

Cost To Value: Opportunities And Challenges Of Integrating Environmental Accounting In Financial Reporting In Kalimantan Wetlands

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Abstract

Wetlands are productive ecosystems and play a vital role in ecological, economic, and social functions. However, in South Kalimantan, wetlands face significant pressure from land conversion, mining, and oil palm plantations, posing challenges for recording and reporting environmental impacts. This study used a literature review method with content and thematic analysis of academic publications and official reports to assess the integration of environmental accounting into financial reporting. The findings indicate significant opportunities, such as improved accountability, corporate reputation, and cost reduction through resource efficiency, but also significant challenges, such as the lack of a standardized valuation methodology, limited physical and quantitative data, and the absence of a standard accounting framework for natural assets. The study results indicate a paradigm shift from a cost-based orientation to a value-based one, where ecosystems are recognized as economic assets through the application of Natural Capital Accounting (NCA). Key constraints include limited data, the absence of national standards, low human resource capacity, and weak institutional coordination. This study recommends developing national ecosystem valuation standards, strengthening human resource capacity, and implementing pilot projects to support the strategic use of environmental accounting in enhancing economic value, ecosystem sustainability, and long-term societal benefits.

Keywords – Cost and Value, Environmental Accounting, Wetlands

INTRODUCTION

Wetlands are among the most productive ecosystems and play a vital role in maintaining global environmental balance. These ecosystems not only provide ecological functions such as carbon storage, water absorption, and flood protection, but also possess significant economic and social value through the provision of biological resources and environmental services (Wang et al., 2021, pp. 3345–3354). However, in many areas, including South Kalimantan, the existence of wetlands is under serious pressure due to unsustainable economic activities such as land conversion, oil palm plantations, coal mining. (Mahfuzah & Maimunah, 2019), and infrastructure development that pays little attention to environmental carrying capacity.

This phenomenon poses new challenges for the world of accounting, particularly regarding how economic activities and their impacts on the environment can be accurately recorded and reported. Environmental accounting emerged as a response to the limitations of conventional accounting, which tends to focus solely on financial aspects. The goal is not only to record environmental costs but also to recognize and measure the economic value of ecosystem services provided by nature (Doka et al., 2022, pp. 528–541). In this context, the Kalimantan wetlands have great potential to become a model for implementing environmental accounting that integrates ecological values into the company's financial reporting system.

The paradigm shift from cost to value in environmental accounting represents a fundamental shift in how we view the relationship between economics and ecology. This new approach requires companies to go beyond simply disclosing their social responsibilities through sustainability reporting to also incorporate the value of environmental assets and ecosystem services into their financial statements (Chakraborty & Shanmugam, 2024). This concept is known as Natural Capital Accounting (NCA), where environmental assets such as wetlands, forests, and rivers are treated as “natural capital” that has economic value that can be measured and managed.

South Kalimantan is a province with a wetland area of more than 800 thousand hectares. (Kementerian Lingkungan Hidup dan Kehutanan, 2023) It is a strategic area for studying the integration of environmental accounting into financial reporting. Economic activities in

this region, such as coal mining, oil palm plantations, and swamp fisheries, put pressure on ecosystem functions.

However, most companies still consider environmental expenses as an additional cost (overhead) rather than a long-term value investment (Handajani et al., 2022). In fact, various studies show that the quality of comprehensive environmental and social reporting contributes positively to a company's reputation and competitive advantage in the market. (Ghuslan et al., 2021). This is reinforced by research (Rahmawati & Hamzah, 2025), which states that the urgency of environmentally-based reporting has implications for companies and policymakers to strengthen environmental governance and accounting practices, so that sustainability reporting becomes not only an administrative obligation but also a business strategy that supports competitiveness and the broader sustainable development agenda.

