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From Blue Economy to Blue Accounting: Mapping the Scientific Evolution through Bibliometric Analysis

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Abstract: Blue Accounting has emerged as an interdisciplinary concept that supports sustainable marine resource management by integrating economic, environmental, and governance perspectives. However, its scientific development and relationship with Blue Economy, Blue Management, and Blue Carbon remain insufficiently understood. This study aims to analyze the scientific evolution of Blue Accounting and identify its intellectual structure through a bibliometric analysis. A total of 189 Scopus-indexed journal articles published between 2000 and 2025 were analyzed using Bibliometrix in RStudio. Performance analysis and science mapping techniques were employed to examine publication trends, influential contributors, research hotspots, intellectual structures, and thematic evolution. The results indicate that research has grown substantially over the past two decades and is primarily concentrated in marine policy, sustainability, and environmental governance journals. Science mapping demonstrates that the intellectual structure has evolved from marine resource utilization and economic growth toward sustainability, governance, ecosystem services, climate resilience, and environmental accountability. Furthermore, the findings reveal that Blue Accounting has not yet developed as an independent research field but has progressively emerged through the integration of Blue Economy, Blue Management, and Blue Carbon. This study contributes by proposing a conceptual pathway that explains the evolution of Blue Accounting and provides a theoretical foundation for future accounting research supporting sustainable marine resource management.

Keywords: Blue Accounting, Blue Economy, Blue Management, Blue Carbon, Bibliometric Analysis.

INTRODUCTION

Global sustainability has become one of the foremost priorities in academic research and public policy as increasing economic activities continue to generate significant environmental challenges, including climate change, biodiversity loss, natural resource depletion, and ecosystem degradation (United Nations, 2015; IPCC, 2023). Among the ecosystems most vulnerable to these pressures are marine and coastal environments, which play a fundamental

role in maintaining ecological balance while simultaneously supporting food security, international trade, climate regulation, and the livelihoods of billions of people worldwide. Oceans cover approximately 71% of the Earth's surface and constitute one of the world's most valuable natural assets, making the sustainable management of marine resources an essential component of global sustainable development (Apriantoro et al.; World Bank).

Growing awareness of the strategic importance of marine resources has accelerated the development of the *Blue Economy*, a concept that promotes the sustainable utilization of ocean resources to generate economic growth, improve social welfare, and preserve marine ecosystems (Pauli, 2010; United Nations, 2012; Afzal et al.). Since its introduction at the United Nations Conference on Sustainable Development (Rio+20), the Blue Economy has evolved into an influential framework for sustainable ocean governance by emphasizing that economic development and environmental conservation should be pursued simultaneously rather than treated as competing objectives (Trenggono et al.). As the implementation of the Blue Economy has expanded across countries and sectors, scholarly attention has progressively shifted toward broader dimensions of sustainable marine development. This evolution has led to the emergence of *Blue Management*, which emphasizes governance quality, institutional capacity, stakeholder collaboration, and adaptive resource management, as well as *Blue Carbon*, which focuses on the capacity of coastal and marine ecosystems to sequester carbon and contribute to climate change mitigation (Cisneros-Montemayor et al.; Afzal et al.).

Although these concepts have substantially advanced sustainable marine development, their successful implementation depends not only on policy and governance but also on the availability of reliable information for decision-making and accountability. Governments, investors, industries, and society increasingly require transparent mechanisms capable of measuring the economic, environmental, and social consequences of marine resource utilization. Existing accounting approaches, including Environmental Accounting, Sustainability Accounting, Natural Capital Accounting, and Carbon Accounting, have significantly contributed to environmental accountability; however, their primary focus has remained on terrestrial ecosystems and land-based economic activities. Consequently, the distinctive characteristics of marine resources have received relatively limited attention within accounting and reporting systems, creating a need for a more comprehensive accountability framework specifically designed for sustainable ocean governance.

This need has encouraged the emergence of *Blue Accounting*, an evolving accounting approach that integrates economic, environmental, and social dimensions into the measurement, reporting, and evaluation of marine resource management. Rather than functioning solely as a financial reporting mechanism, Blue Accounting seeks to provide information regarding marine resource utilization, ecosystem services, environmental impacts, operational efficiency, and sustainability performance to support evidence-based decision-making. From this perspective, Blue Economy provides the development vision, Blue Management establishes governance mechanisms, Blue Carbon emphasizes ecosystem value and climate mitigation, while Blue Accounting translates these dimensions into measurable and accountable information for sustainable marine resource management.

Despite growing scholarly interest, Blue Accounting remains an emerging field whose intellectual foundations have not yet been comprehensively established. Compared with Green Accounting, Sustainability Accounting, and Carbon Accounting, research on Blue Accounting is still limited and dispersed across multiple disciplines, including accounting, marine economics, environmental science, public policy, and natural resource management. Furthermore, only a relatively small number of publications explicitly employ the term *Blue Accounting*. Instead, many of its underlying concepts have evolved through studies on Blue Economy, Blue Management, and Blue Carbon. As a result, the conceptual boundaries, intellectual structure, and thematic development of Blue Accounting remain fragmented,

making it difficult to understand how this field has evolved and how it relates to its broader scientific foundations.

