

Research Article

A bibliometric analysis of blue growth: Trends, challenges, and opportunities

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ABSTRACT

The European Union is leading the Blue Growth initiative as a strategic approach to increasing economic prosperity in Europe's seas despite today's challenges. Drawing on the EU's Green Growth initiative, Blue Growth extends sustainability principles to marine areas, solidifying commitments to the sustainable management of marine ecosystems and the promotion of technological innovations. This initiative focuses on sectors such as energy, aquaculture, tourism, and biotechnology in coastal and offshore environments. Blue Growth has increased in importance following major events such as Rio+20 and has had a significant impact on ocean and marine resource management practices. In this study, we conduct a comprehensive bibliometric analysis to trace the trajectory of global research on blue growth across science, policy, and the blue economy over the 17 years since the term's inception in 2007. We analyze blue growth using bibliometric techniques. Examining the blue growth literature, identifying key contributors, collaborations, research trends, and gaps. Our analysis covers publication outputs, institutional affiliations, author collaborations, research themes, and alignment with the Sustainable Development Goals (SDGs). Blue growth research is aligned with several Sustainable Development Goals, particularly SDG 14 (Life Below Water) and SDG 15 (Life on Land), highlighting marine conservation and land-sea ecosystem connectivity. Keyword analysis underlines the interdisciplinary nature of blue growth research, highlighting key themes such as the blue economy, aquaculture, and sustainable development. Institutional analysis identifies the University of Exeter and CNR as key contributors, while country-level analysis highlights global collaboration networks. Citation analysis reveals the intellectual structure of blue growth research, with marine biology, oceanography, sustainability science, and climate change among the prominent themes. During the 17-year period from 2007 to 2024, there was a significant increase in publication output, especially from 2013 onwards. Key countries contributing to this research include the UK, US, Germany, Italy and Spain, reflecting extensive global collaboration. The research emphasizes a strong commitment to sustainability, with a heavy emphasis on Environmental Science and Ecology. Alignment with the Sustainable Development Goals (SDGs) emphasizes a focus on marine conservation (SDG 14) and land-sea ecosystem connectivity (SDG 15). Keyword analysis reveals critical themes such as "blue economy," "aquaculture," and "sustainable development," with an emphasis on interdisciplinary approaches. Institutionally, the University of Exeter and CNR stand out among the contributors.

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INTRODUCTION

The European Union has spearheaded the Blue Growth initiative, envisioning it as a strategic tool for fostering economic prosperity within European seas amidst challenges such as climate change, dwindling natural resources, heightened environmental vulnerabilities, urbanization trends, and the burgeoning population in coastal areas [1]. Building upon the EU's 2010 Green Growth initiative, Blue Growth extends its sustainability ethos to marine domains [2,3]. This strategic framework is anchored in pledges for the sustainable stewardship of marine ecosystems and the promotion of technological innovations, which serve as catalysts for both technological and economic advancement [4]. Blue Growth focuses particularly on sectors such as energy, aquaculture, tourism, mining, and biotechnology within coastal and offshore environments [5]. The prominence of Blue Growth and its allied concepts has surged in recent years, particularly following significant events like Rio + 20, exerting a substantial influence on oceanic and marine resource management practices [6,7]. Blue growth is a term that was introduced in 2007 to describe a sustainable growth strategy that aims to harness the economic potential of oceans, seas, and coastal areas while preserving their environmental health. This concept is part of the broader sustainable development agenda and focuses on balancing economic growth with the need to protect marine ecosystems. [7]. Moreover, this holistic approach to marine resource management not only underscores the importance of conservation but also emphasizes the potential for innovation and economic growth within sustainable parameters [8,9]. By integrating environmental preservation with technological progress, Blue Growth not only addresses immediate challenges but also paves the way for a more resilient and prosperous future for coastal communities and marine ecosystems alike [10,11]. Efforts to manage marine resources are increasingly streamlined with the concept of 'blue growth', a recent addition to the discourse [12,13]. Stemming from the principles of sustainable development (SD), which have been under international scrutiny since the 1960s, blue growth seeks to balance the sustainable utilization of natural resources with economic and social objectives [14]. The European Commission (EC) introduced the Blue Growth agenda in 2012, extending the ethos of the 'Green Economy' to encompass the 'Blue World' or 'Blue Economy' [15]. This paradigm shift aims to harness sustainable growth opportunities in marine, maritime, and coastal domains. The overarching goal is to maximize benefits from the responsible development of marine ecosystems [16,17]. Under the Blue Growth agenda, economic activities are poised to impact the marine environment, particularly concerning the concept of Good Environmental Status (GES). Within the framework of European Union (EU) policies, a clean, healthy, and productive marine environment is paramount [18,19]. National governments and corporate entities alike are championing the blue growth agenda, positioning oceans as fertile ground for development, replete with opportunities to fuel economic expansion [20], [21]. The European Union, with its 'Blue Growth Strategy', iden-

tifies oceans as pivotal drivers of the European economy. Realizing their potential necessitates fostering market forces by dismantling barriers and addressing market failures that impede innovation and investment. Within the scope of bibliometric analysis, the field of blue economy, which forms the basis for global studies on Blue Growth, should be discussed. This study aims to explore the trajectory of global research concerning Blue Growth, encompassing its implications across science, policy, and the blue economy. The purpose is to trace the expansion of literature, identify key contributors, analyze collaborative efforts, and highlight research trends and gaps within this domain.

To effectively measure and analyze the progress and impact of these efforts, bibliometric analysis provides a valuable tool. Bibliometric analysis is an analytical technique that is often employed in systematic literature reviews—it involves the quantitative analysis of scholarly works [22]. Through bibliometric analysis, we can evaluate the productivity (i.e., publications) and impact (i.e., citations) of research (e.g., articles) and contributors (e.g., authors, institutions, countries/territories, funders, subject areas) in the field—this relates to “performance analysis,” [23-25] which is one of the two major components in bibliometric analysis. Nonetheless, given the complex world of scholarly research, bibliometric data is often ambiguous, in that it can be meaningless on its own, diverse due to varying formats, and expansive, often including hundreds to thousands of records. These characteristics reflect the multifaceted dynamics of research production (i.e., publication) and consumption (i.e., citation).