In a broader context, environmental accounting functions not only as a tool for recording ecological impacts but also as a governance instrument that supports sustainability-based decision-making and social responsibility. (E. Triyuwono et al., 2020). However, efforts to integrate environmental dimensions into financial reports still face structural and contextual obstacles (Gray, 2010, pp. 47–62), Such as limited ecosystem valuation data and the lack of standardized assessments for the economic value of natural resources. This situation demonstrates the need for an accounting model capable of representing ecological value more fairly and measurably, so that financial reporting can serve as a means of accountability to nature, society, and future generations. This research is important because it seeks to formulate an integrative approach to environmental accounting that is contextualized to the characteristics of Kalimantan's wetlands. This approach is expected to encourage a paradigm shift in companies from a cost orientation to the creation of environmental value, while simultaneously strengthening governance practices and the implementation of a green economy and sustainable finance in Indonesia.

RESEARCH METHODS

This research employed a literature review method. Literature was selected purposively based on its relevance to the Indonesian context and the Kalimantan wetlands, particularly on the topic of environmental accounting integration in financial reporting. The data used

were sourced from academic publications (I. Triyuwono, 2012) as well as reports from official institutions such as KLHK (2023), BPS (2024), and OJK (2023).

The inclusion criteria covered: (1) publications issued between 2010–2024; (2) relevance to environmental accounting or ecosystem valuation; (3) focus on Indonesia or the Kalimantan wetland context; and (4) full-text availability. Exclusion criteria included non-academic opinion pieces, sources lacking methodological clarity, and materials unrelated to financial reporting or ecosystem valuation. Screening proceeded through title, abstract, and full-text review.

Data collection techniques were conducted through literature and documentation searches using keywords such as environmental accounting, natural capital accounting, and wetland valuation. The collected references were then reviewed descriptively to map concepts, identify relevant practices, and explain opportunities and challenges in integrating environmental accounting into financial reporting.

Data were interpreted qualitatively through narrative comparison between academic insights and institutional data (source triangulation). The descriptive review resulted in a conceptual understanding of how environmental accounting is transitioning from a cost-based orientation toward a value-based approach to support green economy initiatives and sustainability in the Kalimantan wetlands.

RESULTS

A systematic search through the Scopus, Semantic Scholar, and Google Scholar databases for the period 2019–2025 using the keywords environmental accounting, Cost and Value, natural capital accounting, and wetland valuation in Indonesia yielded 33 articles, several of which met the inclusion criteria because they discussed the integration of environmental accounting in the context of natural resource economics and sustainability reporting in Indonesia.

Table 1.1 Analysis Linkage between Environmental Accounting and the SDGs

No	Research Title	Main Focus	Method Approach	Key Findings / Implications	Relation to Environmental Accounting	Related SDGs
1	A Natural Capital Accounting Framework to Communicate the natural capital values (land, water, biodiversity) into Business (2022) pp. 765–802)	Integrating natural capital (land, water, biodiversity) into business reports	Conceptual framework	Enhances transparency and adds value to eco-friendly products	Application of Natural Capital Accounting (NCA) in agriculture	SDG 12, SDG 15
2	True Cost Accounting Using LCA Methods and Data (Bellon et al., 2024)	Measuring true and environmental impacts of vegetable oils	Comparative LCA	Internalizes social and ecological costs into food policy	True Cost Accounting & Environmental Accounting integration	SDG 2, SDG 12, SDG 13
3	Ecosystem Accounting of Forests in Sustainable Environmental Management (“Ecosystem Accounting of Forests in Sustainable Environmental Management,” 2025)	Developing ecosystem accounting for forests	Conceptual–for theoretical	Basis for green economy and sustainability reporting	Ecosystem Service Accounting framework	SDG 13, SDG 15
4	Formation of Conceptual Foundations for Cost Accounting of Forest Ecosystem Services(Бахед Яцухно, 2024)	Environmental cost accounting for forest ecosystem services	Conceptual–analytical	Strengthens valuation of ecosystem services for economic policy	Environmental Cost Accounting	SDG 13, SDG 15
5	Recognising Capital on the Balance Sheet: Options for Utilities(Pelletier et al., 2023)	Natural Recognition of environmental assets in financial statements of water companies	Case study	Improves accountability and risk transparency	Integration of environmental assets into financial reporting	SDG 6, SDG 12
6	Exploration of Natural Capital on the Balance Sheet: A Case Study of a Water Utility Company (2025)	Natural Capital Applying NCA to a public water utility	Qualitative case study	Measures water resource value and ecosystem services	Natural Capital Accounting in financial statements	SDG 6, SDG 9, SDG 12
7	Economic Assessment of Ecosystem Services of the National Natural Capital (Economic Assessment of National Natural Capital, services 2023)	Economic evaluation of national ecosystem services	of Economic biophysical assessment	Provides foundation for green economic policies	Environmental Valuation Accounting	SDG 13, SDG 15
8	Cost Measurement of Ecosystem Services in Determining Damage from Pollution	Measuring ecological damage costs	Economic–ecological analysis	Supports green liability and environmental responsibility	Green Cost Accounting	SDG 13, SDG 16

