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MARINE & FRESHWATER RESEARCH

Have 'mainstream' economics journals 'missed the bus' on wetland, marine and coastal ecosystems?

Pranab Mukhopadhyay[A,*] and M. P. Tapaswi[B]

For full list of author affiliations and declarations see end of paper

***Correspondence to:**
Pranab Mukhopadhyay
Goa Business School, Goa University, Taleigao Plateau, Goa, India
Email: pm@unigoa.ac.in

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Ritesh Kumar

ABSTRACT

We assess research published in Scopus-indexed journals from 1981 on the economics of wetlands, marine and coastal ecosystems. We used scientometric techniques to extract records of all journal articles with the keyword economics, in combination with wetland, marine or coastal ecosystems in their titles, abstracts or keywords. We compared this with publications in the top 10 journals in economics in the Scimago database. We found that these top economics journals have ignored this topic and, thus, 'missed the bus' on an important economic resource. They published only eight articles with these word combinations in their entire history, even though these ecosystems contribute significantly to human wellbeing. However, new journals that have been more inclusive of these themes in ecological and environmental economics have emerged. Our study adds to the literature on wetland, marine and coastal ecosystems by providing a systematic study of publications in Scopus-indexed journals on this theme. Whereas a number of studies have reviewed the literature with the objective of documenting methodological advances, our study complements them by looking at the spatial and temporal spread of the contributors. We also provide an insight on which journals are most frequently publishing research in this thematic area.

Keywords: coastal, ecosystems, mainstream economics journals, marine, scientometrics, Scopus-monitored journals, spatial distribution of authors, wetlands.

Introduction

Given that about 70% of the earth's surface is covered by water, 95% of which is in our oceans and coastal and inland wetlands (which cover about 12.1 million square kilometers), the importance of wetland, marine and coastal (WMC) ecosystems to human survival cannot be over-emphasised (UNEP 2006; Davidson and Finlayson 2018). By using a combination of techniques, Costanza *et al.* (1997) placed the global flow value of coastal ecosystem services at US$28.9 trillion per year, including wetlands (at US$4.9 trillion) and marine (at US$20.9 trillion, including coastal) ecosystems. Compared with this, the global GDP was US$18 trillion in 1997 (all values at 1995 US$ Purchasing Power Parity (PPP) prices). In a follow-up article, Costanza *et al.* (2014) claimed that the annual services provided by marine ecosystem services had gone up to US$49.7 trillion per year in 2011 when global GDP was US$75.2 trillion (expressed in 2007 US$ PPP prices). These values are significant when compared with the value of goods and services estimated in conventional national income accounts. There was an animated debate that followed, and although some felt that it was feasible to assign values to ecosystem services (Barbier *et al.* 2009), others did not (Toman 1998).

One would have expected that a subject such as economics that studies the optimal allocation of resources to maximise human welfare (Varian 2010) would be abuzz with research on this topic. We found that this has not been the case, and mainstream economics journals have maintained an odd silence when it comes to wetland, and marine and coastal ecosystems. This is not to argue that mainstream economics has not engaged itself with the problems of scarcity of resources and sustainability. In fact,

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there has been a fair amount of writing on this theme. Hotelling (1931) is an early example of a paper in an economics journal writing on resources. This was followed by a bit of a lull till 1974 when two of the top journals in economics published some much-cited papers on this theme (such as Dasgupta and Heal 1974; Solow 1974). *The Review of Economic Studies* carried a Symposium on the Economics of Exhaustible Resources and the *American Economic Review* devoted significant space for resource economics.

However, the specific keywords of WMC ecosystems have been missing due attention from the top mainstream economics journals. The top 10 journals in economics have published just eight articles in their entire history (see Table 1). Five of these journals had zero papers, whereas the *Journal of Political Economy* had four. This, we claim, would qualify as 'missing the bus' on a group of ecosystems that is critical in sustaining human life and wellbeing.