In this study, we examine the trajectory of global research concerning blue growth within the realms of science, policy, and the blue economy. Our analysis offers a comprehensive overview of the developments observed and the publications produced during the 17-year span following the introduction of the term "blue growth" in 2007. These objectives encompassed: a) tracing the expansion of blue growth literature across time; b) delineating the countries, institutions, publishing entities, and authors contributing to blue growth discourse; c) uncovering collaborative efforts among nations and institutions in advancing blue growth initiatives and disseminating related studies; and d) discerning prevailing research trends and identifying gaps within this domain.

MATERIALS AND METHODS

The study employs bibliometric analysis to examine the evolution of Blue Growth literature from its inception in 2007. This analytical technique involves quantitative assessment of publications and citations to elucidate productivity and impact across various dimensions: countries, institutions, authors, and collaborative networks. By synthesizing data from scholarly databases, the study aims to provide a comprehensive overview of research dynamics in the field. In May 2024, our study utilized a bibliographic search employing the Web of Science (WoS) database. WoS stands as a premier academic information resource, encompassing an extensive

array of subjects worldwide, thereby furnishing scholars with comprehensive academic insights [26]. The core collection of WoS, which serves as the primary data source for this paper, comprises several key databases, namely Conference Proceedings Citation Index-Science (CPCI-S), Science Citation Index Expanded (SCI-EXPANDED), Social Sciences Citation Index (SSCI), Current Chemical Reactions (CCR-EXPANDED), and Index Chemicus (IC).

We examined publications from WoS's proprietary data spanning 2007 to 2024, utilizing "blue growth" as the search criterion. Documents featuring "blue growth" in the title, keywords, and/or abstract were included. Bibliometric analysis was carried out utilizing VOSviewer an open-source tool facilitating data visualization and both descriptive and quantitative analysis of bibliographic data. To ascertain the most prolific countries, each publication was attributed to the country of its corresponding author. A collaboration world map was generated to enhance the visualization of international cooperation among countries, distinguishing between Single Country Publications (involving authors from the same country) and Multi-Country Publications (featuring authors from multiple countries). To complement the global perspective provided by the collaboration world map, we conducted a network analysis utilizing authors' affiliations as the units of analysis. The institution collaboration network illustrates how institutions interact in blue growth research, highlighting pertinent institutions within specific research themes. The graphical representation of this network comprises several clusters, with institutions depicted as nodes (scaled according to their significance) and links denoting collaborations. Furthermore, we conducted a co-word analysis utilizing publication keywords to identify and visualize key themes within blue growth research.

RESULTS AND DISCUSSIONS

Results

Bibliometric analysis provides significant insights into the research landscape in a specific discipline, offering light on trends, patterns, and areas of attention. The wide range of article types encountered in the analysis of blue growth literature, including articles, books, book chapters, data papers, early access publications, editorial materials, letters, reviews, and proceeding papers, demonstrates the multifaceted nature of scholarly contributions to this field. Each sort of publication serves a certain purpose and contributes to the advancement of knowledge in blue growth. For example, research articles and data papers present empirical evidence and theoretical frameworks, whereas book chapters and books give detailed analyses and synthesis of current information. Editorials and letters may offer perspectives on new issues or conflicts, whereas reviews provide critical assessments of current work. Proceeding articles frequently report preliminary results or explain ongoing scientific projects. The variety of publication types reflects the interdisciplinary character of blue-growth research, with contributions from domains like marine biology, economics, policy studies, and engineering.

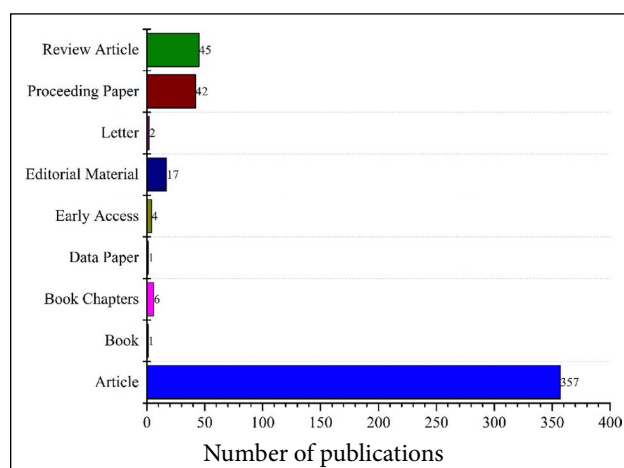


Figure 1. Research type of blue growth articles regarding WoS data.

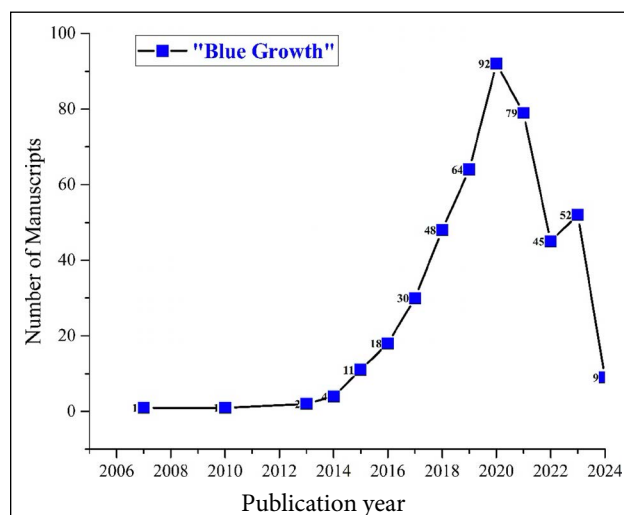


Figure 2. Number of articles published on blue growth by year according to the WoS data.

Understanding the distribution of various publication genres can assist academics and policymakers in assessing the breadth and depth of scholarly engagement with blue growth, identifying gaps in knowledge, and prioritizing areas for future research and collaboration. As shown in Figure 1, a significant 75.16 percent of research-focused articles in the field of blue growth compiled from WoS data are articles.

This statistic underscores the heavy focus on empirical research and scientific discourse within the discourse surrounding blue growth. Based on the article "The sheer breadth of contributions highlights the depth of research and scholarly engagement within academic communities in uncovering the complexities of the blue growth phenomenon.

