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Conference Paper

STRENGTHENING ECONOMIC-ACCOUNTING TRANSPARENCY TO SAFEGUARD MARITIME NATURAL RESOURCES IN THE INDO-PACIFIC REGION

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Abstract.
The Indo-Pacific region is increasingly challenged by geo-maritime pressures due to the unregulated exploitation of marine ecological resources. This paper explores two key questions: to what extent economic transparency supports the protection of maritime ecological assets, and whether institutionalising eco-accounting within public sector reporting contributes to national resilience. The study adopts a qualitative content analysis method to examine international practices, regulatory documents, and sustainability accounting frameworks. The findings indicate that the absence of disclosure regarding ecological assets, especially blue carbon and ecosystem services, leads to unrecorded environmental degradation and weakens long-term fiscal and ecological stability. Anchored in the geographical and ecological pillars of the Asta Gatra framework, the study proposes an extended accountability model that integrates maritime ecological values into national financial governance. The relevance of this study lies in the growing need to align environmental stewardship with fiscal transparency, particularly for states exposed to climate and geopolitical volatility. The originality of this research is reflected in its proposition to embed ecological metrics into fiscal systems as a strategic approach to reinforce maritime resilience across Indo-Pacific coastal nations.

Keywords: Economic resilience, Indo-Pacific, maritime accounting, natural resources, sustainability reporting.

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Introduction

The Indo-Pacific region has gained increasing scholarly and policy attention due to its strategic significance in global maritime security and ecological sustainability. Coastal nations across this region face mounting challenges as they strive to reconcile economic development with environmental preservation. Maritime natural resources, which underpin both economic growth and ecological stability, remain vulnerable to persistent mismanagement, unsupervised exploitation, and insufficient institutional safeguards. These deficiencies are further exacerbated by the absence of transparent economic and accounting mechanisms, which has led to the unrecorded degradation of marine ecosystems and, consequently, threatens the long-term resilience of affected states.

Although global forums have promoted sustainability agendas, institutional accounting frameworks have yet to effectively internalise ecological values into national economic governance. Existing literature underscores the imperative of embedding sustainability within accounting standards. Elkington introduced the triple bottom line as a conceptual foundation for linking economic, social, and environmental priorities (1). Milne and Gray critically examined traditional reporting practices, noting their failure to account for biodiversity and natural capital, thereby exposing a disconnection between corporate disclosures and ecological realities (2). In parallel, Adams et al. advanced the practice of integrated reporting and sustainability accounting; however, their application remains limited in the context of state-led maritime governance (3). These contributions predominantly focus on terrestrial ecosystems and broad public-sector reforms, while paying limited attention to marine biodiversity, ecosystem services, or blue carbon within fiscal systems.

Moreover, there remains a theoretical gap concerning the role of geo-economic tools in reinforcing sovereignty and resilience in maritime zones. This gap becomes increasingly problematic when fiscal frameworks exclude ecological assets. Without credible valuation and reporting mechanisms for marine resources, public decision-making becomes misaligned with the actual extent of environmental degradation. This misalignment undermines interministerial coordination, obstructs strategic budgeting, and diminishes national responsiveness to geopolitical tensions and climate-induced coastal disruptions.

In light of these concerns, study examines two central questions. First, to what extent does economic-accounting transparency enhance the protection of maritime ecological assets? Second, how does the institutionalisation of eco-accounting within public sector reporting contribute to national

resilience across the Indo-Pacific? Through these questions, the study aims to establish a framework of extended accountability that integrates ecological metrics into the core of public governance.

To investigate these issues, this article employs a qualitative content analysis approach. It examines international best practices, regulatory provisions, and policy instruments relevant to sustainability accounting and maritime governance. The conceptual lens draws upon the Asta Gatra framework, which recognises geography and natural resources as essential components of national resilience. The analysis centres on institutional practices relating to the reporting and valuation of marine ecological assets.