Existing studies have primarily examined specific aspects of sustainable marine development, such as governance, marine conservation, carbon sequestration, or blue economic growth (Afzal et al.; Cisneros-Montemayor et al.; Trenggono et al.). However, limited attention has been devoted to systematically mapping the scientific evolution of Blue Accounting and its relationship with these interconnected concepts. In particular, there is still insufficient evidence regarding publication trends, influential authors and institutions, collaboration networks, thematic evolution, and the intellectual structure underpinning this emerging research area. This lack of comprehensive knowledge mapping represents an important research gap because it restricts both theoretical development and practical implementation by limiting researchers' and policymakers' understanding of the field's scientific landscape.

Bibliometric analysis offers an appropriate methodological approach for addressing this gap because it enables the quantitative examination of scientific production through publication trends, citation patterns, collaboration networks, conceptual structures, and thematic evolution (Aria & Cuccurullo, 2017; Donthu et al., 2021; Handoyo, 2024). Unlike conventional literature reviews, bibliometric techniques provide an objective and systematic understanding of knowledge development by identifying influential contributors, emerging themes, and intellectual relationships within a research field. Considering the interdisciplinary nature of Blue Accounting and its close association with Blue Economy, Blue Management, and Blue Carbon, a bibliometric approach is expected to provide a comprehensive overview of the field's scientific development.

Accordingly, this study aims to examine the scientific development of Blue Accounting through a bibliometric analysis of Scopus-indexed publications related to Blue Economy, Blue Management, Blue Carbon, and Blue Accounting. Specifically, this study analyzes publication trends, identifies the most influential authors, institutions, countries, and publication sources, examines intellectual structures and scientific collaboration networks, investigates thematic evolution and emerging research topics, and evaluates the position of Blue Accounting within the broader evolution of sustainable marine research. By providing a comprehensive knowledge mapping of this emerging field, this study contributes to the advancement of sustainability accounting literature while offering practical insights for researchers, policymakers, and practitioners in strengthening accountability and governance for sustainable marine resource management.

METHODS

This study employed a quantitative bibliometric approach to examine the scientific development of Blue Accounting within the broader context of Blue Economy, Blue Management, and Blue Carbon research. Bibliometric analysis was selected because it provides a systematic and objective approach for evaluating scientific publications, identifying intellectual structures, mapping collaboration networks, and examining thematic evolution within a research field (Aria & Cuccurullo, 2017; Donthu et al., 2021; Handoyo, 2024).

The study utilized secondary data retrieved exclusively from the Scopus database, which was selected because of its extensive multidisciplinary journal coverage and comprehensive bibliographic metadata. Literature retrieval was conducted using the TITLE-ABS-KEY search field with keywords related to *Blue Economy*, *Blue Management*, *Blue Carbon*, and *Blue Accounting*. The search covered publications published between 2000 and 2025. The initial search yielded 1,637 documents.

To ensure the quality and relevance of the dataset, the retrieved publications were screened using predefined inclusion and exclusion criteria. Only English-language journal

articles indexed in Scopus with complete bibliographic information and substantive relevance to the research topic were included in the analysis. Conference papers, books, book chapters, editorials, notes, letters, duplicate records, and publications unrelated to the research scope were excluded. After the screening and data-cleaning process, 189 journal articles were retained as the final dataset.

The bibliographic metadata, including article titles, authors, publication years, source titles, institutional affiliations, countries, keywords, abstracts, references, and citation information, were exported from Scopus in CSV format and analyzed using the Bibliometrix package implemented in RStudio, with Biblioshiny serving as the graphical user interface (Aria & Cuccurullo, 2017). The analysis followed the bibliometric framework proposed by Donthu et al. (2021), consisting of performance analysis and science mapping. Performance analysis was conducted to evaluate annual scientific production, the most relevant publication sources, the most productive authors, leading countries and institutions, and globally cited documents. Science mapping was employed to investigate the conceptual and intellectual structure of the research field through keyword co-occurrence analysis, thematic mapping, and thematic evolution.

The analytical procedure consisted of five sequential stages: identifying research keywords, retrieving bibliographic records from Scopus, screening and cleaning the retrieved records according to the selection criteria, importing the final dataset into Bibliometrix for bibliometric analysis, and interpreting the findings by integrating bibliometric evidence with previous studies. This procedure enabled the study to systematically identify publication trends, intellectual structures, collaboration networks, dominant research themes, and the scientific evolution of Blue Accounting in relation to Blue Economy, Blue Management, and Blue Carbon.

RESULTS AND DISCUSSION

Publication Trends and Dataset Characteristics

Table 1 presents the general characteristics of the bibliometric dataset used in this study. A total of 189 journal articles published between 2000 and 2025 were retrieved from 65 publication sources, indicating that research on Blue Economy, Blue Management, Blue Carbon, and Blue Accounting has attracted scholarly attention across a diverse range of academic journals. Although the number of publications remains relatively limited compared with more established sustainability-related disciplines, the distribution of articles across numerous journals demonstrates the interdisciplinary nature of this research field, encompassing accounting, environmental science, marine policy, economics, and sustainability studies.