Figure 2 shows the number of published articles on blue growth in 2007-2024. From 2007 to 2022, there was a discernible upward trajectory in the volume of published articles. The study period is delineated into three distinct phases: Phase I spanning 2007-2013; Phase II from 2013-2022; and Phase III from 2022 onwards. Initially, during Phase I, the

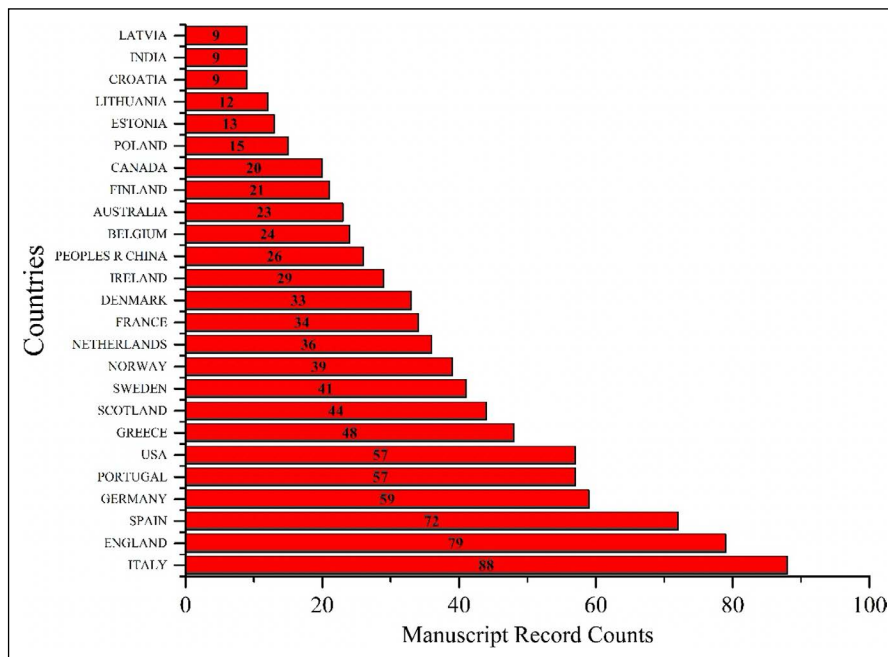


Figure 3. Countries contributed to the manuscripts of the blue growth field according to the WoS data.

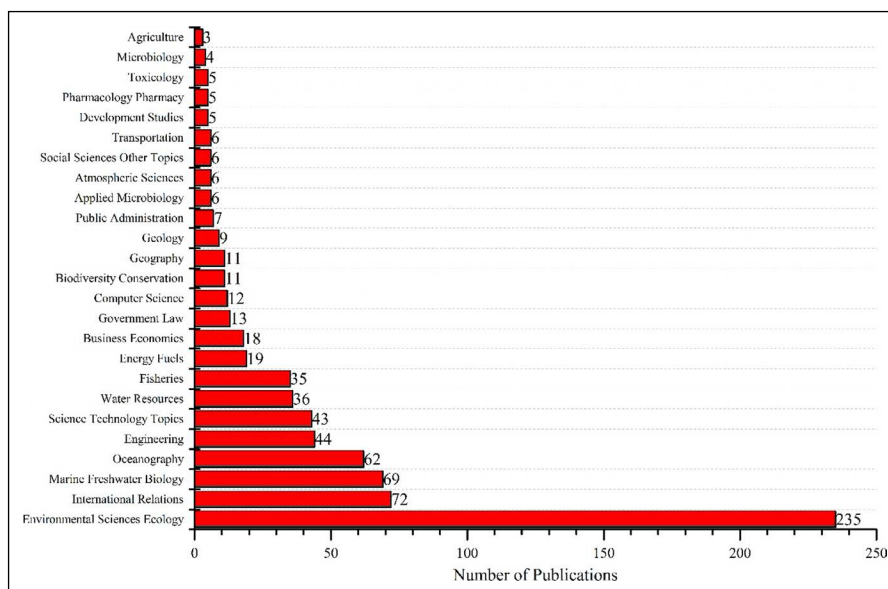


Figure 4. Research areas of blue growth articles according to the WoS data.

number of publications remained relatively stagnant from 2007 to 2013. However, from 2013 to 2022, there was a noticeable uptick in publication numbers. Subsequently, post-2022, there was a discernible decline in publication output.

Knowing which nations have contributed publications on the subject of blue growth based on WoS data provides various bibliometric benefits. For starters, it sheds light on the global distribution of research activities and identifies geographic regions with a high level of interest and investment in blue growth. This data can be used to pinpoint locations that may be underrepresented or ignored in blue growth research and development, as well as those that are at the forefront of the field. Furthermore, examining national contributions makes it possible to evaluate global alliances and

collaborations, exposing trends in information sharing and cooperation among researchers worldwide. In order to promote innovation and sustainable development in the marine and maritime sectors globally, strategic decisions on funding priorities, policy development, and resource allocation can be made with more knowledge about the geographic distribution of blue growth research output. The countries that spent the most effort on bibliometric studies were Italy, England and Spain (Fig. 3). It is noteworthy that researchers in Republic of China, who have made many contributions to the scientific literature, do not show interest in this issue.

To delve deeper into the research themes within the realm of blue growth over the past 17 years, an analysis was conducted using WoS data (Fig. 4). The findings indicate that