Economics of ecosystem services

The literature on ecosystem services has grown rapidly over the past two decades (McDonough *et al.* 2017). The Millennium Ecosystem Assessment (MA), The Economics of Ecosystems and Biodiversity (TEEB) and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) are part of multiple efforts at classifying, conceptualising and valuing ecosystem services. The classification of ecosystem services has also evolved over time. The MA used the following four categories: provisioning, regulatory, supporting and cultural (including religious and recreational) services (MA 2005). The TEEB used three categories of MA, dropping supporting services because of possibilities of double counting (Flood *et al.* 2020). In contrast, the IPBES adopted a more complex typology that classifies services under the following three broad categories: the intrinsic value of nature, nature's benefits to people, and good quality of life (IPBES 2017). It also expanded the notion of 'human wellbeing' to 'good quality of life'. This allowed an inclusive understanding of nature holistically where 'Mother Earth is entitled with rights as a collective subject of interest' (Díaz *et al.* 2015). The MA and TEEB classifications were, thus, incorporated into the IPBES framework. In parallel, there were efforts to reconcile the different classifications evolving from these large processes. Two important ones include the European initiative called Common International Classification of Ecosystem Services (CICES; Haines-Young and Potschin-Young 2018) and the USA's National Ecosystem Services Classification System (NESCS; Landers 2015; Newcomer-Johnson *et al.* 2020). These efforts have provided growing clarity on the study of ecosystem services (La Notte and Rhodes 2020).

Wetland, marine and coastal ecosystems play a significant role in the economic and social life of communities living around them, as well as the world economy (UNEP 2006). They provide livelihood support to fishers, benefits of commerce, navigation and recreation, climate regulation and support services, among other services. Macroeconomics continues to largely account for provisioning services in its assessment of ecosystems through the national income accounts. It includes output value from fishing catch and other extractions such as minerals, water for home and industrial use, sand for construction, seagrass and planktons, from WMC ecosystems. It also captures the expenditure people make on recreational trips (travel cost, accommodation and food), which are payments for human-made resources. The conventional United Nations System of National Accounts (UNSNA) does not capture the consumers' surplus generated during recreation or religious visits, which, technically speaking, is the net benefit (welfare gain) from that activity. This approach to resource valuation has numerous limitations (Cavalletti and Corsi 2021), which has led to continuous efforts towards creating an accounting framework that is more environmentally sensitive and would integrate ecosystem services into the System of National Accounts (United Nations *et al.* 2009), namely, the System of Environmental-Economic Accounting (SEEA; United Nations *et al.* 2017). The SEEA framework is complemented by the recently adopted Ecosystem Accounts (UN 2021) and hopefully, in the near future, we will have all countries reporting information on WMC ecosystems in their expanded national income accounts.

The macroeconomic accounting efforts have relied on a parallel improvement in microeconomic valuation techniques (Costanza *et al.* 2017; Tinch *et al.* 2019). Although conventional economics was able to achieve acceptable methods of valuation with revealed preference methods, economists were initially ill-equipped in valuing resources that either did not have market values (Carson 2012) or, when they did, these were distorted values (Hanley *et al.* 2008). This knowledge gap saw increasing sophistication in the stated preference methods (Ben-Akiva *et al.* 2019) and many argue that the revealed and stated preference methods (when used carefully) yield similar values (Carson *et al.* 1996).

Research on ecosystem services is an active topic of research both among ecologists and economists (Daily *et al.* 2000). However, mainstream economics journals have given this particular domain a 'pass'. This is evidenced by the lack of any published work in the top 10 journals of mainstream economics.

Purpose of the study

The purpose of this study was to find out

(1) the number of articles published on the 'economics of wetland, marine and coastal ecosystems' as recorded in the Scopus database from within the journals devoted to the fields of economics, econometrics and finance;

Table 1. Number of articles with wetland, coastal or marine ecosystem terms in any article in the top 10 journals in the subject group of economics (since their inception).

Rank (Scimago)	Journal	Association	Publisher	1st volume in the year	CiteScore	Percentile (Scopus)	Number of papers on WMC ecosystems
1	Quarterly Journal of Economics	Department of Economics Harvard University	Oxford University Press	1886	21.3	99	1
2	Journal of Political Economy	Department of Economics, University of Chicago	University of Chicago Press	1892	10.9	97	4
3	Journal of Finance	The American Finance Association	Wiley	1946	11.2	99	0
4	American Economic Review	American Economic Association	American Economic Association	1911	12.1	98	1
5	Econometrica	The Econometric Society	Wiley-Blackwell	1933	7.9	94	0
6	Review of Economic Studies		Oxford University Press	1933	7.8	94	1
7	Review of Financial Studies	Sponsored by The Society for Financial Studies	Oxford University Press	1988	9.2	98	0
8	Journal of Economic Literature	American Economic Association	American Economic Association	1969	13.8	98	0
9	Journal of Financial Economics		Elsevier	1974	9.6	99	1
10	Journal of Economic Perspectives	American Economic Association	American Economic Association	1987	18.6	99	0

Top 10 journals in Economics as sourced from Scimago (https://www.scimagojr.com/journalrank.php?category=2002&wos=true).

