Integrating Environmental Accounting into Small Coastal Fisheries: A Review

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Abstract

This study reviews and synthesizes existing research on the integration of environmental accounting in small coastal fisheries. Using an article review approach, it analyzes peer reviewed literature published between 2015 and 2024 to identify thematic patterns, methodological developments, and research gaps related to sustainability accounting in small scale marine enterprises. The findings show that environmental accounting enhances transparency, operational efficiency, and environmental responsibility in coastal fisheries. Three dominant themes are identified: first, the role of environmental accounting in supporting sustainable resource management; second, institutional, financial, and technical barriers that hinder implementation; and third, the contribution of accounting practices to the blue economy and community based sustainability. Despite these potential benefits, empirical applications remain limited, particularly regarding the adaptation of accounting models to the socio ecological characteristics of coastal communities. Many existing frameworks overlook local knowledge, environmental variability, and governance challenges that strongly influence fisheries management practices. This study contributes by consolidating fragmented evidence from environmental science, accounting, and fisheries management, and by proposing a conceptual linkage between environmental accounting, resource governance, and community welfare. Overall, the review emphasizes the need for further empirical research to develop context sensitive accounting tools supporting sustainable marine resource management and blue economy development globally.

1. Introduction

Coastal and small-scale fisheries represent one of the most vital yet vulnerable sectors in the global economy (Cánovas-Molina & García-Frapolli, 2022; Islam & Chuenpagdee, 2022). They contribute significantly to food security, poverty reduction, and the livelihoods of millions of coastal communities worldwide (Canty & Deichmann, 2022; March & Failler, 2022). However, increasing environmental degradation, overfishing, and climate-induced changes in marine ecosystems have created serious threats to the long-term sustainability of these fisheries (Islam et al., 2020; Lam et al., 2020). In many developing countries, small-scale fishers often depend on natural resources as their primary asset, yet they operate within fragile ecosystems that are increasingly affected by both human and ecological pressures (Islam & Chuenpagdee, 2022; Kurien, 2007). These conditions highlight the urgent need for an integrated approach to resource management one that combines economic accountability with environmental stewardship.

Traditional accounting systems used in the fisheries sector focus primarily on financial transactions, costs, and market outputs, often ignoring environmental impacts such as resource depletion, habitat destruction, and pollution (Laugen et al., 2014). This conventional approach has led to an incomplete understanding of the true economic value of marine ecosystems. Environmental accounting emerges as a strategic tool to bridge this gap by quantifying the environmental costs and benefits associated with fishing activities (Buonocore et al., 2020). It integrates ecological variables such as natural capital, resource depletion rates, and environmental restoration costs into financial reporting and decision-making processes (Bateman & Mace, 2020). Through this integration, small coastal fisheries can better assess their ecological footprints, optimize resource use, and ensure the long-term sustainability of both their operations and surrounding ecosystems.

In recent years, the global policy landscape has shifted toward sustainability-oriented frameworks, such as the United Nations Sustainable Development Goals (SDGs) and the Blue Economy initiative, both of which emphasize the sustainable use of ocean resources and improved environmental governance (Leal Filho et al., 2023; Pace et al., 2023). Within this context, environmental accounting provides a practical mechanism to operationalize these objectives by offering policymakers, local governments, and fishing cooperatives data-driven insights for balancing economic gains and environmental conservation (Ghosh, 2024; Kruk et al., 2024). However, the adoption of environmental accounting in small-scale fisheries remains limited due to financial constraints, insufficient institutional capacity, and the lack of standardized tools adapted to the local context (Hamilton et al., 2021; Penca et al., 2021). Moreover, most existing studies on environmental accounting have focused on industrial sectors such as manufacturing, agriculture, and energy, while research specific to small-scale fisheries is still scarce (González-Cancelas et al., 2025). This research gap limits the development of comprehensive sustainability models that integrate ecological, social, and economic dimensions in coastal resource management. To address these limitations, this article employs a review article approach to synthesize existing studies on environmental accounting integration within small-scale fisheries. The review identifies key frameworks and best practices, as well as barriers that hinder implementation.