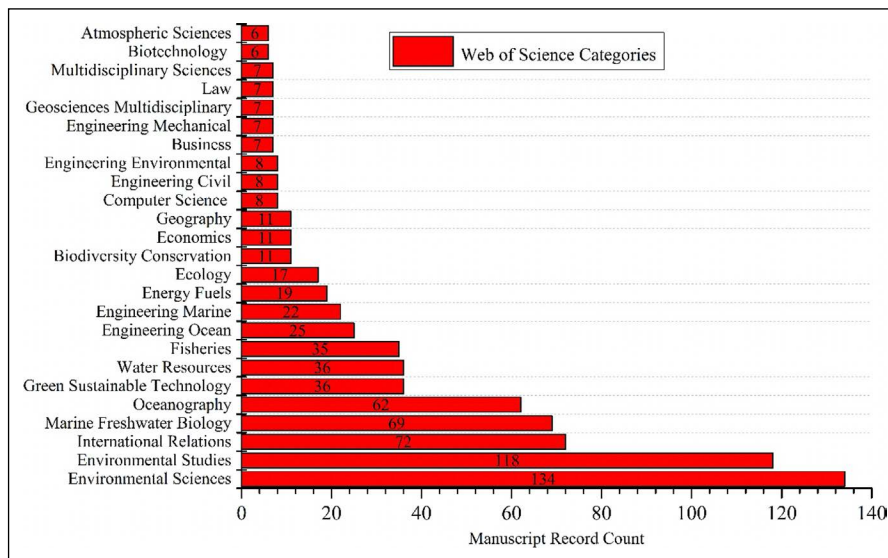


Figure 5. Categories of blue growth articles according to the WoS data.

the primary areas of research focus are Environmental Science and Ecology, followed closely by Business Economics. This suggests that environmental science has emerged as the predominant direction within this field of study, serving as its cornerstone for advancement. Consequently, disciplines related to the environment lay the groundwork for research on the sustainable progression of blue growth. Categories of blue growth articles according to the WoS data is shown in Figure 5.

The examination of Web of Science (WoS) data sheds light on how blue growth research aligns with the European Union's (EU) Sustainable Development Goals (SDGs). It is worth noting that the corpus of studied publications addresses the bulk of the SDGs, except for targets 1, 5, and 10. A major amount of the study, consisting of 289 papers, is related to SDG 14: Life Below Water, demonstrating a strong emphasis on marine conservation, sustainable fishing, and the overall health of ocean ecosystems. Furthermore, the findings show a strong emphasis on SDG 15: Life on Land, with 264 items tagged as relevant to this target. This implies an understanding of the connectivity of terrestrial and marine ecosystems, emphasizing the significance of comprehensive approaches to environmental sustainability and biodiversity conservation. Moreover, the presence of research linked to SDG 13: Climate Action (64 articles) and SDG 7: Affordable and Clean Energy (31 articles) underscores the recognition of the crucial role of renewable energy, mitigation of climate change impacts, and sustainable resource management in the context of blue growth initiatives (Table 1). Overall, the observed alignment between blue growth research and a wide range of SDGs signifies the interdisciplinary nature of efforts aimed at advancing sustainable development in coastal and marine environments. By addressing various dimensions of sustainability, from environmental conservation to socioeconomic equity, researchers and policymakers contribute to the collective endeavour of achieving a more resilient and prosperous future for both humanity and the planet.

The analysis, carried out using VOSviewer, provided insights into the keywords associated with blue growth. 1,239 keywords were examined. Among these, "blue growth" stood out with 175 occurrences (O) and a total link strength (TLS) of 846. In addition, keywords such as "blue economy" (O: 78, TLS: 381), "aquaculture" (O: 51, TLS: 274) and "sustainable development" (O: 30, TLS: 150) were identified as significant (Fig. 6). Highlighting the importance of the data mining analysis of keywords within the articles, it becomes clear that certain terms play a crucial role in understanding the discourse on blue growth. Notable keywords include "maritime spatial planning", "sustainability", "climate change", "fisheries", "ocean governance", "Baltic Sea", "ecosystem services" and "ocean economy". Such an analysis underlines the importance of delving into the intricate web of article's keywords in order to grasp the multifaceted dimensions of blue growth. This can enhance our understanding and guide future research efforts. Keyword usually indicates the main purpose of any article in depth and they can easily explain as shown in Figure 6, some keywords were found whose occupancy rates maintained their position in both. Figure 6 shows the most common author keywords and the author keyword network in articles. The most popular keywords of the authors are blue growth, blue economy and sustainable economy.

This is confirmed by the fact that the topic of innovation in the field of blue growth is a development topic. The bibliographic coupling of universities studied on blue growth subjects can be seen in Figure 7.

Institutional analysis has proven to be more insightful than author-centered analysis because of its immunity to the mere act of renaming, which often occurs without changing the underlying institutional hierarchy. In this regard, the University of Exeter stands out as the university that hosts the highest number of published academics.

Table 1. Distribution of blue growth articles regarding EU sustainable development goals






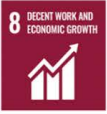







EU Sustainable Development Goals	Manuscript Record Count
	1
	15
	5
	11
	31
	3
	12
	22
	2
	64
	289
	264
	4

Table 2. Top 25 research profiles of mostly published authors of blue growth articles

Researcher profiles	Record count
Kotta, Jonne	8
Van Den Burg, SanderW. K.	7
Galparsoro, Ibon	7
Kyvelou, Stella Sofia	6
Borja, Angel	6
Murillas-Maza, Arantza	6
Barbanti, Andrea	5
Aura, Christopher Mulanda	5
Rebours, Celine	5
Collu, Maurizio	5
Calado, Helena	5
Hicks, Christina	5
Krost, P.	4
Guerreiro, Jose	4
Kaasik, Ants	4
Depellegrin, Daniel	4
Gissi, Elena	4
Soma, Katrine	4
Johnson, Kate	4
Froehlich, Halley E.	4
Alsaleh, Mohd	4
Ierapetritis, Dimitrios	4
Muggiasca, Sara	4
Lillebø, Ana I	4
Flannery, Wesley	4

Additionally, leveraging the WOS database allows determining the number of co-authors affiliated with a particular institution, providing an estimate of the size of the research community. However, it is important to recognize inherent disparities in institution sizes, as top-tier institutions often have larger research groups than their lower-ranked counterparts. Considering these factors, it was concluded that University Exeter and CNR emerged as the most efficient institutions.

The analysis conducted using VOSviewer, based on the aforementioned results, sheds light on the scholarly contributions of various countries to the discourse on blue growth. A time frame from 2007 to 2024 was chosen to identify node types, with each year represented separately. Vosviewer was used to create a co-occurrence knowledge map showing research on sustainable development within the blue economy across countries (Fig. 8). In this map, each node corresponds to a specific country or region, with a size indicator showing the volume of articles published. Links defined by lines between nodes express cooperative relationships and proximity between countries or regions.

