

# Application of Brodford's Distribution to the Journal for Natural conservation

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## Abstract

*The term is derived from Ancient Greek zoion, i.e. "animal" and, logos, i.e. "knowledge, study". Zoology can be subdivided into two categories, Vertebrate zoology and Invertebrate zoology. Vertebrate means to have a spinal column or backbone. Invertebrate means lacking a spinal column. Invertebrates make up 90% of the Earth's animals. They range in size from minute to extremely large. They possess soft bodies and external skeletons. This article analysed data on ranking of source, country wise distribution and authorship pattern of Journal citation. Finally Brodford's law applied to the journal to know the highly production journals.*

Keywords: Zoology, Nature, Conservation, Journal ranking, Brodford's law

## 1. INTRODUCTION

The history of zoology traces the study of the animal kingdom from ancient to modern times. Although the concept of zoology as a single coherent field arose much later, the zoological sciences emerged from natural history reaching back to the works of Aristotle and Galen in the ancient Greco-Roman world. This ancient work was further developed in the Middle Ages by Muslim physicians and scholars such as Albertus Magnus. During the Renaissance and early modern period, zoological thought was revolutionized in Europe by a renewed interest in empiricism and of many novel organisms. Prominent in this movement were Vesalius and William Harvey, who used experimentation and careful observation in physiology, and naturalists such as Carl Linnaeus and Buffon who began to

classify the diversity of life and the fossil record, as well as the development and behaviour of organisms.

### 1.2 Definition of Zoology

**According to Oxford English Dictionaries** The scientific study of the behaviour, structure, physiology, classification, and distribution.

### 1.3 Importance Of Zoology

Zoology is important to understand and preserve the vast diversity of species on our planet and learn about our own ancestry and how we came to be. we can also learn about our anatomy and better understand the function of our bodies, which can help us combat diseases. Genetics is the branch of zoology its knowledge has brought revolution in the plant and animal breeding. There is every possibility that our non-renewable natural resources will be exhausted in near future.

The conservation of these natural resources may be possible through zoological knowledge. Zoological knowledge and theories are applicable to maintain health and to control the epidemic diseases. But still there are some dangerous medical problems which needs further study.

#### **1.4 Citation Analysis**

Citation pattern or the analysis of citation pattern is one of the major and popular branches of bibliometrics. Bibliometrics has established itself as a viable and distinctive research technique for studying science of science based on citation data. Analysis of citation pattern or citation analysis is one of the most important bibliometric techniques involving analysis of the references forming part of primary communication. Citations are the formal explicit linkages between publications that have particular points in common. The word "Bibliometrics" is although of not so old but bibliometric studies were performed much earlier since the beginning of the 20th century.

#### **1.5 About Source Journal**

Science publishes the *Journal for Nature Conservation* in affiliation with ECNC-European Centre for Nature Conservation. The *Journal for Nature Conservation* is a scientific journal, published bi monthly focusing on methods and techniques used in nature conservation. This international and interdisciplinary journal offers a forum for the communication of modern approaches to nature conservation. It aims to provide both scientists and practitioners in conservation theory, policy and

management with comprehensive and applicable information.

#### **1.6 Objectives of study**

- a. To determine the most Rank list of frequently need Journals Textbooks,
- b. To understand the Authorship pattern of Journal Citation and book Citations.
- c. To know Bradford law scattering applies to the researcher in the field of zoology.
- d. To understand the chronological distribution to check of ranked journal Citation.
- e. To compare and measure the growth rate of literature on a particular subject in various countries.
- f. To examine the growth literature output in a subject during a period of time.

#### **1.7 Need for the study**

The subject of zoology is one of the branch of subject in the field of science. After the globalization the research domain increased tremendously, Innumerable journals, Text books, Report, Conference proceeding, etc. are publishing extensively on the subject. Therefore the present study was undertaken to find productive list of core journals in zoology.

#### **1.8 Scope of study**

The present study in Analysis of Citations which are appended to journal of Nature conservation during the year 2012-2016 with total 5 volumes and 30 issues were selected for the study with their 3102 citations.

#### **1.9 Methodology of Research**

There are 3102 Citations were recorded in Journal for Nature conservation In the field of zoology. These Citations later grouped according to periodicals, Textbooks, Thesis, etc. There were 3102 Citations identified in the study out of which 1237 were periodical articles and Textbooks referred by the researchers. The application of Bradford's law scattering is testified in the study.