Literature Review

Theoretical Studies

This research is grounded in the field of sustainability accounting, particularly in the development of eco-accounting models that extend beyond traditional financial reporting to incorporate ecological assets. It adopts Stakeholder Theory as its overarching theoretical foundation, recognising that institutions hold responsibilities not only to shareholders but also to a wider network of stakeholders, including the natural environment (4). This theoretical position aligns with the Triple Bottom Line framework introduced by Elkington which integrates environmental and social dimensions as essential components of organisational performance metrics (5).

Moreover, the study draws on Environmental Governance Theory, which provides a conceptual bridge between institutional behaviour and ecological outcomes. It emphasises the importance of transparency, regulatory compliance, and participatory engagement as mechanisms that shape environmental governance (6). In the maritime governance, this implies that accounting systems should not only record economic activities but also capture the dynamics of resource extraction and ecological preservation along coastal zones.

The concept of extended accountability has become increasingly relevant in recent discussions concerning institutional adaptability. Doktoralina et al. highlight that environmental turbulence significantly influences sustainable outcomes (7). However, the roles of innovation and competitive advantage as mediating factors remain insufficiently explored. These insights underscore the need for governance systems that enable flexible and adaptive responses, rather than relying solely on static disclosure. Institutional transparency must therefore serve as a mechanism that enables adaptation to ecological volatility and climate-related uncertainties.

Inhibiting this objective, however, are fragmented data systems that continue to constrain transparency and hinder the integration of ecological assets into national planning instruments. Doktoralina has shown, through an analysis of Indonesia's digital architecture for public governance, that effective digital systems are crucial for institutionalising environmental accountability. Furthermore, they serve to enhance the visibility of maritime ecological services by enabling the systematic collection, management, and dissemination of integrated environmental data (8).

Empirical Studies

Empirical evidence from the Indo-Pacific region reveals pronounced disparities in the adoption and institutionalisation of eco-accounting frameworks. These differences largely stem from variations in political commitment, institutional readiness, and data infrastructure capabilities. Among the countries assessed, Australia stands out as a regional leader, having implemented national ecosystem accounts under the auspices of the Australian Bureau of Statistics (9). This initiative incorporates marine ecological assets into public financial reporting and has enhanced the alignment between environmental valuation and fiscal policy formulation.

At the global level, 94 countries have adopted the System of Environmental-Economic Accounting (SEEA); however, only a fraction of these nations consistently publish environmental accounts (10). This gap between adoption and implementation reflects broader structural and administrative constraints, particularly in the Indo-Pacific.

Other countries within the region demonstrate varying levels of maturity in implementing eco-accounting. Indonesia and Fiji have introduced partial frameworks, but both continue to face challenges due to fragmented inter-agency coordination and limited institutional continuity. India has officially adopted a natural capital accounting model, although its integration into public financial systems remains nascent. In the Philippines, the Bureau of Fisheries and Aquatic Resources has initiated pilot programmes aimed at valuing coastal ecosystem services (11). These national initiatives are summarised in Table 1.

Table 1. National Initiatives on Eco-Accounting in Indo-Pacific Countries

No.	Country	Total
1	Australia	Implemented
2	Indonesia	Partial
3	Philippines	Pilot
4	India	Framework Adopted
5	Fiji	Partial

Source: Compiled from national reports and academic literature (9,11–14)

The variation captured in Table 1 underscores the fragmented nature of eco-accounting institutionalisation across the Indo-Pacific. This fragmentation highlights the urgency of a harmonised strategy that promotes standardised ecological valuation within fiscal systems. Persistent differences in political will, administrative governance, and technological infrastructure continue to hinder the effectiveness of eco-accounting in contributing to resilience planning.

Indonesia, in particular, exemplifies the limitations facing developing archipelagic states. Significant ecological degradation, including the loss of coral reefs and the decline of coastal ecosystems, remains largely absent from national fiscal and planning frameworks (15,16). The continued lack of institutional coordination further obstructs the translation of blue economy strategies into measurable and actionable policy instruments (15).

