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Mapping a Decade of Biodiversity Research in India: A Scientometric Perspective

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Abstract

This study analyzes the scientometric parameters on the trends and patterns of biodiversity research in India, 2015-2024. Data was extracted from the Web of Science database 2015-2024. A total of 7319 publications were found, and there was a sustained upward trend in research output, with the highest output in 2023 (1080). India is estimated to be fourth (4.46%) in the world for total biodiversity research behind China, the United States, and Brazil. Nearly all publications were in English (99. 5%) diagnostic publication type was a research article (87.6%). The primary institutes were the University of Calcutta, Banaras Hindu University, and the Chinese Academy of Sciences. The three primary authors based on productivity included Singh R.P, Kumar A., and Singh S. There is a growing profile of biodiversity research in India, output is increasing across time, there are multiple institutes contributing to the research agenda, and there is collaboration with Indian and international researchers. These insights may be useful in the development for new research in biodiversity science, research priorities, research funding, and increased synergy and collaboration between institutions.

Keywords: Biodiversity Research, Conservation, Network Analysis, Scientometric Analysis, Web of Science

1. Introduction

Biodiversity is vital to the resilience and stability of ecosystems and the provision of essential services such as clean water, food and climate regulation, not to mention that biodiversity reflects diversity within species between species and ecosystems. Among these increasing pressures, the need to understand biodiversity and its preservation has never been more important than now. Over this past decade, we have seen a clear proliferation of literature relevant to biodiversity that signifies not only a rise in interest, but possibly a development of tools and frameworks to better advance all (e.g., remote sensing, environmental DNA and Geographic Information Systems (GIS)). The rapidly developing literature signals various levels of robust interest, from an academic

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perspective to evidence-based policy for biodiversity conservation.

This article analyzes publication trends in biodiversity research over ten years (2015-2024) to characterize the quantity and direction of scientific production in this field. These trends will help us characterize how the objectives of biodiversity science are shifting and how the world is responding to ecological and environmental crises. Such information can suggest new frameworks for thinking about new opportunities for research and promote better action around conserving the Earth's natural resources.

2. Literature Review

Several studies have explored biodiversity research in India using bibliometric and scientometric approaches, but notable gaps remain. Roy, Garai, and Pramanick (2023) conducted one of the first focused bibliometric analyses examining 223 publications from 2000 to 2023 in the Web of Science. They highlighted publishing trends, leading institutions, funding agencies and international collaborations, yet noted the absence of comprehensive national-level evaluations. Hydar Ali and Adithya Kumari (2015) analyzed 1206 publications from 2003 to 2012, assessing publication types, international collaborations, productive authors and institutions, subject-wise contributions and citation impact. Their findings indicated that India ranked 13th globally with major contributions from Environmental Science, Ecology, and Plant Sciences, led by institutions such as ATREE, WII and IISc. Revathi and Ranganathan (2020) analyzed 2786 publications from 1991 to 2017, focusing on year-wise trends, document types, institutional output and country-wise contributions. Despite the insights provided by these studies, they are limited by temporal scope, smaller datasets and insufficient attention to emerging research areas, cross-disciplinary contributions and evolving patterns of international collaboration. The present study addresses these gaps by providing a comprehensive scientometric analysis of biodiversity research in India from 2015 to 2024, examining publication trends, thematic areas, institutional contributions, author productivity and international collaborations. This analysis provides insightful advice for determining future research goals, guiding policy choices, and encouraging cooperative projects in the field of Indian biodiversity science.

3. Objectives of the Study

The study addressed the following specific objectives:

- To study the year-wise growth of biodiversity research publications in India.
- To identify the types of documents published and their contribution to the total output.
- To examine the productivity and impact of leading authors and institutions.
- To measure the degree of collaboration among researchers.
- To analyze the distribution of keywords and major research themes.

4. Research Methodology

The present study adopts a quantitative scientometric research design to analyze biodiversity research publications from India during the period 2015-2024. The study relies exclusively on secondary data retrieved from the Web of Science Core Collection (WoS) database. This search yielded 7333 records which were subsequently refined by removing duplicate and irrelevant entries, resulting in a final dataset of 7319 valid publications. HistCite software was used to examine publication trends, citation patterns and chronological distributions, while VOSviewer (version 1.6.15) was employed for mapping and visualizing bibliometric networks such as co-authorship, bibliographic coupling and keyword co-occurrence. In addition, Microsoft Excel was utilized fortabulation and graphical representation. The study included the application of authorship patterns and the degree of

collaboration, which helps validate the distribution pattern of authors' research output, to further support the conclusions. All things considered, the technique offered a thorough and organized framework for assessing India's research output in biodiversity studies throughout the previous ten years.

