2. Financial losses can occur if companies are unable to utilize limited natural resources. Companies must disclose the potential financial losses from the loss of important ecosystems and how they plan to avoid or mitigate those losses.
3. Companies must disclose business risks and opportunities related to biodiversity in their sustainability reports. This includes disclosures on how companies identify and manage environmental risks and how they see opportunities to improve the sustainability of their business through biodiversity conservation.

Biodiversity management and reporting is an essential part of a company's sustainability strategy. By using standards such as GRI and measurement methods such as Biodiversity Footprint Analysis and Natural Capital Accounting, companies can increase transparency and accountability in managing their impacts on biodiversity. In addition, disclosing biodiversity-related risks and opportunities helps companies understand and manage environmental risks and increase social and environmental awareness and responsibility (Mysaka et al., 2021) .

3. Accounting Standards and Frameworks for Biodiversity

International Regulations and Reporting Standards

The following are some of the standards that govern biodiversity reporting and how these standards encourage transparent reporting of impacts on ecosystems according to (Maroun & Atkins, 2021) :

1. **Global Reporting Initiative (GRI):** GRI has revised its biodiversity standards to improve reporting transparency. The standards include full transparency across the supply chain, site-specific impact reporting, new disclosures on direct drivers of biodiversity loss, and requirements for reporting impacts on communities.
2. **Natural Capital Protocol:** This protocol is used to measure and manage the value of natural capital used in company operations. This way, companies can

understand and measure the ecosystem losses caused by their activities, and make more sustainable decisions.

3. ISO 14001: While ISO 14001 is not specifically aimed at biodiversity, it can be used as a framework for managing environmental impacts more generally. However, more specific biodiversity standards such as those revised by GRI are more relevant to biodiversity reporting needs.

The Role of Global Standards in Managing Biodiversity

International standards play an important role in helping companies manage biodiversity (Kopnina et al., 2024) . Here are some important roles of global standards:

1. Standards like GRI help companies identify the impacts of their operations on biodiversity, so they can measure and manage those impacts more effectively.
2. The revised standards by GRI encourage transparent reporting of impacts on ecosystems. This increases corporate accountability and allows investors and society to understand the impacts of corporate operations.
3. The GRI Standards have been recognized for drawing on key components of the UN Kunming-Montreal Global Biodiversity Framework (GBF). This enables the GRI Standards to support the achievement of the Sustainable Development Goals (SDGs) and collective efforts to develop methods and resources for better decisions about climate and nature.

Challenges in Adopting Standards Across Industries

Adopting biodiversity standards can face several challenges, especially in various industries (Mysaka et al., 2021) . Here are some of the challenges that may arise:

1. Companies may face difficulties in obtaining data from suppliers beyond tier one. The GRI Standards have provided additional guidance for identifying the most significant impacts, based on recent frameworks such as SBTN and TNFD.
2. A global biodiversity framework requires consistency and comparability across countries for reporting, across sectors for mainstreaming, and over time for monitoring. Standards are essential to support all three.
3. The rapid development of new frameworks, such as the TNFD, alongside other policies and tools, has overwhelmed companies. Therefore, GRI has chosen a more collaborative approach with the TNFD, SBTN, and GBF to align and strengthen their different roles and objectives.

Biodiversity accounting standards and frameworks are essential in increasing transparency and accountability of companies regarding their operational impacts on ecosystems. Standards such as GRI and the Natural Capital Protocol help companies identify, measure, and manage biodiversity impacts, as well as increase social and environmental awareness and responsibility (Raar et al., 2020) . However, adopting these standards across industries also faces several challenges, such as limited data and consistency in reporting. Therefore, collaboration and integration between various

standards and frameworks are essential to achieve global biodiversity goals (Widaryanti et al., 2022) .

4. Challenges in Biodiversity Accounting

Limitations of Measurement Methodology

Companies face several challenges in measuring biodiversity impacts quantitatively and qualitatively, as well as data limitations that often arise (Soesanto, 2022b) . Here are some of the challenges faced:

1. Companies may face difficulties in obtaining data from suppliers beyond the first tier. Standards such as the Global Reporting Initiative (GRI) have provided additional guidance for identifying the most significant impacts, based on recent frameworks such as the SBTN and TNFD.
2. Complex ecosystems make it difficult to measure biodiversity impacts accurately. Companies must deal with multiple variables that interact with each other, such as species, habitats, and interactions between species.
3. Current measurement methodologies may not be sufficient to measure the full impact of biodiversity. Companies should use a combination of different methods to get a more comprehensive picture of the impact of their operations.