Table 1. Summary of Bibliometric Dataset Characteristics

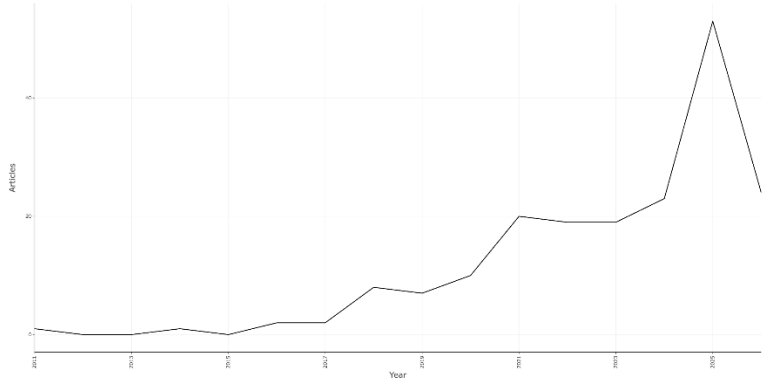
Category	Indicator	Value
Dataset	Time span	2000–2025
	Publication sources	65
	Total documents	189
	Annual growth rate	23.6%
	Average document age	3.02 years
	Average citations per document	23.19
Document Content	Author's keywords	698
	Keywords Plus	492
Authorship	Total authors	758
	Single-authored documents	33
	Co-authors per document	4.26

Category	Indicator	Value
	International co-authorship	34.92%
Document Type	Journal articles	189

Source: Authors' bibliometric analysis using Bibliometrix in RStudio (2026).

The dataset exhibits an annual publication growth rate of 23.6%, indicating a substantial increase in scientific interest over time. Such a growth rate reflects the expanding recognition of sustainable marine resource management as an important research agenda following the increasing global emphasis on ocean sustainability and the implementation of Sustainable Development Goal 14 (*Life Below Water*). The rapid growth also suggests that Blue Economy-related research is still evolving and has not yet reached a mature stage, thereby providing significant opportunities for future theoretical and empirical development. Similar publication growth has been reported in previous bibliometric studies investigating sustainability and environmental accounting research, where increasing policy attention has stimulated scientific productivity (Donthu et al., 2021; Handoyo, 2024).

Figure 1. Annual Scientific Production in Blue Economy, Blue Management, Blue Carbon, and Blue Accounting Research (2011–2025)



As illustrated in **Figure 1**, the annual scientific production further confirms this positive publication trend. Although the dataset covers the period from 2000 to 2025, publications began to appear consistently only from 2011 onward. Scientific output remained relatively limited during the early years but increased steadily after 2018, with a particularly notable acceleration between 2021 and 2025. This upward trajectory reflects the growing international interest in sustainable marine development, marine governance, and environmental accountability. The sharp increase in publication output during recent years indicates that Blue Economy and its related concepts have gained considerable academic attention, supporting the view that this research field is transitioning from an emerging topic toward a more established interdisciplinary area of study.

Another notable characteristic is the average document age of 3.02 years, indicating that the literature analyzed is relatively recent. This finding suggests that research on Blue Accounting and its related concepts continues to develop rapidly, with new scientific contributions emerging in recent years. The relatively young age of the publications also reflects the dynamic nature of this research area, in which conceptual development, governance approaches, and sustainability practices continue to evolve alongside international environmental policies and marine conservation initiatives.

The bibliometric indicators further reveal an average of 23.19 citations per document, demonstrating that publications within this field have received considerable academic attention despite the relatively limited number of available studies. This citation performance suggests that several publications have become influential references in shaping the intellectual

foundation of sustainable marine development, particularly concerning Blue Economy, marine governance, ecosystem conservation, and climate-related issues.

Regarding document content, the dataset contains 698 author keywords and 492 Keywords Plus, indicating a broad diversity of research topics. The large number of keywords reflects the multidisciplinary characteristics of the field and suggests that studies related to Blue Economy and Blue Accounting continue to expand into various research domains, including environmental governance, sustainability reporting, ecosystem services, climate change mitigation, and natural resource management. This diversity provides an initial indication that Blue Accounting has evolved through interactions with several established sustainability-related disciplines rather than as an isolated area of accounting research.

The collaboration analysis also demonstrates a high level of scientific cooperation. A total of 758 authors contributed to the 189 publications, resulting in an average of 4.26 co-authors per article, while 34.92% of the publications involved international collaboration. These findings indicate that research on sustainable marine development has become increasingly collaborative and international in nature. Such collaboration is expected because the challenges addressed by Blue Economy and Blue Accounting—including marine conservation, climate change, biodiversity protection, and sustainable resource governance—are inherently transboundary and require multidisciplinary expertise across countries and institutions.

Overall, the descriptive characteristics of the dataset, together with the annual publication trend presented in Figure 1, indicate that research on Blue Economy, Blue Management, Blue Carbon, and Blue Accounting has developed into a rapidly growing and highly collaborative scientific field. The steady increase in scientific production, combined with a high annual publication growth rate, relatively recent publications, substantial citation impact, and extensive international collaboration, suggests that the field is progressing from an emerging research area toward a more established domain of interdisciplinary scholarship. These findings provide a solid foundation for the subsequent bibliometric analyses, which further examine influential contributors, research hotspots, intellectual structures, thematic evolution, and the emerging role of Blue Accounting within sustainable marine research.