(2) how many of these articles are published in the highest-ranked (top 10) journals in the field of economics;
(3) which are the other journals in which authors have published and what is their impact by way of citations to their publications;
(4) number of authors who have contributed to this domain and who are the most prolific authors;
(5) what is the spatial distribution (by countries) of authors;
(6) how many of these publications are in the open domain?

Materials and methods

For our analysis, we used scientometric techniques, which are described as the 'quantitative study of science, communication in science, and science policy' (Hess 1997, p. 75). These techniques allow us (a) to select a database, (b) search the database content using a complex search expression, and then (c) draw conclusions on the basis of the items retrieved from the search.

Choice of the database

The selection of the database is a crucial decision. Several multidisciplinary citation databases have emerged since 2017, such as Microsoft Academic, Dimensions, Semantic Scholar and Lens.org, among others (Martín-Martín *et al.* 2021). Before this, the choice set included three databases namely, Web of Science (WoS), Scopus and Google Scholar. The Science Citation Index was the first citation database introduced in 1964 that expanded to morph into the WoS in 1997. Scopus and Google Scholar were launched in 2004. Whereas WoS and Scopus are subscription-based services, Google Scholar was considered an attractive option because of its very large coverage and availability of data without a subscription fee to the user (Gusenbauer 2019). However, it does not provide any criteria for what makes its results 'scholarly' in the manner that WoS and Scopus do, thereby limiting the use of Google Scholar for scientometric analysis (Merga *et al.* 2020). The new databases are still being explored for their suitability for scientometric studies (Visser *et al.* 2021). This filters the choice set for our analysis down to the two global multidisciplinary databases, namely the WoS and Scopus.

We decided to use the Scopus database for the following reasons:

(a) It has a wider base with a large number of journals in its monitoring list, as compared with the WoS (Mongeon and Paul-Hus 2016)
(b) It is also used for international institutional ranking by reputable agencies such as Times Higher Education (THE) and QS World University Ranking, for their publications analysis (https://www.elsevier.com/solutions/scopus/who-uses/ranking-organizations).

Identifying core economics journals

To decide on the core journals in the field of 'economics', we used the Scimago Journal Rank (https://www.scimagojr.com/journalrank.php) because it provides a list of core journals for a given subject category. We searched for the journals in 'economics and econometrics' and obtained the list of the first 10 journals (Table 1).

Building a search expression

The list of relevant references was retrieved from Scopus by using the following strategy:

(a) The Scopus database includes conference proceedings and chapters of books in series, besides quality journals. However, we decided to examine journal articles alone because
  (i) contemporary economics research mostly emerges in journals before books (Hartley *et al.* 2001),
  (ii) books (especially book chapters) are known to have lesser citations and peer impact, so researchers often prefer journals as their preferred outlet (Anderson 2012; Chapnick and Kukucha 2016).
  (iii) 'reports' and 'policy briefs' are considered 'grey literature' because these documents normally do not go through a similar peer review process as a journal. Moreover, if it is good research, the authors of such reports would anyway publish their work in the form of journal articles.
(b) The choice of keywords was critical. We decided to use 'wetland ecosystems' or 'marine ecosystems' or 'coastal ecosystems' and 'economics' as core keywords for our study. To increase recall, we opted not to search on phrase terms ('wetland ecosystems' or 'marine ecosystems' or 'coastal ecosystems'). However, we truncated the expressions appropriately and separately used the Boolean expression 'AND'. The search expression thus derived was (coastal AND ecosyst*) OR (marine AND ecosyst*) OR (wetland AND ecosyst*).
(c) The search was restricted to the fields such as Title, Abstract and Keywords. In addition, the term 'economics' was used for the field Subject Area so as to maintain a balance between recall and precision in retrieving desired information.
(d) We did not apply any chronological restrictions because we wanted to find out the evolving interests of researchers in this area of study since their initial conceptualisation.

The step-wise narrowing down of the search expressions is detailed in Table 2.