Gaps in Reporting

Gaps in biodiversity reporting include a lack of uniform standards, variation across sectors, and uncertainty in measuring long-term impacts on ecosystems. (Schaltegger et al., 2023) . Here are some of the gaps faced:

1. Biodiversity reporting standards such as GRI are still under development and revision. This results in a lack of uniform standards among companies, making it difficult to compare biodiversity reporting between different companies.
2. Companies from different sectors have different needs and challenges in biodiversity reporting. For example, companies operating in protected areas have more specific needs in measuring and reporting biodiversity impacts than companies operating in other areas.
3. Measuring long-term impacts on ecosystems remains a significant challenge. Companies must deal with uncertainty in measuring impacts that will occur over long periods of time, such as climate change and habitat destruction.

Integration of Biodiversity into Business Strategy

Integrating biodiversity issues into strategic business decisions and accounting decision-making processes is a significant challenge (Nedopil, 2023) . Here are some of the challenges faced:

1. Biodiversity issues are often considered a formality and not taken seriously in business decision making. This results in a lack of attention and resources being given to integrating biodiversity into business strategies.
2. Companies must increase transparency and monitoring actions in integrating biodiversity into business strategies. This requires a paradigm shift in business decision-making, from a focus on short-term profits to a focus on environmental sustainability.
3. Accountants have a major role to play in integrating biodiversity into accounting decision-making. However, it is a challenge for accountants to develop professional skills relevant to environmental issues.

Biodiversity accounting faces several significant challenges, including limitations in measurement methodologies, gaps in reporting, and the integration of biodiversity into business strategies. To address these challenges, companies must improve transparency and monitoring actions, and develop professional skills relevant to environmental issues. Standards such as the revised GRI can help improve corporate accountability and transparency regarding biodiversity impacts (Houdet et al., 2020) .

5. Benefits of Biodiversity Accounting for Companies

Sustainability and Risk Management

The implementation of biodiversity accounting provides significant benefits for companies in managing environmental risks and ensuring long-term operational sustainability (Candraningsih & Bayangkara, 2024) . Here are some ways this implementation helps companies:

1. By measuring and reporting impacts on biodiversity, companies can identify environmental risks that may arise from their activities. This allows companies to take appropriate mitigation measures before the problem becomes bigger.
2. Biodiversity accounting helps companies understand the value of the natural resources they use. This allows companies to manage those resources more efficiently, reduce the risk of scarcity, and maintain the sustainability of their operations.
3. The application of biodiversity accounting facilitates compliance with increasingly stringent environmental regulations. Companies that proactively report their environmental impacts can avoid legal sanctions and improve their reputation in the eyes of the public.

Company Reputation Enhancement

Good biodiversity reporting and management can improve a company's image in several ways according to (Khasanah, 2021) :

1. Companies that demonstrate their commitment to biodiversity conservation through sustainability reporting attract investors who care about sustainability

issues. This can open up new funding opportunities and increase the company's value in the market.

2. Consumers today are increasingly aware of environmental issues and are more likely to choose products from socially responsible companies. By reporting on biodiversity conservation efforts, companies can meet consumer expectations and build brand loyalty.
3. Transparent disclosure of environmental impacts and conservation efforts can reduce the reputational risks associated with environmental damage. Companies with a positive image are better able to withstand public criticism and maintain good relationships with stakeholders.

Operational Efficiency and Innovation

Better biodiversity management can encourage innovation and improve company operational efficiency, according to (Widaryanti et al., 2022) :

1. By understanding the impact of their activities on biodiversity, companies can find new ways to manage resources more efficiently. This includes using new technologies or best practices in natural resource management.
2. Efficiency in resource use not only helps conserve biodiversity but can also reduce operational costs. For example, reducing waste and using energy more efficiently can result in significant cost savings for companies.
3. Companies that innovate in sustainability practices often gain a competitive advantage in the marketplace. By offering more environmentally friendly products or services, they can attract new consumers and maintain their market share.

Biodiversity accounting offers many benefits to companies, including environmental risk management, reputation enhancement, and operational efficiency and innovation. By implementing these accounting principles, companies not only contribute to environmental conservation but also ensure the long-term sustainability of their operations (Atkins & Macpherson, 2022) .

6. Case Studies and Best Practices in Biodiversity Management

Case Study of Biodiversity Management in Companies

Mount Ciremai National Park

Mount Ciremai National Park in Indonesia is an example of biodiversity management involving various stakeholders, including local governments and local communities. Research shows that despite conservation policies, conflicts between the government and communities often occur due to restrictions on access to natural resources. Policy implementation must be carried out fairly and equitably, involving local communities in resource management to reduce conflicts and increase conservation effectiveness (Diana et al., 2022) .

PT Pupuk Kaltim's Wanatirta Greening Park

Wanatirta Greening Park is a forest area managed by PT Pupuk Kaltim, which functions as a green open space, conservation area, and carbon storage. This park also plays an important role as an urban forest for the surrounding community. The company conducts a biodiversity inventory and uses the data to plan sustainable management strategies. This includes habitat restoration and more efficient resource management. (Kwatrina, 2018).