Scientific Contributions

The performance analysis provides an overview of the major contributors shaping the development of research on Blue Economy, Blue Management, Blue Carbon, and Blue Accounting. This analysis examines publication sources, author productivity, scientific impact, country contributions, and globally cited documents to identify the intellectual leadership within the field.

Table 2. Most Relevant Publication Sources in Blue Economy, Blue Management, Blue Carbon, and Blue Accounting Research

Rank	Publication Source	Number of Articles
1	*Marine Policy*	98
2	*Journal of Cleaner Production*	6
3	*Ecological Economics*	4
4	*Environment, Development and Sustainability*	4
5	*Review of Accounting and Finance*	4
6	*Sustainable Futures*	4
7	*Journal of World Investment and Trade*	3
8	*Ocean and Coastal Management*	3
9	*Marine Pollution Bulletin*	2
10	*Sustainability*	2

Source: Authors' bibliometric analysis using Bibliometrix in RStudio (2026).

The analysis of publication sources demonstrates that research is highly concentrated in journals focusing on marine governance, environmental sustainability, and resource management. As presented in **Table 2**, *Marine Policy* is the dominant publication outlet, contributing 98 of the 189 articles included in the dataset, representing more than half of the total publications. Other important journals include *Journal of Cleaner Production*, *Ecological Economics*, *Environment, Development and Sustainability*, *Review of Accounting and Finance*, and *Sustainable Futures*, each contributing between three and six articles. This distribution indicates that the scientific development of Blue Economy and its related concepts has primarily occurred within interdisciplinary journals emphasizing marine policy, sustainability, and environmental governance rather than within traditional accounting journals. Although accounting-oriented journals such as *Review of Accounting and Finance* have begun to publish studies related to the topic, their contribution remains relatively limited, suggesting that Blue Accounting is still an emerging research area within the accounting discipline.

Author productivity analysis further indicates that no single researcher dominates this field. The most productive authors, including Bennett N.J., Hicks C.C., and Thompson B.S., each contributed three publications, while several other researchers authored two publications. This relatively even distribution of publication productivity suggests that the field is characterized by broad participation from researchers across multiple disciplines instead of being driven by a small number of specialized scholars. Such a pattern is commonly observed in emerging interdisciplinary research areas, where knowledge development is supported by collaborative scientific contributions from diverse academic backgrounds.

Table 3. Most Productive Authors and Their Scientific Impact

Author	Articles	h-index	g-index	Total Citations
Bennett NJ	3	3	3	700
Hicks CC	3	...	...	...
Thompson BS	3	...	...	...
Belhabib D	2	2	2	183
...	...	...	...	...

Source: Authors' bibliometric analysis using Bibliometrix in RStudio (2026).

While publication productivity is relatively dispersed, scientific influence is more concentrated among several leading researchers. According to the author impact analysis, Bennett N.J. demonstrates the strongest scientific influence with an h-index of 3, g-index of 3, and 700 total citations, despite publishing only three articles. This finding indicates that research influence is determined not only by the number of publications but also by the academic significance and recognition of individual studies. Other influential authors, including Belhabib D., Cottrell R.S., and Fidelman P., also exhibit considerable citation performance, reflecting their important contributions to the advancement of sustainable marine governance and Blue Economy research.

Table 4. Country Contributions and Most Influential Publications

Country	Total Citations	Average Article Citations
Canada	892	81.1
Australia	677	37.6
United Kingdom	424	30.3
Brazil	304	76.0
China	216	15.4
USA	208	23.1
Indonesia	121	11.0

Source: Authors' bibliometric analysis using Bibliometrix in RStudio (2026).

The geographical distribution of scientific influence reveals that research leadership is concentrated in several developed maritime nations. Canada records the highest citation impact with 892 total citations, followed by Australia (677 citations) and the United Kingdom (424 citations). Brazil and China also demonstrate substantial scientific contributions, while Indonesia records 121 total citations with an average of 11 citations per article. The predominance of Canada, Australia, and the United Kingdom reflects the strong research capacity, policy commitment, and international collaboration established within these countries in addressing marine governance and sustainable ocean development. Conversely, Indonesia's relatively modest citation impact, despite being one of the world's largest maritime nations, suggests significant opportunities to strengthen international scientific visibility, particularly in the development of Blue Accounting and sustainable marine resource management.

Table 5. Top Globally Cited Publications in Blue Economy, Blue Management, Blue Carbon, and Blue Accounting Research

Rank	First Author	Year	Journal	Total Citations
1	Bennett NJ	2021	*Marine Policy*	385
2	Bennett NJ	2018	*Marine Policy*	212
3	Soares MO	2020	*Marine Policy*	211
4	Keen MR	2018	*Marine Policy*	189
5	Phelan A	2020	*Journal of Sustainable Tourism*	172

Source: Authors' bibliometric analysis using Bibliometrix in RStudio (2026).