No	Research Title	Main Focus	Method Approach	Key Findings / Implications	Relation to Environmental Accounting	Related SDGs
9	Global Pricing of ESG Criteria (Gregory et al., 2021)	Integrating ESG criteria in asset valuation	Quantitative model	ESG improves market value & sustainability performance	Sustainability Accounting & ESG Reporting	SDG 8, SDG 12, SDG 13
10	Risk Considerations in Investment of Geothermal Energy	Investment risk in geothermal projects	Multi-criteria risk analysis	Integrates environmental risk into investment decisions	Green Investment & Environmental Risk Accounting	SDG 7, SDG 13
11	Identifying Economic and Clean Strategies to Provide Electricity in Remote Rural Areas (Alqahtani & Patino-Echeverri, 2023)	Clean energy strategies for rural electrification	Optimization & Cost-Benefit Analysis	Internalizes environmental externalities into energy economics	Environmental Economic Accounting	SDG 7, SDG 9, SDG 13
12	Priorities of Methodological Principles of Accounting Sustainability (Kostyrko et al., 2021)	Integrating sustainability into management accounting (R. accounting)	Theoretical analysis	Supports green decision-making within organizations	Sustainability Management Accounting	SDG 8, SDG 12
13	Eurointegration Imperatives of Ukraine's Post-War Recovery	Green finance and post-war recovery	Policy finance analysis	Green & accounting as a tool for economic reconstruction	Environmental & Green Finance Accounting	SDG 9, SDG 16, SDG 17
14	Impact of EU Emissions Trading System on Enterprise Value	Effect of carbon policy on firm valuation	Econometric analysis	Carbon pricing affects financial performance	Carbon Accounting & Financial Impact Analysis	SDG 9, SDG 13
15	Coastal Territory and Coastal Zone: Urban Development and Management	Classification and management of coastal zones	Normative & policy analysis	Promotes ecosystem-based urban governance	Environmental Spatial Accounting	SDG 11, SDG 14
16	Techno-Economic Analysis and Biorefinery Systems (RCF)	Efficiency and emissions of biorefinery systems	TEA & Life Cycle Assessment	Promotes low-emission bioenergy and resource efficiency	Life Cycle Environmental Accounting	SDG 7, SDG 12, SDG 13
17	Environmental and Economic Assessment of Italian Energy Transition	Modeling national energy transition scenarios	Italy's energy LCA optimization	Identifies optimal decarbonization technologies	Environmental-Economic Integration Accounting	SDG 7, SDG 9, SDG 13
18	Restoration Prioritization Must Be Informed by Marginalized People (Fleischman et al., 2022)	Justice-oriented ecological restoration	Critical policy analysis	Integrates social justice into environmental metrics	Social-Environmental Accountability	SDG 10, SDG 13, SDG 15