5. Data Analysis and Interpretation

This study's primary goal is to use scientometric methodologies to examine the development and trends of biodiversity research in India from 2015 to 2024. It included bibliometric data of the type of document, language, institution's name, authors' names, journals, and research areas to look for patterns and trends in research publications.

5.1 Analysis of Authors in Biodiversity

Table 1 presents the top 10 most published authors showcasing their scholarly productivity and impact. Kumar A leads with 180 publications (2.5% of total) followed by Kumar S and Kumar V, indicating a strong presence of researchers with common surnames, possibly reflecting institutional or regional concentrations.

Table 1: The top fifteen publishing Authors in Biodiversity

S.No	Authors	Total Publications	Percent of Total Publications	TGCS	TGCS/t	TLCR	H-Index
1	Kumar A	180	2.5	2059	483.94	117	23
2	Kumar S	118	1.6	1485	332.95	84	19
3	Kumar V	96	1.3	1804	369.38	83	20
4	Kumar R	91	1.2	2375	476.77	72	20
5	Khuroo AA	80	1.1	889	236.88	192	16
6	Singh A	79	1.1	939	228.19	45	17
7	Kumar P	77	1.1	610	170.94	71	14
8	Singh S	75	1	715	152.02	47	15
9	Hyde KD	66	0.9	9059	1432.18	536	38
10	Sharma S	65	0.9	903	229.52	37	16

TGCS-Total Global Citation Score, TGCS/t - Total Global Citation Score per Year, TLCR - Total Local Cited Reference

While several authors have high publication counts, Hyde KD stands out with only 66 publications but the highest global citation score (TGCS: 9059) citation rate per year (1432.18) and H-index (38), highlighting exceptional research influence. Authors like Kumar R and Kumar V also show high citation impact relative to output. Overall, the table reflects a blend of prolific output and high-impact research underlining the varied ways authors contribute to scientific advancement.

5.2 Institutions and the Impact of Their Output in Biodiversity

Table 2 highlights the top 10 most prolific institutions and the effect of their research based on publication volume, citations, and influence.

Table 2: The effects of the most prolific Institutions on Biodiversity

S.No	Institutions	Records	Percent	TGCS	ACPP	H-Index
1	Wildlife Institute of India	227	3.1	2512	11.07	25
2	Chinese Academy of Sciences	214	2.9	20264	94.69	64
3	University of Kashmir	186	2.5	1969	10.59	25
4	Zoological Survey of India	166	2.3	892	5.37	14
5	Banaras Hindu University	165	2.3	3889	23.57	30
6	University of Delhi	162	2.2	3394	20.95	27
7	Indian Institute of Science	158	2.2	3991	25.26	28
8	King Saud University	114	1.6	9375	32.24	32
9	Pondicherry University	112	1.5	4089	36.51	25
10	University of Calcutta	104	1.4	2772	26.65	20

TGCS - Total Global Citation Score, ACPP - Average Citation Per Paper

Wildlife Institute of India leads in publication count (227 records), although its Average Citation Per Paper (ACPP) is moderate at 11.07, indicating a steady contribution. In contrast, the Chinese Academy of Sciences combines high productivity (214 records) with an exceptionally high ACPP of 94.69 and the highest H-Index (64), underscoring its significant global research impact. Institutions like Indian Institute of Science and Pondicherry University also show strong citation averages (25.26 and 36.51, respectively), suggesting high-quality research output. Overall, the table illustrates a mix of quantity and quality, with certain institutions excelling in both high output and global citation impact.

5.3 Analysis of Documents Published in Biodiversity

Figure 1 provides a summary of the different kinds of publications in the biodiversity field, illustrating the diversity of scholarly communication formats. Research articles dominate the landscape, comprising 75.9% of all records (5557), and contributing the highest to both Total Local Citation Score (TLCS) and Total Global Citation Score (TGCS), with 4725 and 79894 citations respectively-emphasizing their central role in disseminating original research.