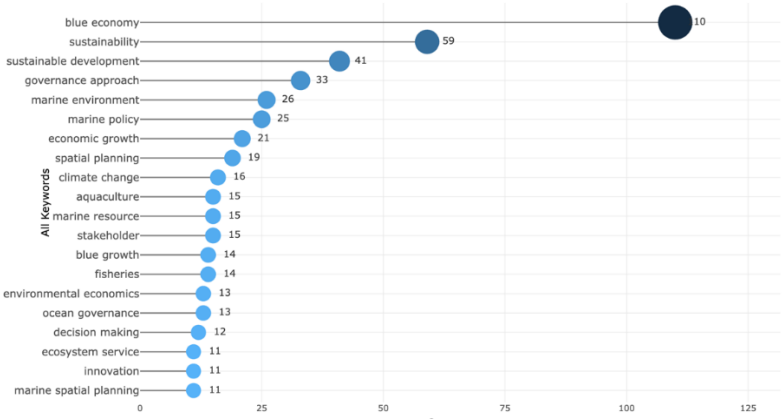
Citation analysis of individual publications further illustrates the intellectual foundations of this research field. The most influential article is Bennett et al. (2021) published in *Marine Policy*, which has received 385 global citations, followed by Bennett et al. (2018) with 212 citations and Soares et al. (2020) with 211 citations. Most of the highly cited publications focus on marine governance, Blue Economy policy, ecosystem conservation, and sustainable ocean management. The dominance of articles published in *Marine Policy* reinforces the central role of governance and policy perspectives in shaping the evolution of Blue Economy research. In contrast, publications explicitly addressing Blue Accounting remain relatively scarce among the most influential studies, indicating that accounting perspectives have not yet become a dominant component of the scientific literature.

Overall, the performance analysis demonstrates that the scientific development of Blue Economy, Blue Management, Blue Carbon, and Blue Accounting has been driven primarily by interdisciplinary collaboration among researchers, journals, and institutions specializing in marine policy, sustainability, and environmental governance. The limited representation of accounting journals and accounting-focused publications suggests that Blue Accounting remains in an early stage of scientific development. Nevertheless, the increasing integration of sustainability, governance, and accountability perspectives indicates considerable potential for future research to establish Blue Accounting as a distinct area within accounting scholarship.

Research Hotspots

To identify the dominant research themes and emerging areas within the field, keyword frequency analysis and trend topic analysis were conducted using author keywords extracted from the 189 publications. These analyses provide an overview of the principal research interests while illustrating how scholarly attention has evolved over time.

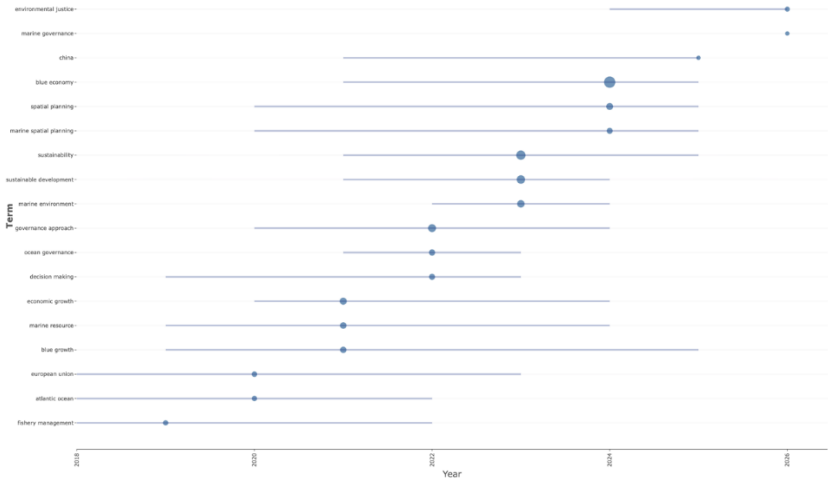
Figure 2. Most Frequent Author Keywords



As presented in **Figure 2**, *Blue Economy* is the most frequently occurring keyword, appearing in **110 publications**, followed by *sustainability* (**59**), *sustainable development* (**41**), and *governance approach* (**33**). Other frequently occurring keywords include *marine environment*, *marine policy*, *economic growth*, *spatial planning*, *climate change*, *aquaculture*, and *marine resource*. The predominance of these keywords indicates that research in this field has expanded beyond marine-based economic development to encompass environmental sustainability, governance, and resource management.

The keyword distribution also highlights the interdisciplinary characteristics of the research field. Economic-related terms such as *economic growth* and *blue growth* remain important, reflecting the original objective of the Blue Economy concept to generate economic value from marine resources. However, the strong presence of sustainability-oriented keywords—including *sustainability*, *sustainable development*, *climate change*, *marine environment*, and *ecosystem service*—demonstrates an increasing emphasis on balancing economic development with environmental conservation. At the same time, governance-related keywords such as *governance approach*, *marine policy*, *ocean governance*, *stakeholder*, and *decision making* indicate that institutional capacity, policy implementation, and stakeholder participation have become central issues in sustainable marine resource management. These findings suggest that contemporary Blue Economy research is no longer confined to economic utilization but has evolved into a multidisciplinary field integrating environmental, social, and governance perspectives.

Figure 3. Trend Topics Research



The temporal development of research topics is further illustrated by the trend topic analysis presented in **Figure 3**. During the earlier period (2019–2021), scholarly attention

primarily focused on *fishery management*, *Atlantic Ocean*, *European Union*, *blue growth*, *marine resource*, and *economic growth*. These topics largely emphasized marine resource utilization, fisheries management, and regional economic development, reflecting the initial implementation of Blue Economy policies aimed at promoting sustainable economic growth from ocean resources.