## 2. REVIEW OF LITERATURE

A literature review surveys scholarly articles, books, dissertations, conference proceedings and other resources which are relevant to a particular issue, area of research, or theory and provides context for an article dissertation by identifying past research. A literature review is a search and evaluation of the available literature in your given subject or chosen topic area. It documents the state of the art with respect to the subject or topic you are writing about. The researcher made an attempt to collect the journal article. The researcher studied research article thoroughly which are related to the present topic before starting the survey. The important references are listed and applied American psychological association 6<sup>th</sup> edition method of Bibliography.

**Senthikumar, R & Ulaganathan, G (2015)** described about the published research articles and its citation from top five ranked Agriculture Universities in India. During the period from 2004-14, the maximum number of articles 1601 are published in the year 2006 among the 14938, 4 to 464 (29.87%) articles from

PAU, 3616 (24.21%) articles from CCSHAU, 1972 (13.20%) articles from angrau. It clearly shows that authors from PAU area concentrating on Indian journals.

**Thanuskodi, S (2014)** made a study to identify the extent of use of web-based sources by scholarly researchers for their research to know the overall input of web based sources on formal communication in field education during 2006-2010. According to him the web has a huge impact on citation analysis research.

**Swapankumar, Patra (2014)** suggested that Indian LIS Journals aren't covered in WOS and coverage in Scopus and ICT data base is very limited. So Google scholar is the only viable option for citation analysis of Indian LIS Journals. Generally two or more authored articles are cited more than the single authored article. Indian researchers should focus more on research for better visibility and relevance because collaborative research is more cited and perhaps more relevant than the single authored articles.

**Reddy, C. Krishna (2014)** made a study based on 15,380 citations appeared to 138 doctoral theses in mathematics accepted by Sri Venkateshwara University, Tirupati, during 1965-2011. This study of the citations is carried out to find out the various sources of literature used by researchers in mathematics and also to study nature of authorship pattern.

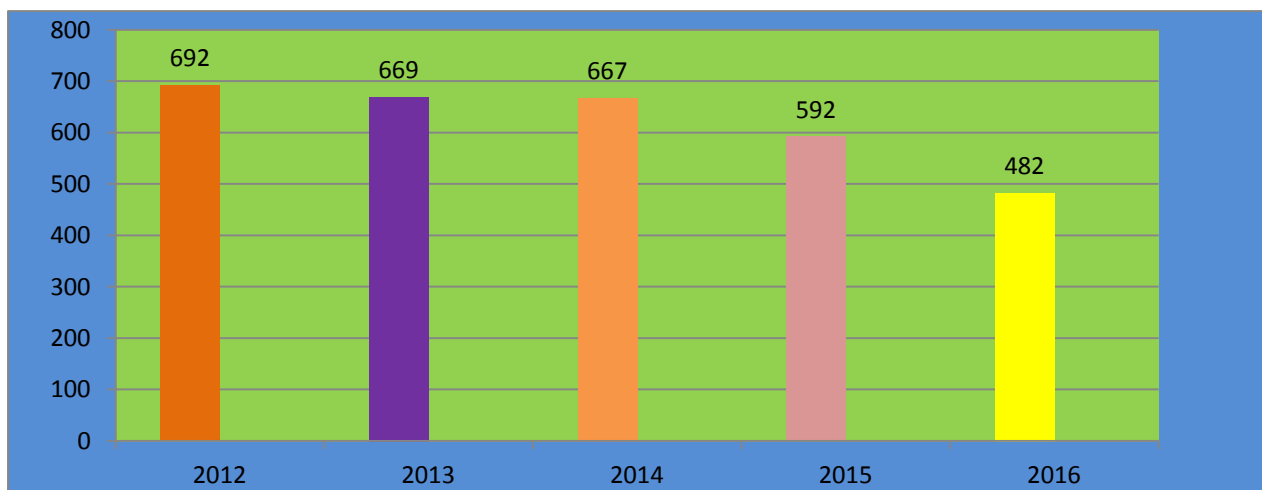
### 3. ANALYSIS AND INTERPRETATION OF DATA

After studying the methodology and scope etc., there are 3102 citations founded out of which periodicals are the highest sources consulted by the researchers. These periodicals citations were analysed according to the following table headings.