No	Research Title	Main Focus	Method Approach	/ Key Findings / Implications	Relation to Environmental Accounting	Related SDGs
19	Economic and Integrating Environmental Marketing ecological values Space of the Experience in the experience Economy economy	Systemic conceptual model	Promotes green marketing through environmental value	Environmental Value Accounting	SDG 8, SDG 12, SDG 13	
20	Restoration Prioritization and Justice (Fleischman et al.)	Environmental and social justice in restoration projects	Critical synthesis	Highlights inclusion of local and indigenous communities	Environmental and Justice Accounting	SDG 10, SDG 13, SDG 15
21	Methodological Principles of Accounting Sustainability	Integrating socio-ecological values into management accounting	Theoretical analysis	Enhances ecological efficiency in organizations	Green Management Accounting	SDG 8, SDG 12
22	Valuing Development, Environment and Conservation	Multi-dimensional valuation of ecological development and nature	Social–of ecological analysis	Promotes inclusive wealth and natural capital integration	Inclusive Environmental Accounting	SDG 8, SDG 12, SDG 15
23	Innovative Ecological Approaches to Ensure Clean Water	Ecotechnological and hydrological water management	Ecohydrology & spatial monitoring	Ecosystem-based management of water resources	Ecosystem-Based Water Accounting	SDG 6, SDG 14
24	Global Conference on Aquaculture +20 (Shanghai Declaration) <i>(Shanghai Declaration Adopted at Global Aquaculture Conference GCA +20 - ICSF, n.d.)</i>	Global strategies for sustainable aquaculture	Policy & FAO report	Encourages eco-innovation and green performance metrics	Environmental Performance Accounting	SDG 2, SDG 12, SDG 14
25	Economics and Risk Management of Biofuel Production	Risk economic feasibility of biofuel projects	Comparative & econometric study	Promotes green investment and agricultural efficiency	Environmental & Energy Accounting	SDG 7, SDG 8, SDG 13
26	Conceptual Principles of Physical Macroeconomics for Sustainable Development	Linking physical–ecological principles to macroeconomics	Conceptual–systemic to model	Bridges energy, economy, and ecosystem systems	Physical Environmental Accounting	SDG 8, SDG 13
27	Methane Removal: Removing Methane from the Atmosphere	Methane removal technologies and policies	Integrated climate modeling	Supports carbon accounting and emission mitigation	Carbon Removal Accounting	SDG 13
28	Designing the Special Pilot Economic Zone on Peatlands (Budiman et al., 2020)	Green economic zones in peatland areas	Spatial–economic analysis	Combines conservation and local green economy	Ecosystem–Economic Accounting	SDG 8, SDG 13, SDG 15

Based on the analysis of 33 articles relevant to the theme of Green Accounting, 28 articles were found. The study of these 28 articles found that 24 articles, or approximately 85%, were directly related to the concept of environmental accounting and the Sustainable Development Goals (SDGs). A pattern consistent with these findings is evident, showing that environmental accounting is increasingly directed toward integrating ecosystem values into financial reporting systems through approaches such as natural capital accounting, ecosystem accounting, and true cost accounting, which generally focus on measuring, reporting, and disclosing environmental values in an economic and financial context. These findings indicate that environmental issues are increasingly being integrated into modern accounting disciplines as part of efforts to achieve sustainable development.

The underlying theme connecting all of this research is the integration of environmental values into accounting and financial reporting systems, at the company, sector, and national policy levels. This integration encourages transparency, accountability, and sustainability in economic decision-making. Thus, accounting no longer functions simply as a conventional financial reporting tool but also as an instrument for internalizing ecological and social impacts into more holistic economic processes. The interconnectedness of these themes is further clarified through the thematic analysis in Table 1.2, which shows the direction of development and depth of research methodology in the field of environmental accounting.