Beginning in 2022, research priorities gradually shifted toward governance and sustainability. Keywords such as *governance approach*, *ocean governance*, *decision making*, *sustainability*, and *sustainable development* became increasingly prominent, indicating greater academic interest in institutional arrangements, policy effectiveness, and long-term environmental management. This transition suggests that researchers have increasingly recognized that sustainable marine development requires not only economic growth but also effective governance mechanisms, stakeholder engagement, and integrated policy frameworks.

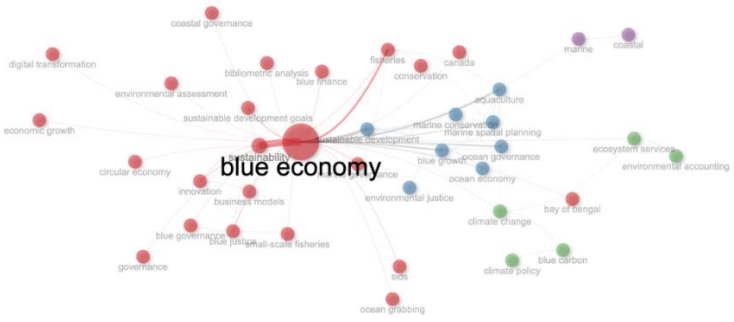
More recent publications, particularly during 2024–2025, introduce emerging themes such as *marine governance* and *environmental justice*. The emergence of these topics reflects a growing concern for equitable access to marine resources, social inclusion, and environmental accountability. Rather than focusing solely on maximizing marine economic benefits, recent studies increasingly examine how governance systems can ensure fairness, resilience, and sustainability in ocean management. This evolution corresponds with global sustainability initiatives emphasizing inclusive governance and responsible utilization of marine resources.

Overall, the keyword and trend topic analyses reveal a clear evolution in the scientific landscape of Blue Economy research. The field has progressed from emphasizing marine resource utilization and economic growth toward broader discussions concerning sustainability, governance, environmental stewardship, and social justice. This progression is particularly significant for the development of Blue Accounting. Although *Blue Accounting* has not yet emerged as a dominant keyword, the increasing prominence of governance, environmental management, ecosystem services, and decision-making indicates that the conceptual foundations necessary for Blue Accounting are gradually being established. These findings suggest that future accounting research can build upon these interconnected themes to develop measurement frameworks, reporting practices, and accountability mechanisms capable of supporting sustainable marine resource management.

Intellectual Structure and Thematic Evolution

To examine the intellectual structure and conceptual development of the research field, science mapping was performed using keyword co-occurrence analysis, thematic mapping, and thematic evolution analysis. These complementary techniques provide insights into the relationships among research topics, identify the maturity of thematic areas, and illustrate the evolution of scientific knowledge over time.

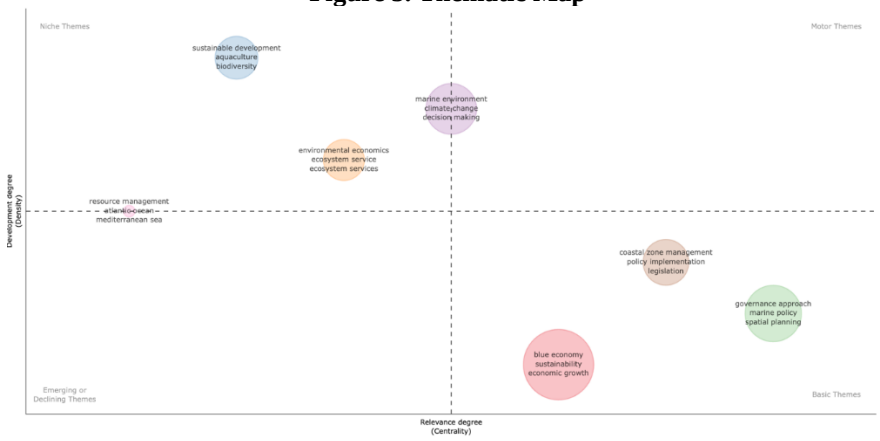
Figure 4. Keyword Co-occurrence Network



The keyword co-occurrence network presented in **Figure 4** demonstrates that Blue Economy serves as the central concept connecting various research themes. As the largest and most interconnected node, Blue Economy is closely associated with *sustainability*, *sustainable development*, *marine conservation*, *ocean governance*, *spatial planning*, and *blue growth*. This network structure indicates that Blue Economy functions as the primary conceptual foundation upon which other research topics are developed. The extensive connections among these keywords further highlight the interdisciplinary nature of the field, integrating perspectives from environmental science, economics, public policy, and resource management.

The network analysis also reveals several distinct thematic clusters. The first cluster is dominated by sustainability and governance-related concepts, including *sustainability*, *governance*, *environmental assessment*, *circular economy*, and *sustainable development goals*, emphasizing the importance of governance mechanisms and sustainable development in marine resource management. A second cluster focuses on marine governance and spatial planning, linking *marine conservation*, *ocean governance*, *spatial planning*, *aquaculture*, and *blue growth*. These themes reflect increasing scholarly attention to integrated coastal and marine planning as a foundation for sustainable ocean management. A third cluster incorporates *climate policy*, *blue carbon*, *ecosystem services*, and *environmental accounting*, indicating an emerging connection between climate mitigation, ecosystem valuation, and environmental accountability. Although *environmental accounting* appears as a relatively smaller node, its linkage with ecosystem services and climate-related topics suggests that accounting perspectives are beginning to be integrated into Blue Economy research.