Figure 1: Types of documents published in Biodiversity

Review articles, while representing only 11.2% of publications, have a substantial TGCS of 18986, highlighting their high impact and utility in summarizing existing knowledge. Notably, formats like early access articles, letters, and corrections appear infrequently and are less cited, reflecting their more specialized or supplementary nature. Overall, the data underscores the primacy of research articles in biodiversity literature while also revealing the complementary value of other publication types.

5.4 Analysis of Countries in Biodiversity

Table 3 presents the research output and global ranking of the top 10 most highly productive countries in biodiversity studies. India leads by a significant margin with 7319 records, accounting for the full 100% baseline in this context, and generating the highest Total Local Citation Score (TLCS: 5490) and Total Global Citation Score (TGCS: 105,251).

Table 3: Output and Biodiversity Ranking of Highly Productive Countries

S.No	Countries	Records	Percent	TLCS	TGCS
1	India	7319	100	5490	105251
2	USA	920	12.6	1157	39757
3	UK	642	8.8	1065	33901
4	Peoples R China	513	7	998	31991
5	Germany	493	6.7	813	29789
6	Australia	467	6.4	572	25727
7	Canada	346	4.7	437	20741
8	France	307	4.2	627	22126
9	Brazil	286	3.9	597	23897
10	Italy	281	3.8	675	20662

This underscores India's dominant contribution in terms of volume and regional scholarly influence. However, countries like the USA, UK, and China, though contributing fewer publications (12.6%, 8.8%, and 7% respectively), display high TGCS values-indicating greater average citation impact per publication. Overall, the table reveals a dynamic interplay between publication volume and impact, where some countries lead by output (e.g., India), while others excel through high citation influence per paper (e.g., USA, UK).

5.5 The Chronological Growth Pattern of Output in Biodiversity

Table 4 illustrates the year-wise growth and citation trends in biodiversity research from 2015 to 2024. Over the past ten years, the quantity of publications has risen steadily, with a notable surge from 426 papers in 2015 to a peak of 1080 in 2023, showing a strong upward trajectory in research output.

Table 4: The chronological growth Pattern

S.No	Publication Year	Records	Percent	TLCS	TGCS
1	2015	426	5.8	678	14246
2	2016	467	6.4	692	10351
3	2017	526	7.2	802	11624
4	2018	601	8.2	797	10348
5	2019	624	8.5	871	14869

6	2020	738	10.1	693	15107
7	2021	937	12.8	484	12350
8	2022	937	12.8	296	9986
9	2023	1080	14.8	147	5367
10	2024	983	13.4	30	1003
	Total	**7319**	**100**		

The highest publication share is observed in 2023 (14.8%), followed closely by 2024 (13.4%) and 2021-2022 (12.8% each). Interestingly, the Total Global Citation Score (TGCS) and Total Local Citation Score (TLCS)are higher in earlier years, particularly in 2015 (TGCS: 14,246) and 2019 (TGCS: 14,869), reflecting the time-dependent nature of citation accumulation. Overall, the table reflects both a rapid rise in publication volume and the expected citation lag for newer research, highlighting growing interest and activity in biodiversity research over the last decade.

5.6 Degree of Collaboration of Single Vs. Multi-authored Research Output in Biodiversity

Table 5 provides an analysis of degree of collaboration in biodiversity research in India from 2015 to 2024 and clearly demonstrates a strong and growing preference for collaborative research.

Table 5: Degrees of Collaboration

Years	Single Author		Multi - Authored		Total	Degree of Collaboration
	Output	%	Output	%		
2015	41	12.42	385	5.51	426	0.90
2016	34	10.30	433	6.20	467	0.93
2017	31	9.39	495	7.08	526	0.94
2018	35	10.61	566	8.10	601	0.94
2019	34	10.30	590	8.44	624	0.95
2020	35	10.61	703	10.06	738	0.95
2021	32	9.70	905	12.95	937	0.97
2022	32	9.70	905	12.95	937	0.97
2023	30	9.09	1050	15.02	1080	0.97
2024	26	7.88	957	13.69	983	0.97
Total	**330**	**100**	**6989**	**100.00**	**7319**	**9.49**

Out of 7319 total publications, 6989 (95.49%) were multi-authored, while only 330 (4.51%) were single-authored, indicating that individual contributions are minimal. The Degree of Collaboration (DC) showed a consistent upward trend, rising from 0.90 in 2015 to 0.97 in 2024, reflecting an increasing tendency among researchers to work jointly. The sustained growth in collaboration suggests a significant shift towards teamwork and collective scientific enquiry, likely driven by the complexity of biodiversity issues that demand diverse expertise, advanced technologies and institutional partnerships. The high level of collaboration also points to enhanced networking among research organizations, universities and international collaborators, contributing to richer, more comprehensive biodiversity research outcomes in India.