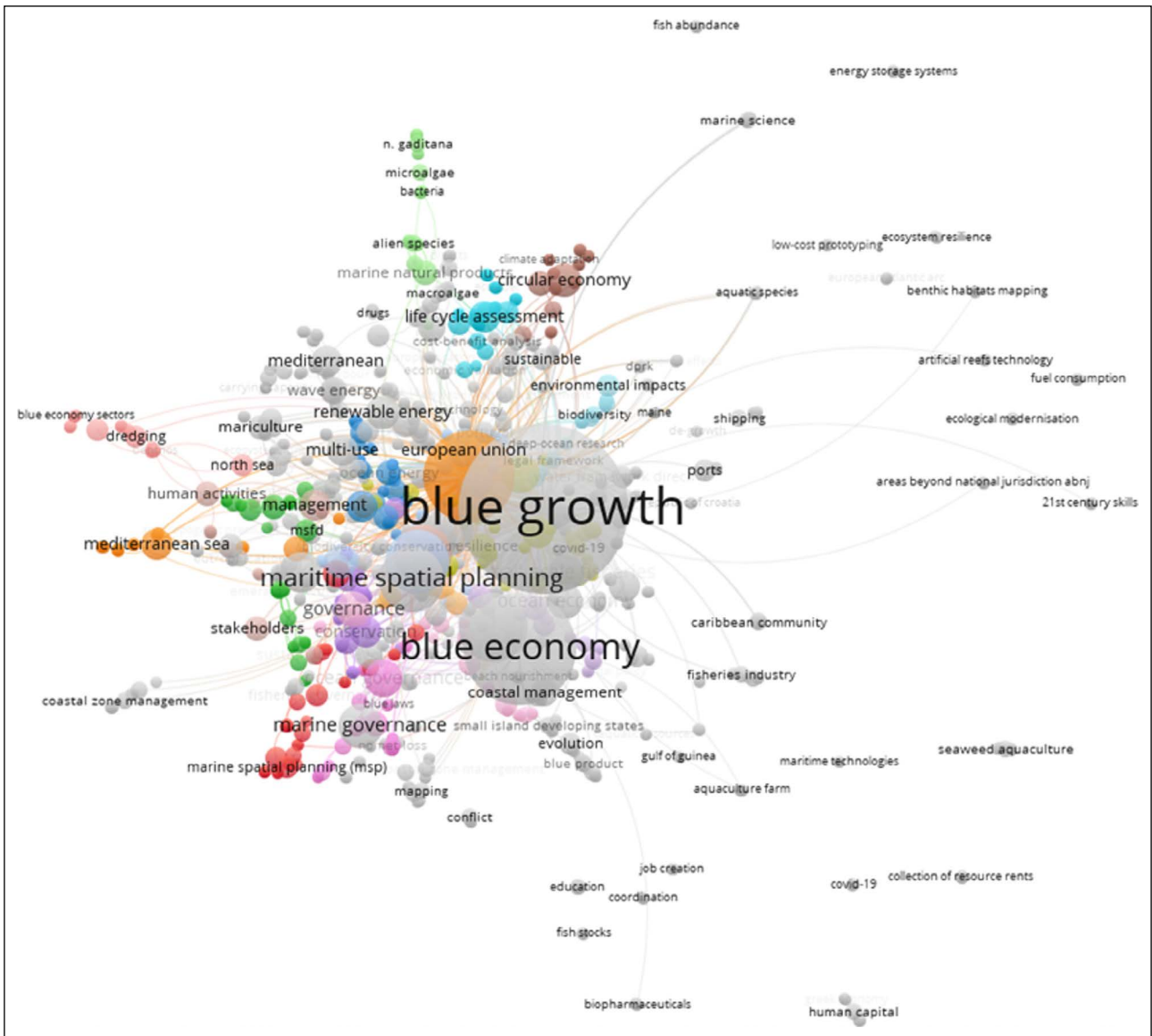


Figure 6. Keywords analysis of “blue growth” according to the Web of Science database.

Examining the frequency of publications on sustainable blue economy development from 2007 to 2024 it can be seen that the biggest contributors in terms of publication volume are the UK, the USA, and Germany. Italy emerges as a notable contributor with 86 articles, accompanied by an impressive citation count of 1844 and a total link strength (TLS) of 31707. Similarly, Spain exhibits substantial involvement, with 70 documents, 1609 citations, and a TLS of 33854. Moreover, it is evident that countries like England, Germany, Portugal, the USA, Scotland, France, Sweden, Norway, and Greece also have a significant presence in terms of the number of articles contributed to this field. This global distribution underscores the international interest and collaboration in researching and understanding blue growth, reflecting the diverse perspectives and expertise involved in advancing knowledge and solutions in this domain. Such analyses not only highlight the geographical distribution of research efforts but also provide insights into the interconnectedness and collaboration networks

among researchers and institutions worldwide. This collective endeavor is crucial for addressing the challenges and opportunities posed by blue growth, fostering innovation, and promoting sustainable practices for the benefit of both marine ecosystems and human societies.

Abstract field analysis of blue growth articles based on WoS data reveals the most frequently used keywords as “blue,” “ecology,” “tourism,” and “production.” These keywords highlight the primary focal points of research on blue growth. Figure 9 provides a more detailed depiction of the frequency and relationships of these keywords.

Table 2 shows the research profiles of the authors of articles published on the topic of “blue growth”. “Blue growth” is a term often used for sustainable use of marine and ocean resources and economic growth. The name and number of records of each researcher in the articles are listed. Researchers may have discussed the issue of blue growth in their articles and conducted studies in this area. Jonne Kot-



Figure 7. Bibliographic coupling of universities according to the WoS data.

ta wrote eight articles, while Sander W.K. Van Den Burg and Ibon Galparsoro are authors of seven articles each. Some researchers are represented by six, five or four articles, while others are represented by fewer articles. Table 3 shows the density and contributions of researchers working in the field of blue growth.