These institutional weaknesses have broader consequences beyond environmental stewardship. Inadequate fiscal oversight of marine ecological assets exacerbates exposure to transnational security threats, including illegal, unreported, and unregulated (IUU) fishing, ecological crimes, and maritime piracy (17). Therefore, strengthening eco-accounting should be prioritised not only as an environmental imperative but also as a vital component of regional security and national sovereignty

In addition to institutional reforms, public participation holds an equally critical function in enhancing ecological accountability. Civic education initiatives aimed at promoting geo-maritime literacy have demonstrated the value of community engagement in environmental governance. Participatory approaches enable citizens to contribute contextual insights that complement official datasets and improve monitoring systems (18).

While Figure 1 outlines a conceptual framework for extended accountability, the empirical insights presented in Table 1 offer a grounded assessment of current national practices. Together, these findings confirm the need for comprehensive reforms and provide the empirical foundation for the accountability model proposed in this study to reinforce maritime resilience across Indo-Pacific coastal states.

Methods

This study adopts a qualitative content analysis approach, defined as a research technique for drawing replicable and valid inferences from texts in relation to their contextual use (19). The method facilitates a systematic examination of policy documents, institutional reports, and scholarly literature concerning ecological accountability and maritime resilience.

The data sources comprise international documents, institutional reports, and peer-reviewed publications released

within the last decade. The selection criteria emphasise relevance to coastal ecosystem management, public accounting practices for marine natural resources, and maritime security policies in the Indo-Pacific region.

The research design consists of three sequential phases, structured according to the analytical framework proposed by Krippendorff (19) and the multiscalar comparative model outlined by Bartlett and Vavrus (20):

(1) Identification of relevant frameworks and international case studies involving public sector eco-accounting practices in coastal nations.
(2) Thematic coding of selected documents to trace patterns, concepts, and gaps in ecological reporting and fiscal transparency.
(3) Synthesis of findings into an integrated accountability framework, tailored to support maritime resilience across Indo-Pacific coastal states.

The unit of analysis focuses on national and sub-national government practices in recognising and reporting ecological assets, particularly in marine zones. The study was conducted over a six-month period, and data credibility was ensured through source triangulation and cross-verification with expert-reviewed publications.

The central research question considered in this study is: How can economic transparency and ecological reporting practices improve maritime resilience among Indo-Pacific coastal states? The analysis is structured along three comparative axes, informed by the case study framework developed by Bartlett and Vavrus (20):

(1) Horizontal comparison between coastal nations;
(2) Vertical comparison across levels of governance (national and sub-national);
(3) Transversal comparison considering temporal shifts and geopolitical dynamics in the maritime domain.

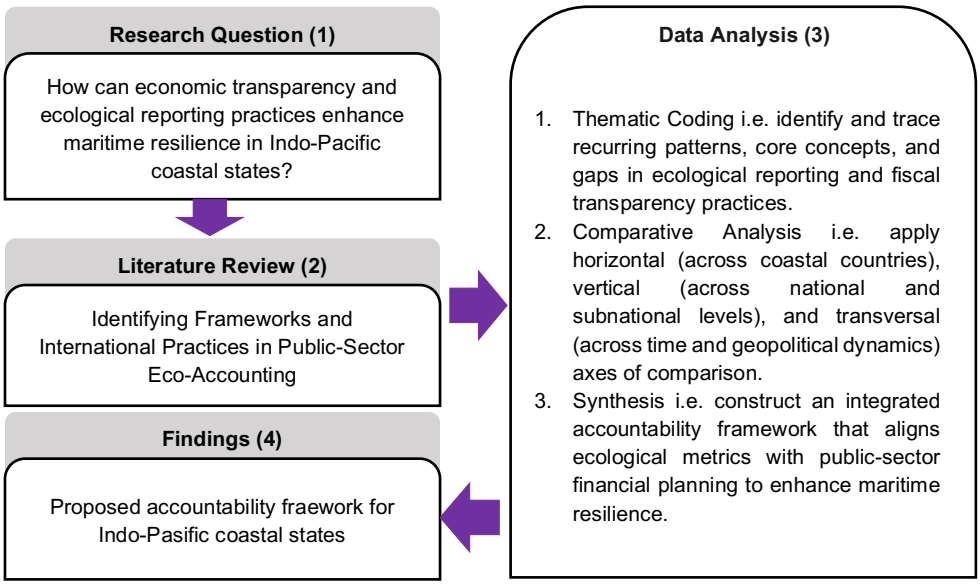

Figure 1. Stages of content analysis for maritime resilience
Source: Adapted from Krippendorff (2013) and Bartlett & Vavrus (2017)