Table 1.2 Research Topic

No	Topic	Total
1	Natural Capital Accounting	7
2	True Cost Accounting	5
3	Ecosystem Accounting	9
4	Life Cycle Assessment	3
5	ESG Reporting	4
Total		28

(Source: Processed data, 2025)

The thematic analysis presented in Table 1.2 illustrates the direction of development and methodological depth of research in the field of environmental accounting. Of the 28 studies analyzed, Ecosystem Accounting dominates with 9 studies, reflecting the research focus on measuring ecosystem services and valuing natural capital as a basis for

formulating environmental and green economy policies. Meanwhile, Natural Capital Accounting ranks next with 7 studies, underscoring the urgency of recognizing the value of natural resources in the financial balance sheet and its role in strengthening sustainable corporate governance. The topic of True Cost Accounting emerged in five studies, demonstrating scientific efforts to assess social and ecological costs more comprehensively, allowing environmental impacts to be internalized into pricing systems and production policies. ESG Reporting and Life Cycle Assessment (LCA)—discussed in four and three studies, respectively—demonstrate a trend toward implementing practical approaches to measuring sustainability performance across various industrial and corporate sectors.

In general, the distribution of these themes indicates a convergence between theory and practice in environmental accounting. Research is no longer confined to the conceptual stage but has moved toward empirical application in the fields of energy, agriculture, and finance. The integration of these diverse topics demonstrates that contemporary accounting is evolving into a multidimensional reporting system that connects economic, environmental, and social aspects within a holistic sustainability framework. These developments demonstrate that environmental accounting research is not only becoming more applicable but also more advanced in addressing the challenges of global poverty. The convergence of theory and practice allows for more specific classifications related to the focus and contribution of each study, as illustrated in Table 1.3.

Table 1.3 Research Impact

No	Impact	Number of Paper	Research
1	Integration of environmental values in financial reporting	1, 2, 5, 6,10, 11, 12, 13, 15, 18, 20, 21, 23, 24, 26, 28	16
2	Green Economy Policies	3, 4, 7, 8, 16, 17, 19, 27	8
3	Investment Decision Making	9, 14, 21, 22, 23, 25	4
Total			28

(Source: Processed data, 2025)

Based on the analysis of 28 research articles in Table 1.3, three main focuses were identified that illustrate the direction of research development in environmental and sustainability accounting. First, 16 studies focused on the integration of environmental aspects into financial reports, demonstrating increasing attention to the recognition of natural assets and

the measurement of ecological value in corporate reporting systems. Second, eight studies focused on green economy policies, placing environmental accounting as the basis for formulating sustainable development strategies and clean energy transitions at the national and sectoral levels. Third, four studies examined investment decision-making by considering environmental risks and values, reflecting efforts to internalize ecological factors in project and asset valuations. These three main focuses indicate the direction of research toward environmental-economic-financial integration in the context of sustainable development. The dominant theme that emerged was the “from cost to value” paradigm, which emphasizes a shift in the function of accounting—from merely an economic measurement tool to an instrument for sustainability policy. This shift provides a foundation for strengthening environmental accountability and strategic decision-making oriented toward a balance between profitability, ecosystem sustainability, and social welfare.

The main contributions of these studies cover four important aspects. First, the recognition of natural capital as an asset with economic and ecological value in financial statements. Second, the measurement of environmental externality costs through approaches such as true cost accounting and environmental cost accounting, which aim to calculate the ecological impacts of economic activities. Third, the assessment of ecosystem services and environmental impacts through a life cycle assessment (LCA) approach to understand the link between production processes and ecosystem sustainability. Fourth, the integration of ESG (Environmental, Social, Governance) principles and sustainable management into accounting practices as a form of corporate responsibility for long-term sustainability.

Substantially, all of these studies contribute to the achievement of several key goals of the Sustainable Development Goals (SDGs). These include SDG 12 (Responsible Consumption and Production), which emphasizes the importance of sustainability reporting and responsible production; SDG 13 (Climate Action), which relates to mitigating and adapting to climate change through environmental reporting; SDG 15 (Life on Land), which highlights the valuation and conservation of terrestrial ecosystems; and SDG 16 (Life on Land). as well as SDG 7 (Clean Energy) and SDG 6 (Clean Water) which relate to the clean energy transition and sustainable management of water resources.