Citation themes offer important insights on the thematic focus and the most important study subjects in the field, especially when considered in the context of meso records of blue growth based on WoS data. Researchers can find important themes, new trends, and foundational publications that have greatly advanced our understanding of blue development by examining citation patterns. Many areas, such as marine biology, oceanography, fisheries management, aquaculture, marine biotechnology, coastal zone management, maritime transportation, marine renewable energy, and blue economy policies, may be covered by these citation topics. Researchers can map the field's intellectual structure, find interdisciplinary linkages, and uncover areas of convergence or divergence within blue-growth re-

Table 3. Citation topics meso records of blue growth regarding WoS data

Record count	Citation topics meso	
3.2	Marine biology	272
8.205	Ocean dynamics	26
6.115	Sustainability science	17
6.153	Climate change	9
3.40	Forestry	8
6.27	Political science	8
3.198	Mycotoxins	7
6.223	Hospitality, leisure, sport & tourism	7
6.122	Economic theory	6
6.86	Human geography	6
8.19	Oceanography, meteorology & atmospheric sciences	6
4.84	Supply chain & logistics	5
6.3	Management	5
8.8	Geochemistry, geophysics & geology	4
3.171	Photoproductivity	3
3.60	Herbicides, pesticides & ground poisoning	3
4.169	Remote sensing	3
6.10	Economics	3
6.294	Operations research & management science	3
8.283	Archaeometry	3
2.241	Membrane science	2
3.83	Bioengineering	2
4.237	Safety & maintenance	2
4.284	Human computer interaction	2
1.163	Parasitology - general	1

search by having a thorough understanding of the issues that receive the most citations. It also makes it easier to find gaps in the literature, emphasizing areas that require more research and cooperation to address urgent issues and progress the sustainable development of marine resources and ecosystems. Blue growth is a concept that includes the aim of sustainably sustaining growth in the sea and ocean and the economic, social, and growth derived from these resources. These citations reflect the diversity of research conducted in various disciplines on the resilience of blue growth. Topics such as marine biology, economics, sustainability science, climate change, and tourism are prominent areas expanded on blue growth.

Table 4 shows and it can be noted that the journals Marine Policy and Frontiers in Marine Science are prominently featured among the journals where blue growth articles are published.

Table 4 provides a breakdown of the journals in which articles on blue growth have been published and the number of records corresponding to each publication title. These jour-

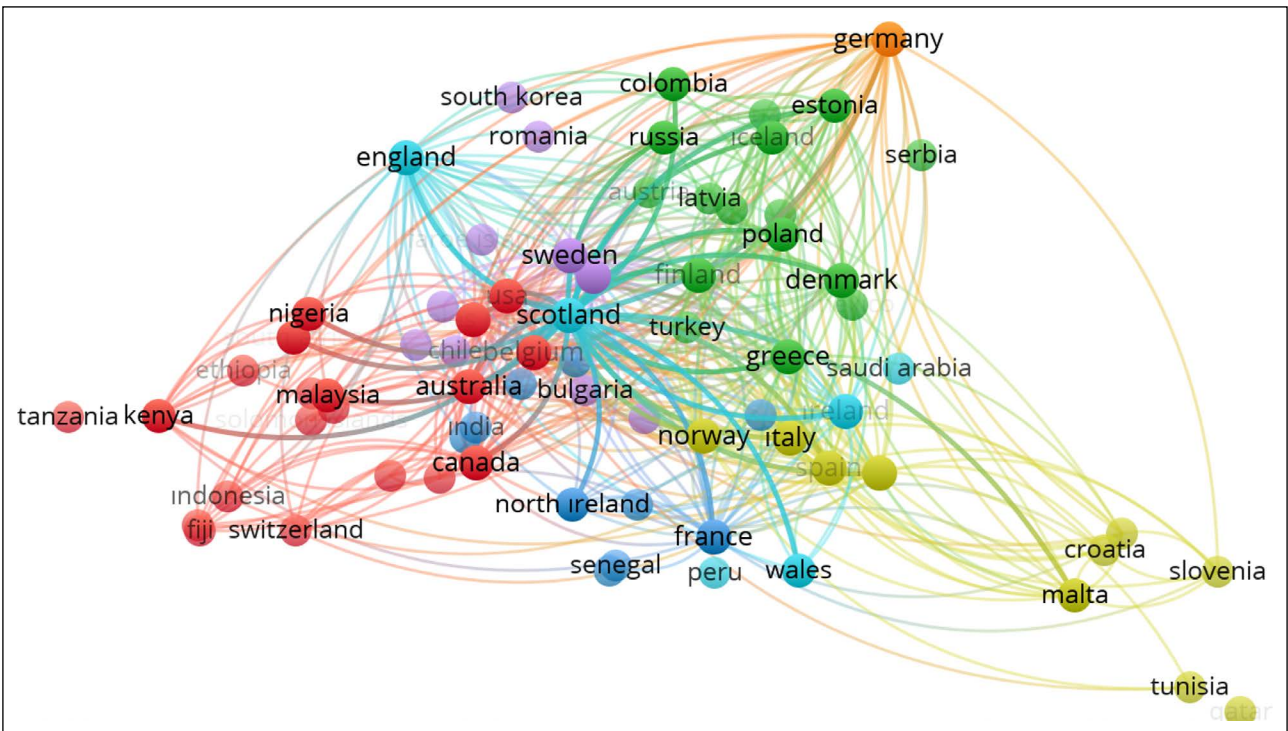


Figure 8. Countries' manuscripts and citations, and their collaboration relations on the blue growth subject.