5.7 Analysis of Cited References

The most cited references are shown in Figure 2 in the biodiversity study in India from 2015 to 2024, highlighting foundational and frequently referenced works. The top-cited reference is by Myers et al. (2000) in Nature, cited 424 times (5.8%), emphasizing the lasting influence of global biodiversity hotspot research.

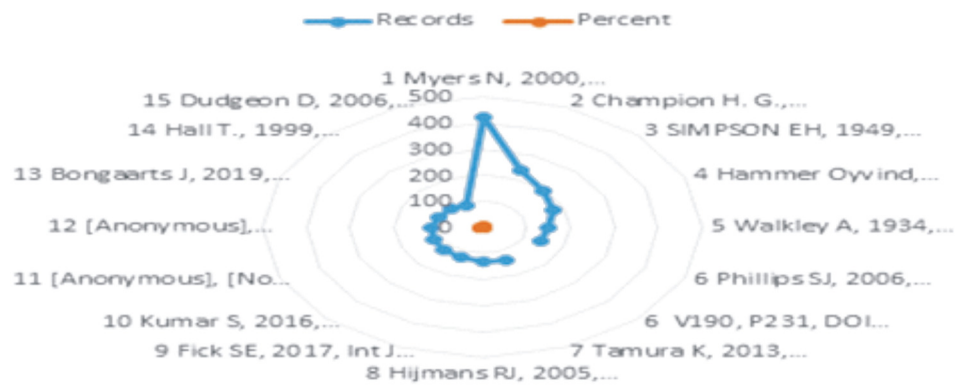

Figure 2: Analysis of Cited Reference

This is followed by Champion H. G. (1968) with 236 citations, reflecting the continued relevance of forest classification in Indian biodiversity studies. Other highly cited works include Simpson (1949) on diversity indices, Hammer Oyvind (2001) for statistical tools in palaeontology, and Walkley and Black (1934) on soil analysis methods.

5.8 Co-authorship of Countries in Biodiversity

Figure 3 was created to display the countries' co-authorship. Individual countries are represented by the circles (or nodes) in the figure; the size of each circle corresponds to the number of documents related to that nation.

Figure 3: Countries Co-Authorship Network Visualization

Out of the 165 countries that conducted biodiversity studies, 109 are deemed to meet the requirements, with a minimum of five documents per nation. The network visualization map is created using a comprehensive counting technique and weights for building the figure as documents. These 109 nations are divided into five groups. Cluster 1 has 36 countries, like Belgium, Belize, Bolivia, Botswana, Brunei, South Africa, Zambia, Zimbabwe, etc.

5.9 Bibliographic Coupling of Authors in Biodiversity

Based on co-citation trends or co-authorship links, the clusters in Figure 4 depict groups of documents or authors. One author is represented by each circle or node in the graphic, and the size of the circle corresponds to the quantity of documents in this biodiversity study.

Figure 4: Bibliographic Coupling of Authors Visualized in a Network

Six clusters make up the Bibliographic Coupling of Authors network diagram. 728 authors of the papers in Cluster 1 have strong co-authorship or co-citation links. It might be a well-known area of study or a closely related group in the subject of biodiversity. Thirty-three documents or writers with similar co-citation or co-authorship patterns make up Cluster 2. Clusters 3, 4, 5, and 6 each contribute a moderate number of authors (21, 11, 5, 2) who demonstrate co-authorship and co-citation links.

5.10 Co-Occurrence of Keywords in Biodiversity

The most popular keywords and those that recur often in the same publications are measured by the co-occurrence network of author keywords, which is shown in Figure 5. The co-occurrence analysis method is predicated on the idea that the terms that appear frequently share a common theme.

Figure 5: Network Visualization of Co-Occurrence of Keywords (Source: VOS Viewer)

The results for the most prevalent themes pertaining to biodiversity are displayed in this figure. A node (circles) represents the keyword and a label indicates it. Co-occurrence between keywords is indicated by the links between nodes and the distance between two keywords provides an approximation of the keywords' importance based on co-occurrence associations. The set of terms that are somewhat closely related to one another is represented by color uniformity.