However, a number of critical challenges are also identified in the literature. Many studies indicate that environmental accounting practices still face obstacles, particularly the lack of standardized environmental accounting standards, the difficulty of valuing natural capital, and the gap between traditional financial accounting systems and the ecological realities on the ground. Nevertheless, the overall research trend points to a paradigm shift from “cost to value”—that is, a shift in accounting orientation from simply measuring economic costs to recognizing ecological and social value in financial statements. This shift marks the evolution of accounting toward a more inclusive system, reflecting not only economic well-being but also environmental sustainability and social balance as the foundation of sustainable development.

REPORTING RESEARCH RESULTS

OPPORTUNITIES

A literature review shows that the implementation of environmental accounting in Kalimantan's wetlands offers a strategic opportunity to strengthen corporate accountability and transparency. Environmental accounting enables reporting entities to measurably assess the ecological impacts of their economic activities, thereby supporting better social responsibility and governance (Triyuwono, 2012; Gray, 2010). This approach aligns with the sustainability disclosure principles stipulated in Financial Services Authority Regulation No. 51/POJK.03/2017, which encourages financial institutions and issuers to prepare sustainability reports. With more comprehensive disclosures, companies report not only their financial performance but also their contributions to ecosystem preservation, thereby increasing transparency and stakeholder trust.

In addition to increasing accountability, environmental accounting integration can also have a positive impact on company value and reputation. Handajani et al (2022) found a positive correlation between environmental disclosure and company market value, particularly in the energy and plantation sectors. This green reporting practice strengthens a company's image in the eyes of investors and the public and can serve as a differentiation strategy that increases competitiveness. Furthermore, the valuation of natural capital and the recognition of ecosystem services encourage companies to implement energy efficiency and resource circularity, which in turn lowers long-term costs and encourages green

technology innovation (Costanza et al., 2020). Thus, environmental accounting is not only a reporting tool, but also a strategic instrument to improve operational efficiency and long-term sustainability. The implementation of environmental accounting also supports the green economy agenda and national sustainable finance policies. The Financial Services Authority (OJK) at 2023, through its Sustainable Finance Roadmap Phase III (2023–2027), emphasized the importance of integrating environmental values into financial reporting to strengthen green investment and encourage environmentally friendly capital allocation. In the context of Kalimantan's wetlands, this approach enables companies and regulators to more systematically assess the ecological value of ecosystems, while integrating sustainability considerations into business decision-making and public policy.

However, the relevance of these theoretical perspectives becomes clearer when examined through concrete cases in Kalimantan's wetland-based industries. In the mining sector, coal concessions operating near peat ecosystems in South and East Kalimantan often fail to quantify water degradation, sedimentation, and peat subsidence because current accounting practices focus solely on reclamation costs rather than losses in ecosystem services (Gaveau et al., 2022; Sloan et al., 2018). Similar limitations appear in the palm oil industry, where companies on peat and mangrove margins rarely monetize biodiversity loss, peat oxidation, or greenhouse gas emissions, despite reporting compliance activities such as zero-burning or reforestation (Miettinen et al., 2017; Austin et al., 2018). In fisheries and aquaculture in the Mahakam Delta and Barito estuary, the economic value of declining fish stocks, mangrove conversion, and water pollution from shrimp ponds is likewise absent from financial reporting (Budianto et al., 2021; Sari & Suparmoko, 2017). These cases show that without a cost-to-value accounting framework, sustainability disclosures in Kalimantan's wetlands remain descriptive and fail to capture the true ecological impacts

CHALLENGE

While integrating environmental accounting into Kalimantan's wetlands offers strategic opportunities, its implementation still faces significant challenges. One major obstacle is limited ecosystem valuation data and methods. The lack of accurate spatial data and comprehensive economic information related to wetland ecosystem services hinders the quantification of ecological value in financial reports. This creates a gap between the actual economic value generated by the ecosystem and existing accounting records, thus not fully

reflecting the potential environmental contribution to company performance. (KLHK, 2023).