Figure 5. Thematic Map

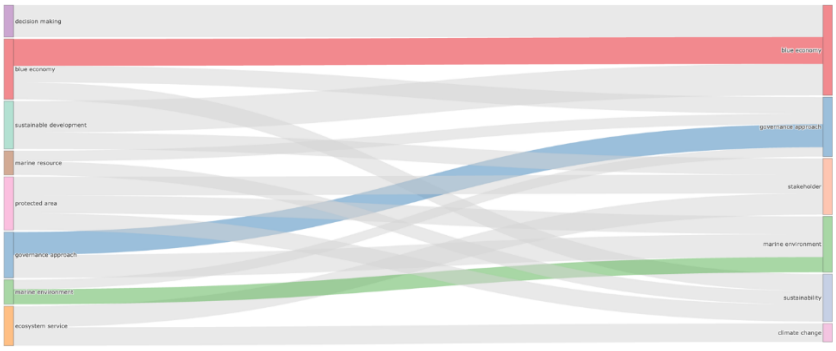


The thematic map presented in **Figure 5** further illustrates the maturity and relevance of research themes. The largest cluster, consisting of *Blue Economy*, *sustainability*, and *economic growth*, is positioned within the Basic Themes quadrant, indicating that these concepts form the fundamental knowledge base supporting the entire research field. Similarly, *governance approach*, *marine policy*, and *spatial planning* are also categorized as Basic Themes, reflecting their high centrality and essential role in advancing sustainable marine governance. These findings demonstrate that governance and sustainability have become indispensable components of contemporary Blue Economy research.

Several themes occupy the Motor Themes quadrant, including *marine environment*, *climate change*, and *decision making*. Their position indicates that these topics are both highly developed and strategically important, driving current research directions. In contrast, *sustainable development*, *aquaculture*, and *biodiversity* appear within the Niche Themes quadrant, suggesting that these areas are well developed but remain relatively specialized within the broader literature. Meanwhile, *resource management*, *Atlantic Ocean*, and *Mediterranean Sea* are located in the Emerging or Declining Themes quadrant, indicating

either newly developing research interests or topics that are gradually receiving less scholarly attention.

Figure 6. Thematic Evolution



The thematic evolution analysis presented in **Figure 6** demonstrates a clear progression in the conceptual development of the field. During the earlier stages, research primarily emphasized Blue Economy, marine resources, protected areas, and sustainable development, reflecting a strong focus on marine resource utilization and conservation. Over time, these themes evolved toward governance approaches, stakeholder engagement, marine environment, sustainability, and climate change, indicating a transition from resource-oriented research toward integrated governance and environmental management. This progression suggests that the scientific discourse has expanded beyond economic development to incorporate institutional, environmental, and social dimensions of sustainable ocean governance.

An important finding emerging from the science mapping analysis is the growing linkage between governance, sustainability, ecosystem services, climate policy, and environmental accounting. Although Blue Accounting does not yet appear as a dominant keyword within the conceptual network, the increasing integration of these interconnected themes indicates that the intellectual foundations necessary for Blue Accounting are gradually being established. The convergence of governance, environmental accountability, ecosystem valuation, and sustainability reporting creates a conceptual environment in which Blue Accounting can develop as a distinct interdisciplinary research field.

Overall, the intellectual structure and thematic evolution demonstrate that Blue Economy research has undergone a significant transformation over the past two decades. The field has evolved from emphasizing marine economic development toward a broader framework integrating governance, sustainability, climate resilience, and environmental accountability. This evolution provides strong theoretical support for the emergence of Blue Accounting as a mechanism capable of measuring, reporting, and evaluating sustainability performance within marine resource management. Consequently, Blue Accounting should be viewed not as an isolated accounting concept, but as the next stage in the scientific evolution of Blue Economy research.

Development of Blue Accounting

The findings of this bibliometric study indicate that Blue Accounting has not yet emerged as a dominant or independent research theme within the existing scientific literature. Instead, the analysis demonstrates that its conceptual development has evolved progressively through the convergence of several established research domains, particularly Blue Economy, Blue Management, Blue Carbon, sustainability, and environmental governance.

The performance analysis revealed that the majority of publications are concentrated in journals specializing in marine policy, environmental management, and sustainability, while

only a limited number of studies have been published in accounting-related journals. Similarly, the most influential publications primarily discuss marine governance, ecosystem conservation, sustainable development, and policy implementation rather than accounting practices. These findings indicate that the scientific discourse surrounding Blue Economy has been dominated by environmental and policy perspectives, whereas accounting remains underrepresented within this interdisciplinary research field.

The science mapping analysis further reinforces this observation. The keyword co-occurrence network demonstrates that *Blue Economy* functions as the central concept linking sustainability, governance, marine conservation, climate change, ecosystem services, and environmental accounting. Moreover, the thematic map identifies sustainability and governance as the principal foundational themes supporting current research, while thematic evolution analysis illustrates a gradual transition from marine resource utilization and economic growth toward governance, stakeholder participation, environmental sustainability, and climate resilience. Collectively, these findings suggest that the scientific focus has shifted from "how marine resources generate economic value" toward "how marine resources should be governed and managed sustainably."

