Library Science

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ABSTRACT   Indian geographical conditions made India a country with high level biological diversity. High level biological diversity and its Impact on Indian socio-economic life and climate forced many researchers to carry out research on many aspects of biological diversity. Increased R & D activities in Biodiversity of India resulted continuous increase in research output. In this Study we have Made an Attempt to measure the research output through Scientometrics analysis to understands the trends of research in terms of H-Index, Collaborative pattern and Citations.

Introduction

"We should preserve every scrap of biodiversity as priceless while we learn to use it and come to understand what it means to humanity".
E. O. Wilson

The great variety of life on earth has provided for man's needs over thousands of years. This diversity of living creatures forms a support system which has been used by each civilization for its growth and development and India graced with very rich biodiversity. Science has attempted to classify and categorize the variability in nature and its impact on society and environment for over a century. Scientists, NGOs, Research Institutes, Universities, National Authority of Biodiversity and many others are working on many areas of Biodiversity. Here we made an attempt to study the author's productivity in Biodiversity Research in India with the data obtained from Web of Science Database.

Objective

This study to analyze the Indian research output in the field of Biotechnology during the period 1999-2012 and the analyses included authors productivity, h-index, collaborative pattern, highly cited papers and year wise growth of the biodiversity research output

Methodology

Data was collected from the Web of Science (WoS). The WoS is the search platform provided by Thomson Reuters (the former Thomson Scientific emerged from the Institute for Scientific Information (ISI) in Philadelphia). SCI database is one of the very comprehensive databases covering all aspects of science. The study period (1999-2012) is selected as the database is available in machine from since 1982. The search string "Biodiversity" in the "Basic search" field of for the years 1999-2012 to download the records on the subjects 'biodiversity' restricted to India. A total of 1360 records were downloaded and analyzed by using the web of science website application as per the objectives of the study.

Data Analysis and Discussion

Table: 1 Research Output, h-index of Top 10 Productive Authors of India in Biodiversity

S.No	Author	Records	TLCS	TLCS/t	TLCSx	TGCS	TGCS/t	TLCR	h-index
1	Nagendra H	27	95	13.41	37	582	81.70	77	11
2	Singh RK	23	17	5.33	3	35	10.97	22	3
3	Bhat DJ	21	7	0.87	1	26	3.61	5	3
4	Roy PS	21	65	9.60	31	158	23.00	54	7
5	Davidar P	17	26	4.69	13	119	18.41	36	6
6	Parthasarathy N	17	81	7.57	56	225	25.96	30	8
7	Kumar A	16	23	3.82	14	85	13.69	40	5
8	Bawa KS	14	31	6.29	20	174	29.66	14	8
9	Maikhuri RK	14	21	2.69	6	128	15.05	13	6
10	Murthy MSR	13	18	3.49	5	54	11.70	47	4

Table 1 reflects the contribution of top ten authors who contributed for the biodiversity research in India. Nagendra H considered being the most productive author in India in the field of Biodiversity research as he tops total records, TLCS, TCS as well as H-index. In case of number of publications Singh P K and Bhat D J stands at 2nd and 3rd rank followed by Nagendra H. In case of TGCS, TLCS and H-Index Parthasarathy N and Bawas KS stands second with H-index count 8 and Roy P S stands third in TLCS, TGCS and H-index. This analysis reflects just highest number of publications won't give much credit to the authors if it is not having quality which reflected with H-index.

Table 2 Showing Authorship Patterns in the Area of Biodiversity Research Output

	1999	2000	01	02	03	04	05	06	07	08	09	10	11	12	Total	Percentage
Single authors	6	9	19	15	11	14	13	7	15	20	21	14	19	14	197	14.49
Double authors	10	9	14	11	22	9	25	18	22	33	42	46	41	32	334	24.56
Triple authors	3	3	3	11	13	14	10	15	24	35	34	42	40	51	298	21.90
Four authors	2	3	3	5	4	5	15	6	16	26	28	32	30	32	207	15.22
Five authors	2	3	1	1	5	3	7	5	13	9	15	22	21	25	132	9.71
Six authors	1	6	1	-	-	4	3	3	7	2	8	13	9	17	74	5.44

Research Paper

Seven authors	1	-	-	1	1	1	3	3	1	2	1	8	8	10	40	2.94
Eight authors	-	-	1	-	-	-		1	1	1	2	5	3	3	17	1.25
Nine authors	-	-	-		1	-	1	1	1	-	-	2	3	2	11	0.81
Ten authors	-	-	-	-	-	-	-	-	1	-	3	1	1	4	10	0.74
> ten authors	-	1	1	1		1	1	2	5	2	1	9	7	9	40	2.94
Total	25	34	43	45	57	51	78	61	106	130	155	194	182	199	1360	100

Table 2 Reflects the collaborative pattern of authors involved in biodiversity research in India. Double authors contribution stands top of the list followed by three, four and single authors. Contribution of double authors is 334 papers which is 24.56 % 0f the total records. The table shows that more than 60 percent of the contribution came from double, three and four authors which is really a positive aspect in collaboration.