The contribution of this study is threefold: first, it consolidates fragmented literature across accounting, environmental science, and fisheries management into a unified analytical perspective for small coastal fisheries; second, it identifies major research gaps, including the limited contextual adaptation of environmental accounting models, the absence of standardized reporting mechanisms linking ecological and financial indicators, and the weak alignment between accounting practices and local policy frameworks; and third, it proposes actionable insights for integrating environmental accounting into fisheries governance through community-based monitoring, digital innovations, and capacity-building initiatives. The expected outcome of this review is to provide an evidence-based understanding of how environmental accounting can strengthen sustainability and transparency in small-scale fisheries, while guiding policymakers and researchers in designing context-specific frameworks that align environmental conservation with economic accountability. Ultimately, this study aims to establish environmental accounting as both a decision-support tool and a policy instrument, contributing to sustainable coastal livelihoods and ecological resilience in the era of blue and green economic transformation.

2. Research Methods

This study employs a descriptive qualitative approach using an article review method to identify, evaluate, and synthesize relevant literature on the integration of environmental accounting into small coastal fisheries. This method enables an in-depth analysis of research trends, ecosystem-based accounting practices, and policy frameworks that support sustainable fisheries management across coastal regions.

The research process was carried out through three main stages. First, the identification stage involved reviewing scientific publications, policy reports, and international documents sourced from databases such as Scopus, ScienceDirect, and Google Scholar, as well as institutional reports from FAO (2020–2022), UN SEEA (2021), OECD (2020), and the World Bank (2021–2023). Literature published between 2010 and 2025 was selected to capture recent developments in environmental accounting for small-scale coastal fisheries.

Second, the thematic classification stage organized the literature into major themes: (a) ecological accounting and natural capital assessment, (b) environmental cost accounting and eco-efficiency, (c) community participation and social accountability, and (d) institutional governance, policy integration, and regulatory compliance. Third, the analysis and synthesis stage used comparative thematic synthesis to identify patterns, challenges, and research gaps. Triangulation was applied by cross-checking findings from multiple sources to strengthen validity and reliability. To clarify the relevance of each literature source, a table summarizing key references and their contributions was compiled.

Table 1. Expanded Key References Relevant to Environmental Accounting in Small Coastal Fisheries

Source	Year	Contribution to the Study
UN SEEA. Ecosystem Accounting Framework	2021	Provides the conceptual basis for ecological and natural capital accounting.
FAO. Small-Scale Fisheries Guidelines	2020	Offers indicators on sustainability, habitat condition, and community-based management.
FAO. State of World Fisheries and Aquaculture	2022	Supplies data on biodiversity, fish stock levels, and ecosystem health.
OECD. Fisheries Sustainability Review	2020	Provides governance insights and environmental cost indicators.
World Bank. Blue Economy Indicators	2021	Highlights institutional and ecological indicators for coastal regions.
World Bank. Natural Capital Accounting for Coastal Resources	2022	Provides guidance on natural capital valuation in fisheries.
Pomeroy & Berkes. Community-Based Fisheries Management	2014	Explains social accountability and participatory governance.
Jentoft & Chuenpagdee. Interactive Governance	2015	Provides institutional theory and governance frameworks.
Schaltegger & Burritt. Environmental Accounting	2017	Offers environmental cost accounting and eco-efficiency tools.
Garcia & Cochrane. Ecosystem Approach to Fisheries	2005	Provides ecological assessment frameworks for fisheries.
Ostrom. Governing the Commons	1990	Provides theory for collective action and compliance mechanisms.
UNEP. Blue Economy Policy Framework	2020	Provides policy approaches for sustainable coastal development.
Allison & Ellis. Livelihoods in Fisheries	2001	Offers social sustainability concepts in fishing communities.
Bjørndal & Munro. Fisheries Economics	2012	Provides cost-efficiency and resource use economic models.
Cinner et al. Social-Ecological Systems in Fisheries	2016	Explains socio-ecological interactions relevant to accounting indicators.
FAO. Coastal Habitat Monitoring Toolkit	2021	Offers standardized ecological monitoring indicators.
UNDP. Coastal Resilience Framework	2019	Provides institutional capacity and resilience assessment tools.

Charles. Sustainable Fisheries Systems	2001	Provides multidimensional sustainability assessment models.
Pikitch et al. Ecosystem-Based Fisheries Management	2004	Provides ecological and institutional indicators for monitoring.
Tallis et al. Natural Capital Indicators	2012	Offers ecosystem valuation and natural capital measurement approaches.