Analysis of the output

The retrieved data of bibliographic details were analysed to examine (a) how many of the articles were published on this

topic of interest and to list those published in the top 10 journals of economics, (b) find the impact by way of citation, (c) the progression in research by frequency of publication year-wise and identify the most frequently published authors, and (d) the spatial distribution by the countries of authors.

We prepared a frequency list of the number of articles published with our keywords in any journal. The quality of the journals was then assessed by using Scopus source parameters (https://www.scopus.com/sources) such as CiteScore and Percentile, to determine in which quartile these journals could be grouped. We also checked whether these journals were born in line with the evolution of the topic of interest by using the publication year of the first volume of these journals and whether any professional academic association or university was linked with the creation of the journal. The citations received by authors in these journals were compared with similar subject groups.

Results

The initial search (Table 2, search number 1) resulted in a listing of 83, 962 documents. Then the output was restricted to articles that had the word 'economics' anywhere in the article, resulting in 8984 documents (Table 2, search number 2). Because our focus was to examine literature in the subject area of economics, we restricted our search to the subject area 'economics' to have the highest precision, retrieving only 1116 documents (Table 2, search number 3).

Evolution of the subject

Our search output from Scopus showed that the first study on the topic had been published in the year 1981 (Lynne *et al.* 1981). The decadal evolution indicated that the subject was in a nascent stage in the first decade (1981–1990); however, there has been an exponential growth as evidenced by the numbers in the subsequent decades (see Fig. 1). More than 75% of the studies were published in the past decade. This indicates the rapidly growing research interest in this area.

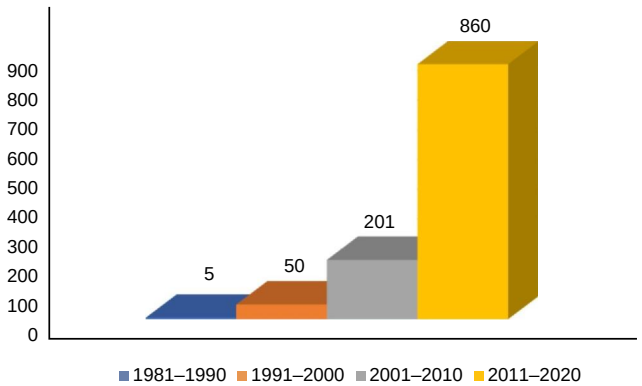

Fig. 1. Decadal evolution of paper publications (by decade, 1981–2020). Source: graphic created by authors on the basis of Scopus data.

Table 2. List of search expressions used for the Scopus database (up to 2020).

Search number	Query string	Number of items retrieved	Explanation (source material limited to journal only)
1	(TITLE-ABS-KEY (coastal AND ecosyst*) OR TITLE-ABS-KEY (marine AND ecosyst*) OR TITLE-ABS-KEY (wetlands AND ecosyst*)) AND (LIMIT-TO (SRCTYPE, "j")) AND (EXCLUDE (PUBYEAR, 2022) OR EXCLUDE (PUBYEAR, 2021))	83 962	Articles with (Coastal and Ecosystem) OR (Marine and Ecosystem) OR (Wetland and Ecosystem) in title, abstract or keyword
2	(TITLE-ABS-KEY (coastal AND ecosyst*) OR TITLE-ABS-KEY (marine AND ecosyst*) OR TITLE-ABS-KEY (wetland AND ecosyst*)) AND (economics) AND (LIMIT-TO (SRCTYPE, "j")) AND (EXCLUDE (PUBYEAR, 2022) OR EXCLUDE (PUBYEAR, 2021))	8984	Articles with (Coastal and Ecosystem) OR (Marine and Ecosystem) OR (Wetland and Ecosystem) in title, abstract or keyword and the word economics anywhere in article
3	*(TITLE-ABS-KEY (coastal AND ecosyst*) OR TITLE-ABS-KEY (marine AND ecosyst*) OR TITLE-ABS-KEY (wetland AND ecosyst*)) AND (LIMIT-TO (SRCTYPE, "j")) AND (LIMIT-TO (SUBJAREA, "ECON")) AND (EXCLUDE (PUBYEAR, 2022) OR EXCLUDE (PUBYEAR, 2021))*	*1116*	*Articles with (Coastal and Ecosystem) OR (Marine and Ecosystem) OR (Wetland and Ecosystem) in title, abstract or keyword And (subject area of economics)*
4	((TITLE-ABS-KEY (coastal AND ecosyst*) OR TITLE-ABS-KEY (marine AND ecosyst*) OR TITLE-ABS-KEY (wetland AND ecosyst*))) AND TITLE-ABS-KEY (economics) AND (LIMIT-TO (SRCTYPE, "j")) AND (LIMIT-TO (SUBJAREA, "ECON")) AND (EXCLUDE (PUBYEAR, 2022) OR EXCLUDE (PUBYEAR, 2021))	157	Articles with (Coastal and Ecosystem) OR (Marine and Ecosystem) OR (Wetland and Ecosystem) in title, abstract or keyword And (subject area of economics)