Table 3: Single Vs multi-author and collaboration Coefficient of Biodiversity research output

| Year	Single Authors		Multi Authored		Total	Collaboration Coefficient
	No of Output	%	No. of Output	%		
1999	6	3.05	19	1.63	25	0.32
2000	9	4.57	25	2.15	34	0.36
2001	19	9.64	24	2.06	43	0.79
2002	15	7.61	30	2.58	45	0.5
2003	11	5.58	46	3.96	57	0.24
2004	14	7.11	37	3.18	51	0.38
2005	13	6.60	65	5.59	78	0.2
2006	7	3.56	54	4.64	61	0.13
2007	15	7.61	91	7.82	106	0.16
2008	20	10.15	110	9.46	130	0.18
2009	21	10.66	134	11.52	155	0.16
2010	14	7.11	180	15.48	194	0.08
2011	19	9.64	163	14.02	182	0.12
2012	14	7.11	185	15.91	199	0.08
	197	100	1163	100	1360	0.26

A study of data from the above table 3 indicates the degree of collaboration in research output of Biodiversity. The degree of collaboration is 0.26 during the study period 1999 to 2012. i.e., out of the total 1360 literature published 1136 are from multiple authors which 85.51 percent is of total output and 197 papers are published by single author which is 14.49 percent of total output. In case of collaboration co efficiency the year 2001 stands ahead of all with 71 percent.

It could be seen clearly from the above discussion that the degree of collaboration in producing research output on Green computing research has shown in fluctuation trend during the study period; because the researcher has identified the selection area of biodiversity is a new discipline. Based on this study, the result of the degree of collaboration C = 0.85.51. i.e., 85.51 percent of collaborative authors' articles published during the study periods.

Table 4: Top 5 most cited Papers

S. No	Authors	Title	Total Citations	Average citations Per Year	Published Year
1	Lambin, EF; Turner, BL; Geist, HJ; et al.	The causes of land-use and land-cover change: moving beyond the myths	502	38.62	2001
2	Butchart, Stuart H. M.; Walpole, Matt; Collen, Ben; et al.	Global Biodiversity: Indicators of Recent Declines	274	68.50	2010
3	Schipper, Jan; Chanson, Janice S.; Chiozza, Federica; et al.	The status of the world's land and marine mammals: Diversity, threat, and knowledge	232	38.67	2008
4	Nagendra, H	Using remote sensing to assess biodiversity	153	11.77	2001
5	Dentener, F.; Drevet, J.; Lamarque, J. F.; et al.	Nitrogen and sulfur deposition on regional and global scales: A multimodel evaluation	122	15.25	2006
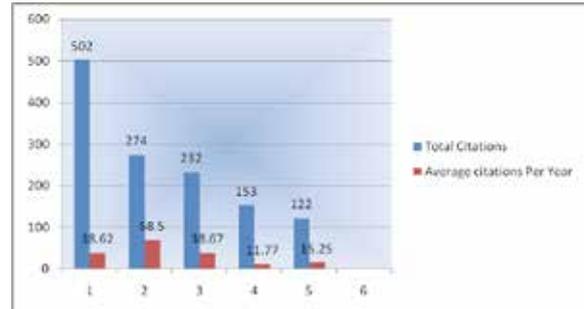
Highly Cited papers (Top 5)

Table 4 and graph 1 indicates ranking of papers by number of Total Citation Scores and average number of citations received per year. The paper "The causes of land-use and land-cover change: moving beyond the myths" of Lambin, E F and others stands top in total citation score as it received 502 total citations and average it received 38.62 citations per year. In case of average citations per year the paper "Global Biodiversity: Indicators of Recent Declines" stands ahead of all the papers as it was published in the year 2010 and it received totally 274 citations with an average of 68.50 citations which is really a sign of quality and its relevance to others researchers.

Findings and Suggestions

· There is no much variation in the early output up to 2005 but from 2005 onwards there is significant development in the research output of biodiversity but as compare to the global output India still need to improve research performance in biodiversity as it is the mega biodiversity nation.

· Contribution of multiple authors is dominating with major contribution of double and three authors; so there is a need of promoting further collaboration in the field of biodiversity research in India.

· The journal paper "The causes of land-use and land-cover change: moving beyond the myths" stands ahead of total citations. The papers of Indian authors need to be cited as there are less citations for Indian paper and more citations for foreign authors who worked on Indian Biodiversity

Conclusion

Biodiversity research in India has shown the importance of understanding the biodiversity for the sustainable development. Though the study started in recent decade but there is really a optimistic growth in the research. Most of the nations are very enthusiastic to take research in the field of biodiversity as it is the real asset of the mankind and India is not exception for it but as compare to Indian rich biodiversity still we need to improve the research performance in a way to protect our rich biodiversity.

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