3. Result and Discussion

3.1. The Role of Environmental Accounting in Coastal Resource Management

Environmental accounting plays a pivotal role in improving the sustainability, transparency, and decision-making processes within small coastal fisheries (Sundarasen et al., 2024). In essence, it serves as a bridge between environmental conservation and economic management by quantifying the ecological, social, and financial impacts of fishing activities (Farmery et al., 2014; Sundarasen et al., 2024). Through this approach, fisheries can better evaluate how their operations influence marine ecosystems while also identifying the true cost of resource extraction and environmental degradation. This comprehensive assessment enables stakeholders such as local governments, cooperatives, and community-based organizations to implement more sustainable policies for resource use and ecosystem preservation.

In the context of small-scale coastal fisheries, environmental accounting supports the integration of ecological indicators into financial systems, a process often referred to as natural capital accounting (Cardona et al., 2023). This framework enables the measurement of environmental costs (such as pollution, biodiversity loss, and resource depletion) and environmental benefits (such as habitat restoration or carbon sequestration). By internalizing these externalities, fisheries can generate a more accurate picture of their operational sustainability (Asche et al., 2022). For example, accounting for energy consumption, waste management, and water usage provides valuable insights into the efficiency of fishing operations and their alignment with sustainable development principles.

Moreover, environmental accounting helps strengthen environmental cost assessment, which quantifies expenditures related to conservation, rehabilitation, and ecological damage mitigation (Buonocore et al., 2014). This approach supports decision-makers in designing cost-effective strategies for sustainable fishing practices, such as investment in eco-friendly gear, waste reduction systems, and renewable energy technologies. In addition, it facilitates compliance with international sustainability frameworks, including the Sustainable Development Goals (SDGs) particularly SDG 12 (Responsible Consumption and Production) and SDG 14 (Life Below Water) (Bengtsson et al., 2018).

From a managerial perspective, the adoption of environmental accounting encourages accountability and fosters participatory governance within local fishing communities (Ghosh & Wolf, 2021). When properly implemented, it not only enhances transparency in financial reporting but also empowers fishers to actively engage in environmental stewardship. Integrating environmental data into financial records helps communities understand the trade-offs between short-term profits and long-term ecological health. This is particularly important in small-scale fisheries where natural resources function as both economic and social assets.

In summary, environmental accounting is not merely a reporting mechanism but a transformative management tool that aligns economic growth with ecological preservation. By incorporating environmental cost analysis and natural capital valuation into decision-making, small coastal fisheries can achieve a balance between productivity, equity, and sustainability. The next sections will explore specific frameworks and models that operationalize these principles and illustrate how environmental accounting has been applied in various coastal contexts around the world.

The framework presented in Table 1 provides a comprehensive overview of how environmental accounting can be systematically integrated into small coastal fisheries management. It outlines four key dimensions—ecological, economic, social, and institutional—that collectively represent the holistic scope of sustainable

fisheries governance. Each dimension includes specific components, measurable indicators, and expected outcomes that demonstrate how accounting practices can capture both financial and environmental performance. This framework serves as a conceptual foundation for assessing the role of environmental accounting in enhancing transparency, accountability, and sustainability in coastal resource management systems.

Table 2. Framework of Environmental Accounting in Small Coastal Fisheries

Dimension	**Key Components**	**Indicators / Measures**	**Expected Outcomes**
Ecological Dimension	Natural capital accounting; resource use monitoring	Fish stock levels, habitat condition, water quality, biodiversity index	Sustainable ecosystem management; reduced overfishing
Economic Dimension	Environmental cost accounting; eco-efficiency analysis	Resource depletion cost, pollution abatement cost, waste management efficiency	Balanced profitability and ecological sustainability
Social Dimension	Community participation; social accountability	Fisher income equity, employment, social awareness on sustainability	Improved livelihoods and community resilience
Institutional Dimension	Policy integration; governance transparency	Compliance with sustainability regulations, local monitoring systems	Strengthened institutional capacity and accountability

Source: (United Nation, 2024; World Bank, 2021)

Table 2 illustrates a comprehensive framework that highlights the multi-dimensional application of environmental accounting within the context of small coastal fisheries. The framework integrates four essential dimensions—ecological, economic, social, and institutional—each contributing to the broader goal of achieving sustainable resource management and environmental accountability in coastal regions.

The ecological dimension focuses on incorporating natural capital accounting and resource-use monitoring into fisheries operations. Through indicators such as fish stock levels, water quality, habitat condition, and biodiversity indices, this dimension enables fishers and policymakers to evaluate the environmental health of marine ecosystems. By internalizing ecological data into financial decision-making, fisheries can track their environmental performance and adopt conservation-oriented strategies, thereby minimizing the risks of overfishing and resource depletion.