Furthermore, Indonesia does not yet have a national environmental accounting standard. Unlike international protocols such as the IFAC Natural Capital Protocol or ISO 14007, local guidelines governing the assessment of environmental costs and values are still very limited (Gray, 2010). As a result, companies tend to develop their own approaches, making environmental accounting practices diverse and difficult to compare. This lack of standards also limits regulators' ability to assess the quality and consistency of sustainability reports across companies.

Low human resource capacity and managerial awareness are also significant barriers. Most business entities lack accountants competent in environmental valuation and sustainability reporting. Rahmawati dan Hamzah's (2025) research emphasizes that education, training, and managerial capacity building are essential for effective environmental accounting integration. Without adequate awareness and understanding, companies tend to view environmental expenditures as mere additional costs, rather than long-term investments.

In addition to internal factors, regulatory and institutional constraints also hamper implementation. Coordination between institutions such as the Ministry of Environment and Forestry, the Financial Services Authority (OJK), and the Ministry of Finance remains suboptimal, resulting in policies related to environmental accounting not being fully integrated into the national accounting system or public financial reporting. This results in a weak legal and policy framework supporting ecological value reporting, leaving companies facing uncertainty in implementing environmental accounting practices. (Triyuwono, 2012). Thus, while the opportunities for environmental accounting integration are substantial, successful implementation requires addressing structural, technical, and institutional barriers, ranging from strengthening data and valuation methods, developing national environmental accounting standards, enhancing human resource capacity, and enhancing regulatory coordination. This holistic approach is necessary to ensure that environmental accounting becomes not merely an administrative formality but also a strategic instrument for enhancing ecosystem sustainability and corporate economic value.

DISCUSSIONS

Based on this analysis, it is known that there has been a paradigm shift in environmental accounting from a cost-based orientation to a value-based one. Traditionally, companies tended to treat environmental expenditures as additional costs that did not directly contribute to economic performance. However, modern approaches emphasize that ecosystems are valuable economic assets that must be managed sustainably and reported with principles of accountability and transparency. In the context of Kalimantan's wetlands, which cover an area of over 1.19 million hectares and provide important ecological functions such as carbon storage, flood mitigation, and biodiversity conservation (KLHK, 2023), the application of Natural Capital Accounting (NCA) is a strategic instrument for quantitatively assessing the economic and ecological contributions of ecosystems.

Integrating NCA with conventional financial reporting systems enables companies and local governments to internalize the value of ecosystem services, including estimates of carbon storage and biodiversity, into investment decision-making and development planning. This aligns with the national mission of the 2030 Sustainable Development Goals (SDGs), particularly the goals related to life in freshwater and marine ecosystems (SDGs 6, 14, and 15), as well as the green economy agenda that emphasizes the sustainable use of natural resources. Secondary data shows that the South Kalimantan region is experiencing significant ecological pressure due to land conversion for oil palm plantations and mining, so recognizing the economic value of ecosystems through NCA can provide incentives for companies to implement more sustainable management practices (Rahmawati & Hamzah, 2025).

One of the substantial challenges in implementing Cost to Value is the limited national standards for ecosystem service valuation, so that each company or institution often adopts a different methodology, which makes it difficult to compare and harmonize reports (Gray, 2010). Furthermore, human resource capacity in environmental accounting is relatively low, resulting in a limited understanding of natural capital measurement and NCA-based reporting. This situation highlights the need for systematic interventions such as developing national ecosystem valuation standards, increasing human resource capacity, and implementing a pilot project in the wetlands of South Kalimantan to demonstrate the operational effectiveness of NCA practices.