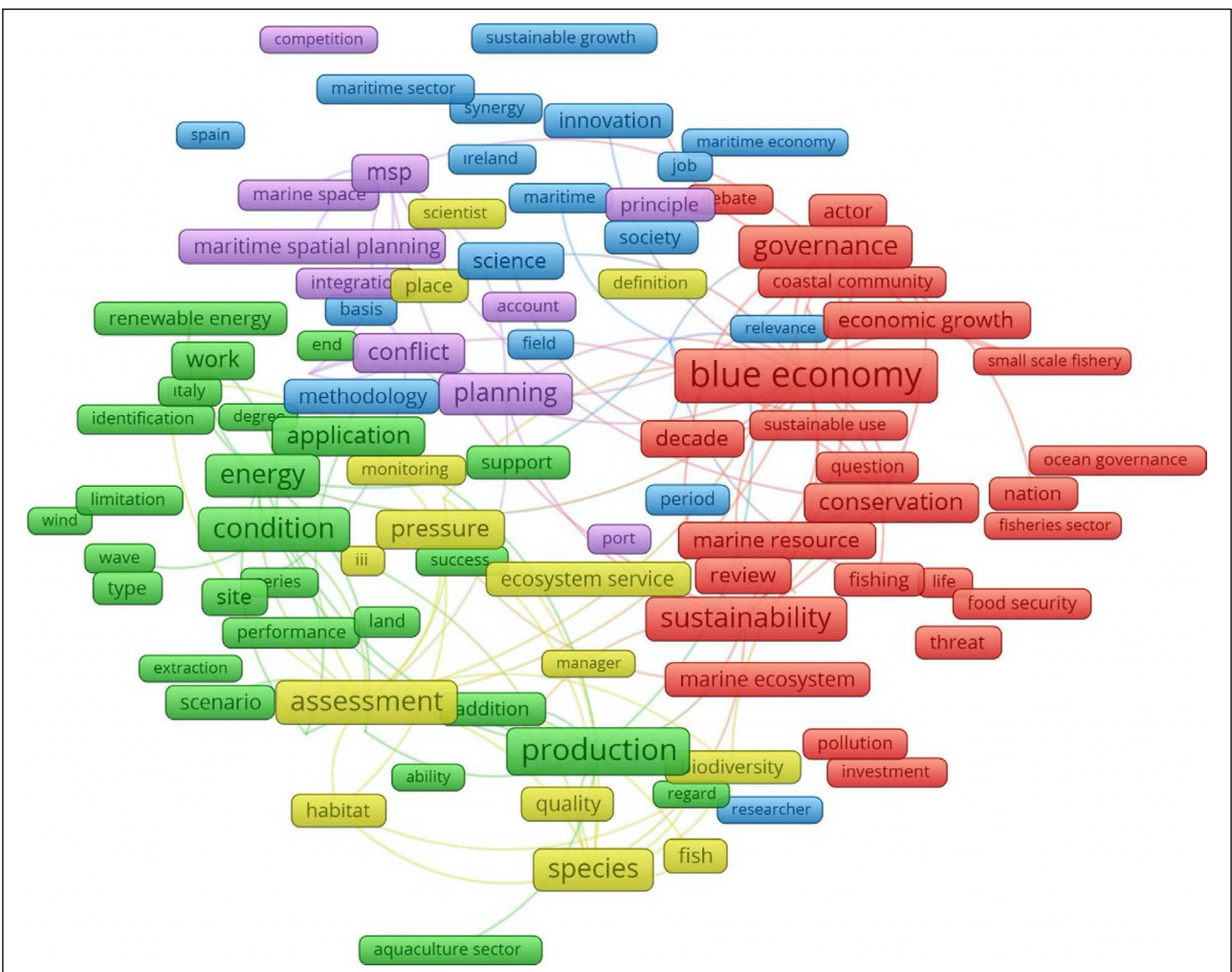


Figure 9. Abstract field analysis of blue growth articles according to the WoS data (10 occurrences).

Table 4. Journals that blue growth articles published

Publication titles	Record count
Marine Policy	68
Frontiers in Marine Science	33
Ocean Coastal Management	23
Maritime Studies	15
Sustainability	13
Science of the Total Environment	12
Sustainability Science	8
Ices Journal of Marine Science	7
Ocean Engineering	6
Water	6
Algal Research Biomass Biofuels and Bioproducts	5
Aquaculture	5
Journal of Marine Science and Engineering	5
Reviews in Aquaculture	5
Frontiers in Energy Research	4
Proceedings of the ASME International Conference on Ocean Offshore and Arctic Engineering	4
Ambio	3
Building Industries at Sea Blue Growth and the New Maritime Economy	3
Coastal Management	3
Ecosystem Services	3
Environmental Engineering and Management Journal	3
Ercim News	3
Journal of Cleaner Production	3
Journal of Coastal Conservation	3
Lecture Notes in Computer Science	3

Table 5. Funding agencies of blue growth articles

Funding agencies	Record count
European Union (EU)	90
Horizon 2020	32
H2020 Societal Challenges Programme	26
UK Research Innovation (UKRI)	21
Fundacao Para a ciencia e a Tecnologia (FCT)	19
Spanish Government	14
Natural Environment Research Council (NERC)	12
Interreg Europe	11
European Commission Joint Research Centre	10
Swedish Research Council Formas	9
Research Council of Norway	8
European Union's Horizon 2020 Research and Innovation Programme	6
Research Council of Finland	6
Australian Research Council	5
Economic Social Research Council (ESRC)	5
Marie Curie Actions	5
National Natural Science Foundation of China (NSFC)	5
Azti	4
Cgiar	4
Engineering Physical Sciences Research Council (EPSRC)	4
European Union's Horizon 2020 Research and Innovation Program	4
Vapem Project Fisheries and Aquaculture Directorate of the Basque Government	4
Xunta de Galicia	4
Australian Government	3
Cesam	3

nals cover a wide range of fields, reflecting the interdisciplinary nature of blue growth research. "Frontiers in Marine Science" emerges as a prominent platform for blue growth discourse with 33 entries. This journal can be considered a primary outlet for researchers to disseminate their findings and insights within the marine science community. Similarly, "Marine Policy" stands out with 68 contributions and reveals its importance as an important publication in shaping policies and strategies regarding blue growth initiatives.

In Table 5, it is emphasized that the funding agencies of the articles are shown, with particular importance placed on the 90 supports from the European Union.

Table 5 presents the funding agencies that have supported research articles related to blue growth, along with the corresponding record counts for each agency. These funding bodies play a crucial role in promoting and advancing research efforts aimed at understanding and promoting sustainable ocean-based economies. The European Union (EU) emerges as a significant contributor, with various programs

and initiatives such as "European Union's Horizon 2020 Research and Innovation Program" and "H2020 Societal Challenges Programme" collectively accounting for a substantial portion of the records, totaling 90. This underscores the EU's commitment to fostering innovation and addressing societal challenges, including those related to blue growth, across member states. Other notable funding agencies include national research councils such as the "National Natural Science Foundation of China (NSFC)" and the "Research Council of Norway," reflecting the global interest and investment in blue growth research and development. Additionally, the "Fundação para a Ciência e a Tecnologia (FCT)" in Portugal and "Swedish Research Council Formas" in Sweden have provided significant support, with 19 and 9 records respectively, indicating the commitment of these countries to advancing blue growth initiatives. Furthermore, regional entities such as the "Xunta de Galicia" in Spain and the "Vapem Project Fisheries and Aquaculture Directorate of the Basque Government" demonstrate localized efforts to promote sustainable practices within specific maritime regions.