The economic dimension emphasizes environmental cost accounting and eco-efficiency analysis. It measures the financial implications of resource depletion, pollution control, and waste management practices. This approach allows fisheries to identify hidden environmental costs, optimize production efficiency, and align profitability with ecological sustainability. For instance, by calculating pollution abatement costs or waste management efficiency, fisheries can design more cost-effective and environmentally responsible operations.
The social dimension addresses community participation and social accountability, which are critical for ensuring inclusive and equitable fisheries management. Indicators such as income distribution, employment levels, and public awareness of sustainability reflect the social outcomes of environmental accounting practices. By involving local communities in decision-making and reporting processes, fisheries can strengthen collective stewardship and build social capital, which enhances long-term resilience.
Lastly, the institutional dimension links environmental accounting to governance and policy integration. It evaluates the degree of compliance with sustainability regulations, the transparency of reporting systems, and the effectiveness of local monitoring mechanisms. This dimension underscores the role of institutional capacity in ensuring that environmental accounting is embedded in policy frameworks and decision-making structures, fostering accountability and multi-stakeholder collaboration.

Overall, the framework demonstrates that environmental accounting extends beyond financial reporting—it acts as a strategic management and policy instrument for balancing ecological protection, economic viability, and social well-being. By adopting this multidimensional approach, small coastal fisheries can transition toward sustainable and transparent operations, contributing to global objectives such as the Blue Economy and the UN Sustainable Development Goals (SDGs).

3.2. Frameworks and Models Applied in Small Coastal Fisheries

The implementation of environmental accounting frameworks in small coastal fisheries provides a structured approach for integrating ecological, social, and economic factors into decision-making (De Valck et al., 2023). These frameworks serve as analytical and policy tools that translate environmental data into measurable financial and sustainability indicators. Two of the most widely referenced models in the literature are the System of Environmental-Economic Accounting (SEEA) developed by the United Nations and the Triple Bottom Line (TBL) Framework introduced by Elkington (1997). Both frameworks aim to align environmental responsibility with economic performance, but they differ in scope, methodology, and application within the fisheries context.

The SEEA model offers a standardized accounting structure that connects environmental and economic data through satellite accounts (Edens et al., 2022). It quantifies ecosystem services, resource extraction, and environmental expenditures, allowing policymakers and fisheries managers to monitor how economic activities impact natural capital. In small-scale fisheries, SEEA facilitates the valuation of marine assets such as fish stocks, mangrove forests, and coastal habitats, helping local authorities design resource-use policies based on ecological thresholds (Pomeroy et al., 2019). This system also supports evidence-based reporting aligned with international sustainability standards, including the UN Sustainable Development Goals (SDGs) 12, 13, and 14.

On the other hand, the Triple Bottom Line (TBL) Framework provides a more flexible, community-oriented approach. It emphasizes three interrelated dimensions People, Planet, and Profit to evaluate sustainability holistically. The TBL approach helps small coastal fisheries assess not only financial performance but also social equity and environmental stewardship. By embedding these principles into management practices, fisheries cooperatives can enhance stakeholder trust, improve accountability, and balance short-term economic goals with long-term environmental sustainability.

While both models promote sustainable accounting, their applicability depends on institutional capacity, data availability, and community involvement. SEEA is more suitable for policy-driven and data-intensive contexts, while TBL aligns better with local-level fisheries that rely on participatory management and social reporting. A comparative summary of these frameworks is presented in Table 3 below.

Table 3. Comparison of Environmental Accounting Frameworks in Small Coastal Fisheries

Aspect	**SEEA (System of Environmental-Economic Accounting)**	**TBL (Triple Bottom Line Framework)**
Developer / Origin	United Nations Statistical Commission (UNSC), 2012	John Elkington, 1997
Main Focus	Integration of environmental and economic data into national accounts	Balancing economic, social, and environmental performance
Scope of Application	National or regional-level policy and economic planning	Local and community-level resource management
Core Components	Ecosystem accounts, resource use, pollution expenditure, and natural capital valuation	Social equity, environmental protection, and economic viability (People, Planet, Profit)
Data Requirement	Quantitative and statistical (requires high data accuracy)	Qualitative and participatory (community-based data collection)
Advantages	Standardized, globally recognized, supports policy alignment	Flexible, adaptable to small fisheries, promotes local participation
Limitations	Complex data integration; requires institutional capacity	Lacks formal standardization; subjective interpretations possible
Typical Use in Fisheries	Ecosystem valuation, resource management, sustainability indicators	Social impact assessment, cooperative reporting, and local governance evaluation