Results and Discussion

Results

The qualitative content analysis conducted in this study identified significant disparities in the institutionalisation of eco-accounting frameworks across Indo-Pacific coastal states. As presented in Table 1, these countries exhibit varying levels of progress. Australia demonstrates regional leadership by incorporating ecosystem valuation within its national statistical and fiscal systems. In contrast, India and the Philippines remain in early stages, with India adopting a formal natural capital accounting framework and the Philippines implementing pilot initiatives. Indonesia and Fiji have made partial efforts, although these remain hindered by fragmented coordination among agencies and limited institutional capacity.

A consistent pattern emerged from the analysis. Most countries lack binding regulatory frameworks that mandate the disclosure of ecological asset changes, particularly in marine and coastal environments. In addition, they have not developed standardised indicators to evaluate blue carbon reserves or marine biodiversity. These limitations are compounded by institutional fragmentation, especially the disconnection between environmental data agencies and fiscal planning authorities. This disconnect results in uncoordinated data systems, which impede the formulation of coherent fiscal and marine conservation strategies.

Indonesia provides a clear illustration of these challenges. Empirical evidence shows that major ecological losses, including

the disappearance of mangrove forests and the degradation of coastal ecosystems, are often excluded from national budgeting and planning documents (15). The lack of institutional synergy continues to obstruct the transformation of blue economy strategies into actionable and measurable policy outcomes (16).

The findings also underscore serious security implications. The absence of integrated eco-accounting frameworks increases vulnerability to transnational maritime threats. These include illegal, unreported, and unregulated fishing, ecological crime, and maritime piracy (17). This level of exposure reflects both the failure of environmental governance and the reduced capacity to exercise effective maritime domain awareness. Consequently, ecological transparency must be recognised as both an environmental obligation and a core strategic element in preserving national sovereignty and ensuring regional stability.

In response to these observations, the study presents a conceptual model entitled Conceptual Integration of Extended Accountability for Maritime Resilience. This model brings together economic transparency, ecological valuation, institutional alignment, and adaptive capacity into a single accountability framework. It offers coastal nations a practical approach to aligning ecological metrics with public financial governance while simultaneously reinforcing their resilience in the face of environmental and geopolitical challenges.

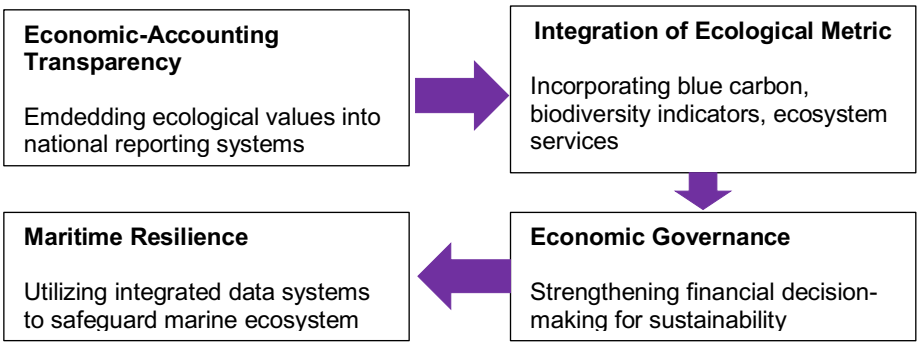

Figure 2. Conceptual Integration of Extended Accountability for Maritime Resilience. Source: Doktoralina, C.M. (2025)

Discussion

The findings of this study demonstrate that public institutions across the Indo-Pacific region have not yet integrated ecological indicators, including blue carbon and biodiversity, into their fiscal planning and reporting systems. This absence restricts institutional accountability towards broader ecological stakeholders and undermines long-term environmental stewardship. The analysis, which draws upon Stakeholder Theory and the Triple Bottom Line perspective, affirms that effective institutional performance must

incorporate ecological considerations alongside economic outcomes (1,4,5,21).

