

Review

Bibliometric Analysis and Systematic Review of the Status and Research Trends of the Blue Economy during 2004-2023

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Abstract

The problems of resource shortage and environmental pollution are becoming increasingly serious due to the growth of the global population and the rapid pace of economic development. The blue economy (BE) promotes economic development, social progress, and sustainable development through the sustainable use of marine resources, and the value and strategic significance of the BE are increasingly being recognized by various countries. To comprehensively understand the research progress and development trend in the field of 1,390 articles related to BE obtained from the Web of Science Core Collection (WOSCC) database from 2004 to 2023 are used as the original data, and quantitative analyses are conducted based on the bibliometric analysis method and the bibliometric software such as Bibliometrix, VOSviewer, and Citespace. The results indicated a growing trend in research findings in this field, and the concentration of publications appeared after 2018, accompanied by an upward trend in both publications and citations. The publications primarily concentrate on the fields of Environmental Sciences, Environmental Studies, and International Relations. China actively participates in BE research and holds the leading position in terms of publications and citations. Furthermore, its research findings exhibit significant academic influence. The top three journals in terms of publication are the Journal of Coastal Research, Marine Policy, and Ocean & Coastal Management. The current research focuses on the sustainable development of the marine environment, management of marine ecosystems, and marine aquaculture. The aforementioned findings can provide some references for the development planning of the BE and decision-making by government management departments.

Keywords: blue economy (BE), bibliometric analysis, marine environmental, sustainable development

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exceeding 100 articles per year. The count increased from 147 in 2019 to 260 in 2023, with the peak at 282 articles in 2020. The cumulative number of publications during this period reached 1151, making up 82.81% of the total publications.

The citation frequency of an article reflects the level of attention it receives, which indicates the utilization and significance of scientific papers in the research process and establishes their role and status in academic communication [19]. According to the citation analysis conducted using the WOSCC database, the most frequently cited article in this field is Araujo R's "Current status of the algae production industry in Europe: an emerging sector of the blue bioeconomy", published in *Frontiers in Marine Science*. This article presented and analyzed maps featuring 447 algal and spirulina production units across 23 European countries [20]. The second most frequently cited article is Silver's "Blue economy and competing runners-up in international ocean governance," published in the *Journal of Environment & Development* in 2015. This article utilizes documents and data from the 2012 UN Conference on Sustainable Development to study the various discourses surrounding the BE within the context of the relationship between people and the sea, highlighting four competing perspectives [21]. The third most frequently cited article is Cohen P J's "Securing a just space for small-scale fisheries in the blue economy," published in *Frontiers in Marine Science* in 2019. This article explores how ocean governance can better incorporate the social dimensions of fisheries from both social science and small-scale fisheries perspectives [22].

Country and Institutional Analysis

Tracking research forces such as countries and institutions can quickly understand the latest research

trends in the field [23]. Based on the WOSCC database, researchers in the field of BE research were primarily affiliated with over 78 countries and regions from 2004 to 2023. A list of the top 10 countries based on publication count is provided in Table 1. Among the top three countries based on publication count, China led with 487 articles (35.04%), followed by the UK with 103 articles (7.41%), and the USA with 94 articles (6.76%). China outperformed other countries in terms of publication count, with significantly higher numbers. Additionally, articles authored by Chinese scholars demonstrated the highest citation frequency. However, the average citation frequency per paper was only 7.54, suggesting a need to enhance China's influence in the field, despite its scholars exhibiting a strong level of attention and research interest. Excluding China, the top ten countries collectively contributed to 34.9% of the total publication count. Notably, Canada, Italy, and the UK published 41, 40, and 103 articles, respectively. Moreover, these three countries exhibited prominent citation rates, with values of 27.73, 20.48, and 20.37, respectively, demonstrating their leadership positions. This suggests that these countries possess a high level of research expertise in the field of BE research, along with considerable international influence and persuasive capabilities.