Source: (The World Bank, 2022; United Nation, 2012)

Table 3 provides a comparative overview of two major environmental accounting frameworks SEEA (System of Environmental-Economic Accounting) and the Triple Bottom Line (TBL) Framework that have been applied or adapted within the context of small coastal fisheries. The table highlights how each framework differs in its conceptual foundation, scope, methodological approach, and practical application, yet both share a common objective: integrating environmental, social, and economic considerations into sustainable fisheries management.

The SEEA framework, developed by the United Nations Statistical Commission (UNSC) in 2012, represents a macroeconomic and policy-oriented system that links environmental and economic data through standardized satellite accounts. It captures how economic activities influence environmental assets, such as fish stocks, mangrove ecosystems, and water quality, by quantifying natural capital and ecosystem services. SEEA enables national or regional authorities to incorporate ecological data into their economic planning, allowing for the evaluation of sustainability indicators like resource depletion costs and ecosystem restoration value. In small coastal fisheries, the SEEA framework supports long-term monitoring, resource valuation, and policy alignment with international sustainability goals such as the UN SDGs 12, 13, and 14. However, its application is often constrained by data limitations, technical complexity, and institutional capacity requirements, particularly in developing coastal regions.

Conversely, the Triple Bottom Line (TBL) Framework, introduced by John Elkington (1997), provides a micro-level, community-centered approach to sustainability. TBL emphasizes the balance between People, Planet, and Profit, focusing on the social equity, environmental protection, and economic viability of fisheries operations. Unlike SEEA, which relies heavily on quantitative and statistical data, the TBL framework allows for participatory and qualitative assessment methods, making it more adaptable for small-scale and community-based fisheries. It promotes social accountability, stakeholder participation, and local governance evaluation factors essential to the success of sustainability initiatives in resource-dependent communities. Nonetheless, its flexibility can also lead to inconsistencies in data reporting and difficulties in establishing standardized performance benchmarks.

In summary, Table 2 illustrates that both frameworks play complementary roles in supporting environmental accounting practices in small coastal fisheries. The SEEA model provides the structure and precision required for national policy integration, while the TBL model offers the inclusivity and flexibility necessary for community-level application. Combining both approaches can create a hybrid model that captures the strengths of data-driven policy analysis and participatory environmental governance, leading to a more holistic and resilient framework for sustainable fisheries management.

3.3. Challenges and Barriers to Implementation

The implementation of environmental accounting in small coastal fisheries faces multiple structural, technical, and socio-institutional challenges that limit its widespread adoption and effectiveness (Calliari et al., 2019; Peng et al., 2020). While the concept has proven successful in corporate and industrial contexts, its application in small-scale fisheries particularly in developing coastal regions remains constrained by limited resources, low institutional capacity, and inadequate policy support. These barriers not only affect the quality of data collection and financial reporting but also hinder the integration of environmental considerations into day-to-day decision-making.

One of the most significant challenges is resource limitation, which encompasses financial, technological, and human capital constraints (Marginson, 2019). Most small coastal fisheries operate with minimal funding and outdated technology, making it difficult to implement digital or data-driven environmental accounting systems. The absence of consistent funding mechanisms prevents investment in monitoring tools, environmental auditing, or data management systems necessary to quantify ecological costs and benefits. Furthermore, limited technical expertise among local fishers and cooperatives often leads to incomplete or inaccurate environmental data, reducing the reliability of accounting reports.

Another major barrier lies in the lack of knowledge and awareness about green accounting practices (van Der Poll, 2022). Many fishers and local administrators are unfamiliar with the concepts of environmental cost, natural capital valuation, or ecosystem service accounting. This knowledge gap results in a low level of adoption, as environmental accounting is often perceived as a complex and non-essential addition to traditional bookkeeping. Training and capacity-building initiatives remain scarce, and academic engagement with local

fisheries institutions is limited, further widening the gap between theoretical frameworks and practical implementation.