Source: raw data were extracted from Scopus database https://www.scopus.com/. Note: search number 3 was used in the analysis.

Author affiliations

In all, 4789 authors from 107 country affiliations have contributed 1116 articles for this subject in the past four decades. This is an average of 28 articles a year. The highest number of contributions to this topic by a single author is 13 (see Table 3). A quick comparison with related areas showed that the highest number of papers, for example, on 'Circular Economy' was 22 in WoS and 15 in Scopus between 2016 and 2019 (Camón Luis and Celma 2020). Returning to our topic of study, we further noticed that there are only three authors who have published 10 or more articles on this topic in Scopus-monitored journals. Twenty-three authors had between five and nine articles.

Country-wise distribution of authors

The list of all authors contributing to these articles allowed us to assess how prolific the authors were in the topic of study and the country they belonged to. We also were able to find the number of contributors to the subject in the past four decades. The affiliation data helped us identify countries where this domain of research was being encouraged.

The authors on this topic represent 107 countries (see Fig. 2). This included all authors whose institutional location was used for the country count. The highest number of contributors (859, which is 22%) are from the USA. This is followed by the United Kingdom (10%), Australia (9%) and Canada (7%). Some developing countries also feature in this list.

Collaboration and open science

We found that 306 of these articles are placed in open access, with 92% of these coming in the 2011–2020 decade. This is a desirable trend in making science accessible to larger audiences. There is a lot of collaborative effort by authors in this area and an average paper typically had 4.7 authors per paper. About 14% were single-authored papers, whereas about 69% had less than five authors.

Discussion

The high-ranked journals in the field of economics as per the SciMago Journal Rank are as indicated in Table 1. Evidently, none of the research papers from our Scopus search appeared in these journals; however, two papers were published in the *Journal of Political Economy* (Gordon 1954; Bell 1972). There could be several reasons why the top journals in economics may not have published articles in this area. The research topic was considerably new to economists, even though ecologists and others have been working on this topic for a long time. We live in a world of micro-specialisation. The top six journals publishing articles relevant

Table 3. Authors publishing at least seven articles in journals with specified keywords.

Number of papers	Author	Affiliation	Country
13	Sumaila, U. R.	Global Fisheries Cluster	Canada
11	Gjerde, K. M.	International Union for Conservation of Nature (IUCN)	Switzerland
10	Barbier, E. B.	London Environmental Economics Centre	United Kingdom
9	Mahon, R.	Centre for Resource Management and Environmental Studies (CERMES), University of the West Indies	Barbados
8	Fanning, L.	Marine Affairs Program, Dalhousie University	Canada
8	Jones, P. J. S.	Department of Geography, University College London (UCL)	United Kingdom
7	Blasiak, R.	Stockholm Resilience Centre, Stockholm University	Sweden
7	Halpern, B. S.	National Center for Ecological Analysis and Synthesis, University of California, Santa Barbara	United States
7	Haward, M.	Institute for Marine and Antarctic Studies	Australia
7	Hynes, S.	Socio-Economic Marine Research Unit, Whitaker Institute, National University of Ireland	Ireland
7	Levin, P. S.	University of Washington, School of Environmental and Forest Sciences	United States
7	Levrel, H.	AgroParisTech/CIRED, Campus du Jardin Tropical	France
7	Nunes, P. A. L. D.	Marine and Environmental Sciences Centre, Faculty of Sciences, University of Lisbon	Portugal
7	Pauly, D.	Institute for the Oceans and Fisheries, University of British Columbia	Canada
7	Villasante, S.	Universidad de Santiago de Compostela, Santiago de Compostela	Spain
7	Yagi, N.	Graduate School of Agricultural and Life Sciences, The University of Tokyo	Japan

Source: Scopus database.