This transition provides a strong conceptual basis for the emergence of Blue Accounting. As marine governance becomes increasingly dependent on transparency, accountability, and evidence-based decision-making, conventional accounting systems are no longer sufficient to capture the multidimensional impacts of marine resource utilization. Existing accounting approaches primarily emphasize financial performance and, to some extent, environmental reporting; however, they remain limited in representing ecosystem services, blue carbon assets, marine biodiversity, and other forms of natural capital associated with ocean-based economic activities. Consequently, Blue Accounting has the potential to bridge this gap by integrating financial, environmental, and social information into a comprehensive accountability framework specifically designed for sustainable marine resource management.

Based on the bibliometric findings, the development of Blue Accounting can be conceptualized as a progressive evolution rather than an entirely new research domain. The scientific trajectory identified in this study suggests that Blue Accounting has developed through several interconnected stages. Initially, research concentrated on the economic utilization of marine resources through the Blue Economy paradigm. As sustainability challenges became more prominent, scholarly attention expanded toward governance mechanisms represented by Blue Management. Subsequently, increasing concerns regarding climate change stimulated the development of Blue Carbon research, emphasizing the ecological value of coastal and marine ecosystems. The convergence of these economic, governance, and environmental dimensions has gradually created the conditions necessary for the emergence of Blue Accounting as an integrated accountability framework capable of measuring, reporting, and evaluating sustainable marine development.

Accordingly, this study proposes a conceptual pathway illustrating the evolution of Blue Accounting:

Blue Economy → Blue Management → Blue Carbon → Blue Accounting

Within this framework, Blue Economy establishes the vision of sustainable ocean-based economic development, Blue Management provides governance mechanisms for implementing that vision, Blue Carbon highlights the ecological and climate-related value of marine ecosystems, while Blue Accounting integrates these dimensions into measurable, reportable, and accountable information to support sustainable decision-making.

The findings also highlight several opportunities for future research. Since Blue Accounting remains in an emerging stage, future studies should focus on developing

conceptual frameworks, measurement indicators, reporting standards, and empirical applications that can be implemented across marine industries, fisheries, coastal management, maritime transportation, offshore renewable energy, and other ocean-based sectors. Such developments would strengthen the role of accounting in supporting sustainable marine governance and contribute to achieving broader sustainability objectives, particularly those related to SDG 14 (*Life Below Water*).

Overall, the bibliometric evidence indicates that Blue Accounting should not be viewed merely as an extension of environmental accounting but rather as an interdisciplinary framework emerging from the integration of economic development, environmental sustainability, governance, and climate resilience within the Blue Economy paradigm. This finding represents the principal contribution of the present study by providing a comprehensive conceptual understanding of how Blue Accounting has evolved and identifying future directions for advancing research in this emerging field.

CONCLUSION

This study examined the scientific development of Blue Accounting through a bibliometric analysis of Scopus-indexed publications related to Blue Economy, Blue Management, Blue Carbon, and Blue Accounting. The findings demonstrate that research in this field has experienced significant growth over the past two decades, reflecting increasing scholarly interest in sustainable marine development. The bibliometric evidence indicates that the scientific landscape is characterized by strong international collaboration and interdisciplinary contributions, with research primarily published in journals focusing on marine policy, sustainability, and environmental governance rather than traditional accounting disciplines.

The science mapping analysis further reveals that the intellectual structure of the field has evolved from an initial emphasis on marine resource utilization and economic growth toward broader themes encompassing sustainability, governance, ecosystem services, climate change, and environmental accountability. These thematic developments demonstrate that contemporary Blue Economy research increasingly recognizes the importance of integrating economic, environmental, and governance perspectives to achieve sustainable marine resource management.

A key contribution of this study is the identification of the conceptual pathway through which Blue Accounting has developed. Rather than emerging as an isolated accounting concept, Blue Accounting has evolved progressively through the integration of Blue Economy, Blue Management, and Blue Carbon. This finding provides a clearer understanding of the scientific foundation of Blue Accounting and positions it as an interdisciplinary accountability framework capable of supporting the measurement, reporting, and evaluation of sustainable marine resource management.

From a theoretical perspective, this study enriches the sustainability accounting literature by providing a comprehensive knowledge mapping of Blue Accounting and clarifying its relationship with related research domains. The proposed conceptual evolution contributes to a deeper understanding of how accounting can support sustainable ocean governance through the integration of environmental, social, and economic information. From a practical perspective, the findings offer useful insights for researchers, policymakers, and practitioners seeking to develop accounting frameworks and reporting mechanisms that strengthen transparency, accountability, and evidence-based decision-making in marine resource management.

Despite these contributions, Blue Accounting remains an emerging research field with limited representation in accounting journals. Therefore, future studies should focus on developing conceptual models, standardized measurement indicators, reporting frameworks,

and empirical applications across various ocean-based industries. Such efforts will contribute to advancing both accounting scholarship and sustainable marine governance while supporting the broader implementation of the Blue Economy.

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