A cooperative network among countries was established using VOSviewer. The size of each circle in the graph represents the level of activity and the number of published articles for each country/region, while the thickness of the lines connecting each country/region signifies the extent of collaboration between them. Close collaboration among countries has the potential to facilitate extensive and in-depth research on the BE. Fig. 2 demonstrates the close collaboration among countries/regions and their shared commitment to advancing research in the field of BE. Notably, China, the USA, Canada, and Australia engage in robust

Table 1. Statistics of the top 10 productive countries/regions from Jan 2004 to Dec 2023.

Rank	Countries	Published literature number	Proportion	SCP	MCP	Total citation	Average citation frequency
1	China	487	35.04	431	56	3673	7.54
2	UK	103	7.41	51	52	2098	20.37
3	USA	94	6.76	58	36	1198	12.74
4	Australia	65	4.68	32	33	1286	19.78
5	Spain	60	4.32	34	26	716	11.93
6	Canada	41	2.95	13	28	1137	27.73
7	Italy	40	2.88	24	16	819	20.48
8	Germany	29	2.09	17	12	510	17.59
9	India	27	1.94	20	7	168	6.22
10	Denmark	26	1.87	11	15	405	15.58

SCP: Single Country Publications; MCP: Multiple Country Publications

Table 3. Statistics of the top 10 productive journals from Jan 2004 to Dec 2023.

Rank	Cited Journal	Published literature number	Proportion	Total citation	Average citation frequency
1	Journal of Coastal Research	183	13.17	571	3.12
2	Marine Policy	183	13.17	4235	23.14
3	Ocean & Coastal Management	80	5.76	1499	18.74
4	Frontiers in Marine Science	67	4.82	910	13.58
5	Sustainability	62	4.46	489	7.89
6	Journal of Marine Science and Engineering	17	1.22	66	3.88
7	Water	16	1.15	104	6.5
8	Journal of Cleaner Production	13	0.94	345	26.54
9	Maritime Economics & Logistics	13	0.94	301	23.15
10	Maritime Studies	13	0.94	86	6.62

(13 articles), accounting for only 0.94% of the total number of articles published, its average cited times reached 26.54, ranking first in all journals.

Cited Author Analysis

Authors are important subjects of scientific research work. The analysis of the network map of authors and their cooperative relationships can reflect the core author groups and cooperative relationships in the field [25]. In this study, a total of 4,907 authors (including all authors involved in the publications) were identified from the 1,390 selected literature sources. Following data cleaning, the top five authors based on the number of publications were identified and listed (Table 4). Voyer M from Univ Wollongong is the author with the largest number of publications, with 11 publications, mainly focusing on the policy of BE and the framework of ocean management. Secondly, Bennett NJ, Depellegrin D, Liu Y, and Wang Y all published 9 papers. Bennett NJ from Univ British Columbia was the author of the total number of citations to the article and had their articles cited a total of 464 times.

Topic Category Analysis

According to the discipline category of the article, the general research orientation and development process can be understood. Based on the analysis of the top ten disciplines in the field of BE research published from 2004 to 2023 (Fig. 3), a total of 109 disciplines were involved in the retrieved literature, indicating that this field has received high attention from researchers in different fields. Additionally, the analysis reveals the diversified and interdisciplinary development trend in the field. The discipline ranked first in terms of the number of articles published was Environmental Sciences, with 525 articles published, accounting for 26.2% of the total. Followed by Environmental Studies, which ranked second with 328 published papers, contributing to 16.37% of the discipline's total publications. The third most published discipline was International Relations, with 199 articles published, representing 9.93% of the total. This was closely followed by Geosciences, Multidisciplinary, Geography, Physical, and other disciplines. The BE research encompasses various aspects of the ocean, ranging from the innovative development of traditional marine industries like fisheries, marine transportation, and shipbuilding to emerging marine industries such as

Table 4. Statistics of the top 10 productive authors from Jan 2004 to Dec 2023.

Rank	Author	Institution	Published literature number	Total citation	Average citation frequency
1	Voyer M	Univ Wollongong	11	292	26.55
2	Bennett NJ	Univ British Columbia	9	464	51.56
3	Depellegrin D	Univ Exeter	9	114	12.67
4	Liu Y	Dalian Ocean Univ	9	42	4.67
5	Wang Y	Chinese Research Academy of Environmental Sciences	9	58	6.44