Fig. 2. The geographical spread of authors and country-wise publication. Source: graphic created by authors using Google maps on the basis of Scopus data.

to these subjects are *Marine Policy*, *Ecological Economics*, *Environment, Development and Sustainability*, *Environmental and Resource Economics, Resources, Conservation and Recycling* and *Marine Resource Economics* (see Table 4). Three of these journals are either official journals or associated with professional associations. All these journals have high CiteScore and Percentile placing them in the Scopus Q1 journals list. Five of these are published by specialised publishers and one by the University of Chicago Press. The top 10 mainstream economics journals indicated a CiteScore range of 7.8–21.3 (with an average of 12.2). The top six journals in publishing WMC ecosystems papers reported a CiteScore range of 3.8–14.7 (with an average of 7.1). Even though these journals report lower CiteScores, we need to keep in mind that they are relatively new (in comparison to the established mainstream journals) and represent new areas of research.

The silence of the mainstream economics journals is not unique to this topic. In a popular column article, Oswald and Stern (2019) pointed out that mainstream economics had hardly engaged with the grand challenge of climate change, after examining the published articles in the leading mainstream economics journal. Dasgupta and Mäler (1995), among others, have pointed out the neglect of environment in mainstream development economics writing.

The authors from the United States outnumbered all other countries (22%). This is typical of many similar research areas such as sustainability (Olawumi and Chan 2018), quantification of ecosystem services (Boerema *et al.* 2017) and ecosystem service evaluation (Chen *et al.* 2020). This research topic is of interest to all countries, whether developed or developing, and is likely to emerge as one of the critical topics given the grand challenges that human sustenance faces in the future. The growth of alternative outlets (journals) to mainstream economics journals provides hope that research on this vital topic will keep growing. As the ecological crisis deepens, and the value of ecosystems services becomes more pronounced for human welfare, we anticipate that the research engagement in this domain will increase rapidly.

The main thrust of the paper was to show that the mainstream journals in economics have published very few papers in the domain of WMC ecosystems. We were unable to ascertain whether researchers working on WMC ecosystems did not submit high-quality papers to these journals or whether there was a glass wall that limited them from being published. Future research could look at these aspects, by using author feedback on submissions.

This study is a critique of mainstream publishing in the top economics journals, with the hope that these journals will provide space for research in this area. This will also respond to the policy inputs that planners need for climate-proofing investments to sustain and enhance WMC ecosystems.

This paper does not provide a content analysis of growing contributions in this domain because it was not proposed as a review article. This is a limitation. Further, we did not include individual keywords such as wetland, marine and coastal (in exclusion of combination with ecosystems). This was to avoid the over-listing of articles that did not study

Table 4. Journals preferred by authors to publish articles on the topic.

Journal title	Links to professional associations	Publisher	1st volume in the year	Cite score	Percentile (Scopus)	Number of articles on the topic	Total citation	Citations per article
Marine Policy	Nil	Elsevier	1977	5.8	97	710	20 590	29.00
Ecological Economics	Official journal of the International Society for Ecological Economics	Elsevier	1989	9.1	95	143	12 722	88.97
Environment, Development and Sustainability	Nil	Springer Nature	1999	3.8	83	30	655	21.83
Environmental and Resource Economics	Official journal of the European Association of Environmental and Resource Economists	Springer Nature	1991	4.2	83	26	1286	49.46
Resources, Conservation and Recycling	Nil	Elsevier	1988	14.7	99	16	315	19.69
Marine Resource Economics	Published in association with the North American Association of Fisheries Economists	University of Chicago Press	1984	4.9	90	12	235	19.58

Source: Scopus database.

ecosystems but merely mentioned these ecosystem descriptors. It is also possible that earlier writings in this area did not use the term ecosystems because it may not have been popular in the early years to use it. This may have lead to the under-reporting of such articles.

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Data availability. The data that support this study were obtained from the Scopus database. No new data were generated during this study. The data used in this study can be obtained from the Scopus database using the search string provided in the article.

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Author affiliations
[A]Goa Business School, Goa University, Taleigao Plateau, Goa, India.
[B]CSIR-National Institute of Oceanography, Goa, India.