Institutional and governance-related barriers also pose serious obstacles. In many coastal areas, institutional resistance arises from rigid bureaucratic structures, lack of inter-agency coordination, and insufficient regulatory frameworks supporting environmental accounting. Traditional management systems often prioritize short-term economic gains over long-term sustainability, leading to policy inertia and reluctance to adopt new accounting practices. Additionally, community-based fisheries organizations may lack clear mandates or legal frameworks that require environmental disclosure, which limits accountability and transparency.

Lastly, cultural and behavioral factors also contribute to the slow adoption of environmental accounting. Many traditional fishing communities operate based on inherited practices and informal record-keeping methods that emphasize immediate economic survival. Introducing environmental cost tracking or sustainability metrics can be seen as foreign or impractical, especially when short-term livelihood pressures are high. Overcoming these cultural barriers requires participatory approaches that combine environmental education, economic incentives, and community empowerment.

In summary, the successful implementation of environmental accounting in small coastal fisheries depends on addressing a combination of financial, technical, educational, and institutional barriers. Strengthening stakeholder collaboration, improving access to technology, and enhancing local capacity through training and participatory policy development are essential steps toward overcoming these challenges. Only through such integrated efforts can environmental accounting become a viable and transformative tool for sustainable fisheries management and coastal ecosystem preservation.

Table 3 presents a summary of the primary challenges encountered in implementing environmental accounting within small coastal fisheries, along with potential strategies to overcome them. The table categorizes these challenges into four dimensions—financial, technical, institutional, and socio-cultural—illustrating how each barrier affects the adoption process and the corresponding strategic measures that can be applied to enhance implementation effectiveness.

Table 4. Key Barriers and Strategic Solutions for Implementing Environmental Accounting in Small-Scale Fisheries

Challenge Dimension	Key Barriers Identified	Proposed Strategies for Implementation
Financial	Limited funding for environmental monitoring, accounting systems, and sustainability reporting initiatives.	Introduce micro-financing and community-based funding mechanisms; integrate environmental cost accounting into cooperative budgets.
Technical	Lack of technology, expertise, and standardized environmental accounting tools adapted to small-scale fisheries.	Develop simplified digital platforms for environmental data collection; conduct training and technical workshops for local stakeholders.
Institutional	Weak governance structures, unclear policy mandates, and limited regulatory support for environmental accounting adoption.	Strengthen institutional frameworks through policy harmonization; establish legal requirements for environmental reporting.
Socio-Cultural	Resistance to change, lack of awareness about sustainability, and dependence on traditional management practices.	Promote environmental education programs; enhance participation and awareness through local leadership and cooperative engagement.

Source: (FAO, 2022; SEEA, 2021; The World Bank, 2022)

Table 3 highlights that financial and technical challenges are among the most immediate constraints, while institutional and socio-cultural barriers require long-term strategic interventions. Financial limitations can be

mitigated through innovative funding and integration into cooperative systems, while technical barriers demand targeted training and technological adaptation. Institutional reform and policy alignment are essential to ensure that environmental accounting becomes part of governance mechanisms. Moreover, addressing socio-cultural resistance through education and participatory engagement can foster behavioral change and strengthen community ownership of sustainability initiatives. Together, these strategies form a comprehensive pathway for enabling effective implementation of environmental accounting in small coastal fisheries.

3.4. Research Gaps and Future Directions

The systematic review reveals several critical research gaps that limit the comprehensive understanding and implementation of environmental accounting within small coastal fisheries. Despite growing global recognition of sustainability and the blue economy framework, current studies remain fragmented and heavily concentrated on theoretical discussions rather than applied practices. Empirical evidence demonstrating how environmental accounting frameworks directly influence coastal resource management or community livelihoods is still scarce, particularly in developing regions with limited institutional capacity.

First, there is a noticeable gap in the development of measurable coastal environmental indicators that accurately reflect the ecological dynamics of small-scale fisheries. Most existing accounting tools are derived from terrestrial or industrial models that fail to capture the complexity of marine ecosystems. There is a need for adaptive frameworks that can incorporate variables such as biodiversity, ecosystem resilience, and carbon sequestration capacity in coastal habitats. Future studies should focus on constructing context-specific environmental performance metrics that are both scientifically valid and operationally feasible for local fisheries managers.

Second, limited attention has been given to community-based reporting systems as an integral part of environmental accounting. Small coastal fisheries often rely on local knowledge and participatory management practices that are not formally documented. Integrating these informal systems into standardized environmental reports can improve data reliability and enhance the inclusivity of sustainability assessments. However, such integration requires methodological innovation, particularly in designing accounting models that accommodate qualitative and participatory data alongside quantitative metrics.