Furthermore, the results are consistent with the principles of Environmental Governance Theory, which emphasises the importance of transparency, regulatory compliance, and participatory engagement as critical enablers of ecological effectiveness (6). Failures to apply these principles are evident in the lack of standardised ecological reporting and the continued fragmentation of environmental data structures. These weaknesses highlight an underdeveloped system of environmental governance that limits the capacity of institutions to respond effectively to ecological degradation and to strengthen maritime resilience.

The findings support Milne and Gray's critique of conventional accounting systems, particularly their limited ability to accommodate ecological dimensions within institutional reporting frameworks (2,20). In response, this study introduces a practical accountability model that aims to integrate ecological metrics within public financial governance, thereby aligning fiscal strategies with sustainability objectives.

The analysis identifies several recurring governance issues. Many Indo-Pacific nations do not possess formal regulatory requirements that oblige the reporting of changes in ecological assets, especially those located in marine and coastal environments. Additionally, most institutions have yet to develop valuation tools that unify the assessment of ecosystem services, including biodiversity and blue carbon. Compounding these challenges is the weak coordination between environmental authorities and fiscal policymakers, which results in isolated data systems and incoherent strategies.

This set of challenges reveals a fundamental gap in environmental governance. The research situates this gap within the broader context of geo-maritime resilience, arguing that the failure to incorporate ecological data into fiscal decision-making renders national strategies blind to the actual costs of environmental degradation. This omission is not solely administrative but carries strategic implications, as ecological decline contributes to increased exposure to cross-border environmental threats, contested resource claims, and security vulnerabilities in the maritime domain.

The study also confirms that the absence of integrated digital infrastructure limits the capacity of many Indo-Pacific governments to implement eco-accounting. As demonstrated in the analysis of Indonesia's public data architecture, disjointed systems inhibit environmental transparency and diminish institutional agility (8). In contrast, inclusive approaches that involve community

participation in ecological monitoring have been shown to enhance policy legitimacy and responsiveness. Locally grounded governance, as discussed by Agustin and colleagues, supports geo-maritime literacy and enables environmental policies to reflect diverse regional contexts more effectively (18).

Overall, the proposed accountability model presented in Figure 2 offers a feasible and integrative solution. By aligning fiscal reporting with ecological valuation, the model provides a pathway for institutional reform that enables governments to improve environmental stewardship, strengthen national resilience, and fulfil international climate obligations while preparing for the multifaceted risks of ecological and geopolitical disruption.

Conclusion

This study concludes that transparency in both economic and ecological reporting is vital for protecting maritime natural resources across the Indo-Pacific region. The analysis identifies three principal insights. First, the lack of institutionalised eco-accounting frameworks in public sector reporting has allowed the degradation of marine ecosystems to proceed without formal recognition. Second, incorporating ecological metrics including blue carbon and biodiversity into fiscal planning enables a closer alignment between sustainability goals and economic governance. Third, integrating eco-accounting practices into national policy frameworks reinforces long-term resilience and contributes to the advancement of sustainable development.

The implications of this research extend meaningfully to a range of stakeholders involved in environmental governance and public finance. Policymakers may adopt the proposed accountability model as a strategic and systematic framework to integrate ecological stewardship within fiscal decision-making processes. This approach enables the alignment of environmental priorities with budgetary planning and institutional development. For academic researchers, the model provides a solid theoretical foundation that supports further empirical exploration concerning the role of eco-accounting in reinforcing maritime governance.

Further studies are encouraged to apply and evaluate this model through comparative analysis across countries where ecological resilience shapes national development and contributes to regional stability. Countries with significant marine assets that are undertaking environmental governance reforms, including Indonesia, the Philippines, and Pacific Island nations, offer valuable opportunities for investigation. Developing a deeper understanding of how eco-accounting enhances institutional capacity and improves policy coherence will contribute to more effective governance outcomes throughout the Indo-Pacific region.

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