The results indicate that key opportunities include improved accountability and reputation, cost efficiency, and the potential for natural asset recognition, which could open access to green finance (Setiawati & Sisdianto, 2024; Dewi et al., 2024). Key challenges include limited monetization methodologies, data availability, and the lack of accounting standards that accommodate natural assets. In the context of Kalimantan's wetlands, unique ecological characteristics such as carbon storage and hydrological complexity present particular challenges in valuation and reporting.

Critically, the paradigm shift from cost to value requires more than just a change in reporting format; it demands a fundamental transformation in managerial culture and economic decision-making. Without integrating environmental values into business strategies and public policies, companies may continue to face the risk of undervaluation of natural assets, long-term losses, and a diminished reputation in a market that increasingly demands sustainable practices. Therefore, implementing NCA in Kalimantan's wetlands is not only ecologically relevant but also economically strategic, as it can enhance regional competitiveness through the responsible and sustainable use of natural capital (Chakraborty & Shanmugam, 2024; Costanza et al., 2020). Integrating environmental accounting into the financial reporting of Kalimantan's wetlands holds significant potential to balance economic value and ecosystem sustainability. However, limitations in methodology, data, and regulations are key obstacles. This requires the development of national standards, a pilot project for natural capital accounting in Kalimantan, and increased human resource capacity in green accounting.

CONCLUSION

An analysis of 28 relevant articles indicates that approximately 85% are directly related to environmental accounting and the Sustainable Development Goals (SDGs), highlighting a strong trend toward integrating environmental values into accounting and financial reporting systems. These studies emphasize a paradigm shift from a cost-based orientation to a value-based approach, recognizing natural capital, ecosystem services, and environmental externalities as significant economic assets, thereby supporting transparency, accountability, and sustainable decision-making at corporate, sectoral, and national levels. In the context of the wetlands of Kalimantan, which perform critical ecological functions such as carbon storage, biodiversity conservation, and flood

mitigation, the application of Natural Capital Accounting (NCA) provides a strategic framework for measuring both the economic and ecological contributions of ecosystems. By incorporating ecosystem services into financial reporting, companies and local governments can internalize environmental values in investment and development planning, aligning with the SDGs, particularly SDG 6 (Clean Water and Sanitation), SDG 7 (Affordable and Clean Energy), SDG 13 (Climate Action), SDG 14 (Life Below Water), and SDG 15 (Life on Land).

The main opportunities presented by integrating environmental accounting include enhanced corporate accountability, improved reputation, cost efficiency, and access to green financing. However, significant challenges remain, including the lack of standardized valuation methods, limited data availability, low human resource capacity, and suboptimal regulatory and institutional coordination. Therefore, the development of national ecosystem valuation standards, capacity building for human resources, the implementation of pilot projects, and strengthened inter-institutional coordination are essential steps to ensure that environmental accounting evolves beyond administrative formalities into a strategic tool that maximizes economic value while maintaining ecosystem sustainability. With proper implementation, environmental accounting in the Kalimantan wetlands not only strengthens sustainability disclosure but also provides an economically and ecologically strategic pathway for responsible ecosystem management, supporting long-term regional competitiveness and the achievement of sustainable development goals at both national and global levels.

Despite the growing scholarly emphasis on Natural Capital Accounting (NCA), several limitations warrant careful consideration, including literature bias toward conceptual analyses, the paucity of empirical data on peatland and riparian ecosystems in South Kalimantan, and the constrained precision of commonly used valuation methods in representing complex ecological processes. These constraints necessitate a cautious interpretation of NCA's effectiveness and underscore the need for stronger empirical validation. To enhance its practical relevance, key interventions include establishing a provincial wetland data repository, institutionalizing periodic ecological monitoring, promoting collaborative valuation research with local academic institutions, piloting NCA-based planning initiatives at the district level, and strengthening cross-agency coordination

and technical capacity. Such measures provide a more robust foundation for evidence-based wetland governance and reinforce the credibility of ecosystem valuation within regional sustainability planning.

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