Table 6. Web of Science Index of articles of blue growth

Web of Science Index	Record count
Science Citation Index Expanded (SCI-EXPANDED)	266
Social Sciences Citation Index (SSCI)	189
Emerging Sources Citation Index (ESCI)	56
Conference Proceedings Citation Index – Science (CPCI-S)	33
Conference Proceedings Citation Index – Social Science & Humanities (CPCI-SSH)	11
Book Citation Index – Social Sciences & Humanities (BKCI-SSH)	4
Book Citation Index – Science (BKCI-S)	3
Arts & Humanities Citation Index (A&HCI)	1

Table 6 shows the distribution of articles on blue growth in the Web of Science database according to different indices. These indexes serve as important tools for categorizing and indexing scientific publications, allowing researchers to access and evaluate the impact of research in various fields.

“Science Citation Index Expanded (SCI-EXPANDED)” emerges as the most prominent index with a remarkable record number of 266 articles. This index is widely recognized for covering a wide range of scientific disciplines and is an important resource for researchers seeking to access high-impact scientific literature on blue growth. The “Social Sciences Citation Index (SSCI)” follows closely with 189 records.

This index is effective in providing access to scientific literature in the social sciences, including fields such as economics, sociology and environmental studies, which are integral to understanding the socio-economic dimensions of blue growth. Additionally, the “Emerging Sources Citation Index (ESCI)” showcases 56 records and highlights the growing visibility and recognition of blue growth research within the academic community. ESCI serves as a platform for indexing high-quality, peer-reviewed journals that are in the process of being evaluated for inclusion in other citation indexes. Additionally, the table includes indices such as “Conference Proceedings Citation Index – Science (CPCI-S)” and “Conference Proceedings Citation Index – Social Sciences and Humanities (CPCI-SSH)”, which indicate the existence of conference proceedings on blue growth. It is included in the Web of Science database.

DISCUSSIONS

The bibliometric analysis undertaken in this study provides useful insights into the current state of blue growth research. The analysis of publication trends, citation patterns, and keyword relationships provides a thorough insight into the growing discourse surrounding this crucial field of study. The popularity of phrases such as blue growth, blue economy, and sustainable development emphasizes the interdisciplinary nature of the study in this topic, which reflects the junction of environmental, economic, and social

factors. Furthermore, an examination of country-specific contributions reveals a global dispersion of research activities, with Italy, Spain, England, and Germany appearing as important participants. This international collaboration demonstrates the broad interest and joint effort required to handle the challenges and opportunities afforded by blue growth. Furthermore, the presence of major phrases such as maritime/marine spatial planning, 'sustainability,' and 'ocean governance' emphasizes the diverse nature of blue growth research, which includes policy, governance, ecological sustainability, and socioeconomic factors.

Overall, the findings of this bibliometric analysis lay the groundwork for future research endeavors, assisting scholars, policymakers, and stakeholders in identifying topics for additional investigation and intervention. By encouraging collaboration, interdisciplinary methods, and knowledge exchange, we can effectively negotiate the complexity of blue growth and strive toward a sustainable and resilient future for our oceans and coastal communities.

CONCLUSION

In the context of blue growth, bibliometric analysis offers insightful information on the field's distribution of knowledge, trends, and patterns, which advances our understanding of ocean literacy. Bibliometric analysis presented here offers a comprehensive overview of the evolving landscape of blue growth research from 2007 to 2024. The study has illuminated key trends, thematic concentrations, and international collaborations within this interdisciplinary field, underscoring its critical importance at the nexus of environmental sustainability, economic development, and social equity. The analysis of publication types revealed a diverse array of scholarly contributions, from empirical research articles to comprehensive reviews and policy-oriented editorials, reflecting the multifaceted nature of scholarly engagement in blue growth. Notably, environmental science emerged as a dominant thematic focus, aligning closely with Sustainable Development Goals (SDGs) such as Life Below Water and Life on Land, highlighting the field's commitment to addressing global challenges through integrated approaches. Geographically, the study identified significant contributions from countries like Italy, Spain, England, and Germany, indicating robust international collaboration and knowledge exchange. This global dispersion underscores the shared responsibility and collective efforts required to advance sustainable practices in marine and coastal environments. Keyword analysis further delineated critical concepts such as blue economy, sustainable development, and ocean governance, signifying the thematic breadth and depth of blue growth research. These keywords serve as pivotal indicators of research priorities and emerging trends, guiding future investigations and policy interventions aimed at promoting ocean health and resilience. Moreover, institutional analysis pinpointed leading contributors such as the University of Exeter and CNR, illustrating their pivotal roles in shaping discourse and advancing knowledge with-

in the field. Funding agencies, notably the European Union through programs like Horizon 2020, played a crucial role in supporting research initiatives, highlighting the importance of strategic investment in blue growth research and innovation. The study's findings underscore the interdisciplinary nature of blue growth research, emphasizing the interconnectedness of ecological, economic, and social dimensions. By fostering collaboration and leveraging diverse expertise, stakeholders can effectively navigate the complexities of blue growth, paving the way for sustainable development and resilient coastal communities. This bibliometric analysis not only provides valuable insights into current research trends but also informs strategic decision-making processes aimed at achieving a more sustainable and equitable future for marine ecosystems and human societies globally. Continued interdisciplinary engagement and knowledge exchange will be essential in addressing emerging challenges and seizing opportunities in the evolving field of blue growth.

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DATA AVAILABILITY STATEMENT

The author confirm that the data that supports the findings of this study are available within the article. Raw data that support the finding of this study are available from the corresponding author, upon reasonable request.

CONFLICT OF INTEREST

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

USE OF AI FOR WRITING ASSISTANCE

Not declared.

ETHICS

There are no ethical issues with the publication of this manuscript.

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