National Biodiversity Management Strategy

The National Strategy for Biodiversity Management of Indonesia aims to increase awareness and collective action in protecting biodiversity. This includes the development of legislation and coordination between sectors. An integrated approach to biodiversity management encourages collaboration between government, communities, and the private sector to achieve sustainability goals (Salim, 2023).

Successful Biodiversity Management Strategies

1. Habitat Restoration

Companies can implement habitat restoration programs to restore degraded ecosystems. This includes replanting native vegetation and rehabilitating damaged land.

2. Conservation Area Management

Developing sustainably managed conservation areas can help protect endangered species and critical habitats. This involves regular monitoring of ecosystem health and enforcement of laws against illegal activity.

3. More Sustainable Use of Resources

Companies can adopt more sustainable resource management practices, such as the use of environmentally friendly technologies in production, waste reduction, and energy efficiency.

4. Local Community Involvement

Involving local communities in biodiversity management can increase the effectiveness of conservation programs. Communities often have valuable traditional knowledge about local ecosystems.

5. Environmental Education and Awareness

Raising awareness about the importance of biodiversity through educational programs can help create public support for conservation initiatives.

Case studies of companies successfully managing biodiversity show that integration between government policies, community engagement, and best practices in resource management is essential. Strategies such as habitat restoration, conservation area management, and sustainable resource use can help companies not only protect biodiversity but also achieve their long-term sustainability goals (Rahman, 2022).

6. Recommendations for the Future

The Need for Better Standards

The importance of developing more consistent biodiversity accounting and reporting standards across industries and countries cannot be overstated (Soesanto, 2022b) . Some key points in this context are:

1. Developing better standards will help create consistency in biodiversity reporting, allowing companies to be more effectively compared. This is important for investors and stakeholders looking to assess companies' environmental performance.
2. Clear and measurable standards will increase corporate accountability for their environmental impact. It will also encourage companies to be more proactive in managing their impact on biodiversity.
3. With recognized international standards, companies in different countries can more easily adopt best practices in biodiversity reporting, thereby creating global alignment in conservation efforts.

Further Research in Biodiversity Accounting

There are several under-explored research areas in biodiversity accounting that need further attention (Candraningsih & Bayangkara, 2024) :

1. Research should focus on developing more accurate biodiversity impact measurement methodologies. This includes both quantitative and qualitative approaches that can provide a comprehensive picture of the impacts of corporate activities on ecosystems.
2. Conduct a comparative study on the effectiveness of different biodiversity reporting standards. This will help in understanding which ones are most effective in driving transparency and accountability among companies in different sectors.
3. Research needs to be conducted to evaluate the long-term impact of biodiversity disclosure on corporate value and reputation. This will provide valuable insights for companies in planning their sustainability strategies.

Driving Further Integration into Business Practices

Companies need to take concrete steps to integrate biodiversity into their long-term business strategies and financial reporting (Blanco-Zaitegi et al., 2022) :

1. Companies must develop clear internal policies related to biodiversity management. These policies must include objectives, responsibilities and concrete steps to minimize negative impacts on the environment.
2. Provide training to employees on the importance of biodiversity and how they can contribute to conservation efforts. This awareness is essential to creating a company culture that cares about the environment.

3. Companies should start integrating biodiversity-related information into their financial reports. This not only increases transparency but also demonstrates the company's commitment to sustainability to stakeholders.

Recommendations for the future of biodiversity accounting include the need for better standards, further research, and a push for integration of business practices. With these steps, companies can improve their social and environmental responsibility, and ensure the long-term sustainability of their operations (King et al., 2021) .

CONCLUSION

Biodiversity accounting plays a crucial role in helping companies manage their environmental impacts and contribute to global sustainability. The most effective approaches include the use of reporting standards such as the revised GRI, measurement methods such as Biodiversity Footprint Analysis and Natural Capital Accounting, and disclosure of biodiversity-related risks and opportunities in sustainability reports. However, key challenges include limitations in measurement methodologies, gaps in reporting due to the lack of uniform standards, and difficulties in integrating biodiversity into business strategy and decision-making.

To address these challenges, several policy and business practice recommendations need to be implemented. Regulators should encourage the development and adoption of more consistent and comprehensive reporting standards. Companies need to increase transparency by reporting impacts on biodiversity in detail, adopting risk management approaches that incorporate biodiversity considerations, and implementing training and awareness programs at all levels of the organization. Investment in research and development of more accurate measurement methodologies also needs to be increased.

By adopting best practices and successful management strategies, companies can not only protect biodiversity but also improve operational efficiency and innovation. Integrating biodiversity into strategic decisions and financial reporting will strengthen companies' commitment to long-term sustainability. Collaboration between companies, governments, and communities in biodiversity management needs to be strengthened to achieve sustainability goals. Thus, biodiversity accounting is not only an ethical obligation but also a strategic step to ensure business viability in the future.

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