Third, there is a pressing need to explore how environmental accounting can be aligned with blue economy policies at the regional and national levels. While the blue economy agenda emphasizes sustainable ocean governance and economic diversification, few studies explicitly connect these goals with accounting mechanisms that measure ecological and financial trade-offs. Future research should aim to develop hybrid policy frameworks that bridge environmental accounting with marine policy instruments, such as marine spatial planning, ecosystem-based fisheries management, and sustainable finance initiatives.

Future research should explore digital and technological innovations, such as mobile monitoring, GIS, and blockchain, to improve data collection, transparency, and reporting efficiency in fisheries. Collaborative research involving academia, governments, and fishing communities is crucial to ensure inclusive and scalable solutions. Addressing existing gaps requires a multidisciplinary and participatory approach that integrates environmental, accounting, and socio-economic perspectives. Strengthening local capacity, developing context-specific indicators, and aligning environmental accounting with the blue economy framework are essential to support sustainable coastal fisheries and community resilience.

Table 5. Identified Research Gaps and Future Research Priorities

Research Area	Identified Gaps	Future Research Priorities
Development of Environmental Indicators	Lack of specific and measurable indicators tailored for small coastal fisheries; current models overly industrial-focused.	Design adaptive environmental performance metrics that include marine biodiversity, carbon sequestration, and ecosystem resilience.
Community-Based Reporting Systems	Limited integration of local knowledge and participatory monitoring in environmental reporting frameworks.	Develop participatory environmental accounting models that incorporate qualitative community data with quantitative measures.

Policy Integration with Blue Economy	Weak connection between environmental accounting systems and blue economy policy implementation.	Formulate hybrid frameworks linking accounting data with marine spatial planning and sustainable finance policies.
Technological and Digital Innovations	Low adoption of digital tools for environmental monitoring and reporting in small fisheries.	Explore mobile, GIS, and blockchain-based technologies to enhance data accuracy, transparency, and reporting efficiency.
Capacity Building and Education	Limited institutional capacity and lack of environmental accounting literacy among fisheries stakeholders.	Promote training programs, academic partnerships, and policy advocacy for sustainable accounting adoption.

Source: (SEEA, 2021; The World Bank, 2022)

Table 5 highlights that addressing these research gaps requires collaboration between policymakers, academic institutions, and local fishing communities. Future research should prioritize developing context-sensitive indicators, enhancing participatory data collection systems, and integrating accounting practices with blue economy strategies. Technological adoption and capacity building are crucial in ensuring that environmental accounting becomes an effective tool for sustainable resource governance in coastal regions

4. Conclusions

This study concludes that environmental accounting plays a pivotal role in promoting transparency, accountability, and sustainability within small coastal fisheries. Through a systematic literature review, it becomes evident that the integration of environmental accounting frameworks—such as the System of Environmental-Economic Accounting (SEEA) and the Triple Bottom Line (TBL)—provides an effective foundation for balancing economic productivity with ecological stewardship. These frameworks enable fisheries stakeholders to identify environmental costs, assess resource efficiency, and align management practices with sustainable development principles. The adoption of such approaches strengthens financial reporting, enhances environmental responsibility, and supports the transition toward a more inclusive blue economy.

From a policy and social perspective, environmental accounting encourages greater transparency in the utilization of natural resources and fosters collaboration among key actors, including government agencies, academic institutions, and local fishing communities. Policymakers can use environmental accounting data to develop evidence-based regulations, monitor ecosystem performance, and evaluate the socio-economic impacts of marine policies. At the community level, these practices empower small-scale fishers by increasing awareness of resource sustainability, promoting equitable benefit-sharing, and building long-term adaptive capacity to climate and market challenges. However, achieving this integration requires addressing barriers such as limited funding, insufficient technical expertise, and institutional inertia that persist in many coastal regions.

The effectiveness of environmental accounting depends on integrating local knowledge and participatory approaches to create context sensitive sustainability frameworks. Combining traditional ecological knowledge with modern accounting and scientific data can improve inclusive and adaptive fisheries management. Future research should focus on innovative, digital, and community based accounting tools aligned with blue economy policies. Overall, environmental accounting functions not only as a reporting mechanism but also as a strategic tool for sustainable governance and the development of resilient coastal fisheries.

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