6. Major Findings

On the basis of the data collection and analysis, the following findings are constructed:

- The study found a steady increase in biodiversity research publications in India between 2015 and 2024, rising from 426 papers in 2015 to 1080 in 2023. Most publications were research articles (75.9%), showing a focus on original studies, while review papers (11.2%) helped summarize key topics.

- A few authors, such as Kumar A, Kumar S and Singh S, contributed the most papers, supporting the Degree of Collaboration that only a small group of researchers produce most of the output. The Wildlife Institute of India, Banaras Hindu University and University of Calcutta were the leading institutions.
- India ranked fourth in the world for biodiversity research, contributing 4.46% of global output. Collaboration with countries like the USA, UK and China was strong. Top journals included Chemistry & Biodiversity, Zootaxa and Current Science.
- Increasing interest in sustainable environmental research is shown by often occurring terms like biodiversity, conservation, ecosystem, and climate change. All things considered, India's biodiversity research is growing quickly thanks to solid institutional backing and international cooperation.

7. Conclusion

The evidence shows that there is steady growth in the number of publications and reasons for increasing recognition for the importance of biodiversity and the sustainable use of environmental resources by researchers in India. India is ranked fourth in biodiversity research in the world; this is largely due to the contributions of the Wildlife Institute of India, Banaras Hindu University and the University of Calcutta. Repeated frequency of keywords, such as biodiversity, conservation, and climate change, speaks to the level of importance being placed on ecological and environmental research themes. The research shows that India has created a well-developed and expanding research ecosystem in biodiversity research supported at the national and international level.

The results of this research provide more useful pathways for policy makers, funding agencies, and research institutions to inform future directions, encourage interdisciplinary research, and stimulate meaningful global research collaboration. Future work should strive to increase the impact of research through publishing in premium journals, while also devising new bibliometric indicators to measure real-world impacts of biodiversity research.

References

Ali, H., & Kumari, A. (2015). Biodiversity: A scientometric analysis of publications output from India during 2003-2012. *Journal of Advancements in Library Sciences, 2*(2), 41-47.

Blanco-Zaitegi, G., Etxeberria, I. Á., & Moneva, J. M. (2022). Biodiversity accounting and reporting: A systematic literature review and bibliometric analysis. *Journal of Cleaner Production, 371*(3), 133- 77. https://doi.org/10.1016/j.jclepro.2022.133677

Borgohain, D. J., Bhardwaj, R. K., & Verma, M. K. (2024). Mapping the literature on the application of artificial intelligence in libraries (AAIL): A scientometric analysis. *Library Hi Tech, 42*(1), 149-179.

Borthakur, A., & Singh, P. (2018). Global research trends in 'Ecology': A scientometric analysis. *Tropical Ecology, 59*(3), 431-443.

Branquinho, A., & Brito, D. (2016). Impact of dams on global biodiversity: A scientometric analysis. *Neotropical Biology and Conservation, 11*(2), 101-110.

Farooqi, T. J. A., Irfan, M., Portela, R., Zhou, X., Shulin, P., & Ali, A. (2022). Global progress in climate change and biodiversity conservation research. *Global Ecology and Conservation,* 38, e02272. https://doi.org/10.1016/j.gecco.2022.e02272

Lwoga, E. T., & Sife, A. S. (2013). Mapping the research productivity and scholarly impact of the traditional medicine scholars in Tanzania: A scientometric analysis. *Library Philosophy and Practice*, 1-15.

Nath, M., Dey, P., Choudhury, R., & Sarmah, M. (2024). Global trends in vitamin D deficiency

research during 2014 to 2023: A scientometric exploration on contributors, leading nations and key collaborations. *College Libraries, 39*(4), 12-22. Retrieved from http://collegelibraries.in/index.php/CL/article/view/176

Paul, S., & Dutta, B. (2024). LASER research in India: A scientometric study during 2004-2023. *College Libraries, 39*(3), 33-43. Retrieved from http://collegelibraries.in/index.php/CL/article/view/166

Revathi, R., & Ranganathan, C. (2020). Mapping of geochemistry research productivity in India: A scientometric analysis. *Webology, 17*(4), 1-10.

Stork, H., & Astrin, J. J. (2014). Trends in biodiversity research: A bibliometric assessment. *Open Journal of Ecology, 4*(7), 354-361.

Van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics, 84*(2), 523-538. https://doi.org/10.1007/s11192-009-0146-3.

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