**Table-1: Volume and Year wise distributions of citations**

Year	Volume	Issue Number	No of Articles	Percentage	Number of Citations	Percentage
2012	20	1-6	24	20.33%	692	22.30%
2013	21	1-6	23	19.49%	669	21.56%
2014	22	1-6	24	20.33%	667	21.50%
2015	23	1-6	24	20.33%	592	19.08%
2016	24	1-6	23	19.49%	482	15.53%
<b>Total</b>	<b>5</b>	<b>30</b>	<b>118</b>	<b>100%</b>	<b>3102</b>	<b>100%</b>

Table -1 presents the year and volume wise distribution of research articles in 5 volumes. Each volume contains 6 issues. A total of 3102 citations are identified. The highest number of citations are found in the year 2012 in issue1-6 with 692 (22.30%) followed by 2013 with 669 (21.56%), citations in issue 1-6 and 2014 with 667 (21.50%), citations in issue 1-6, and 2015 with 592 (19.08%), citations in issue 1-6, and 2016 with 482 (15.53%), citations in issue 1-6 respectively.



**Figure-1 Volume and Year wise distributions of citations**

**Table: 2 Ranking Of Information source Journals**

Sl. No	Rank No.	Title of the Journals	No. of citations	Percentage of citations	Cumulative citations	Percentage Of Cumulative Citation	Country
1	1	Journal Biological conservation	51	4.12%	51	4.12%	India
2	2	Journal for Nature conservation	42	3.39%	93	7.51%	India
3	3	Journal of Agriculture economics	39	3.15%	132	10.66%	Australia
4	4	Journal of Illuminating Engineering Society	35	2.82%	167	13.48%	UK
5	5	Australian Journal of Zoology	32	2.58%	199	16.06%	USA
6	6	Journal of Applied ecology	29	2.34%	228	18.4%	India
7	7	Journal of Environmental management	28	2.26%	256	20.66%	India
8	8	Canadian Journal of Ecology	26	2.10%	282	22.76%	USA
9	8	Journal of wildlife management	26	2.10%	308	24.86%	Brazil
10	9	Journal of	25	2.02%	333	26.88%	UK

		Conservation evidence					
11	10	New Journal of Botany	24	1.94%	357	28.82%	Brazil
12	11	Journal of Zoology	23	1.85%	380	30.67%	USA
13	11	African Journal of Ecology	23	1.85%	403	32.52%	Africa
14	12	Journal of political ecology	22	1.77%	425	34.29%	India
15	12	China Journal of Animal science	22	1.77%	447	36.06%	China
16	12	China journal of tibetology	22	1.77%	469	37.83%	China
17	13	Fauna & Flora International	21	1.69%	490	39.52%	China
18	13	Newzealand Veterinary journal	21	1.69%	511	41.21%	Newzealnd
19	14	Journal of Applied ecology	19	1.61%	530	42.82%	USA
20	14	Journal of Biogeography	19	1.61%	549	44.43%	USA
21	15	Newzealand Journal of Ecology	18	1.53%	567	45.96%	Newzealand
22	15	Journal of sustainabe	18	1.53%	585	45.49%	Africa

		development in Africa					
23	15	Journal of forestry	18	1.45%	603	48.94%	USA
24	15	International Journal of climatology	18	1.45%	621	50.39%	USA
25	16	Journal of vegetation	17	1.37%	638	51.76%	Brazil
26	16	Journal of coastal conservation	17	1.37%	655	53.13%	India
27	17	Journal of forest ecology & management Society and national resource	16	1.29%	671	54.42%	USA
28	17	Journal of applied ecology	16	1.29%	687	55.1%	India
29	17	International journal of Remote sensing	16	1.29%	703	57%	USA
30	18	Journal of Animal Ecology	14	1.13%	717	58.13%	India
31	18	Journal of	14	1.13%	731	59.26%	USA

		experimentry marine biology and ecology					
32	18	Journal of International development	14	1.13%	745	60.39%	USA
33	19	Journal of Wildlife diseases	13	1.05%	758	61.44%	Spain
34	19	European journal of Agronomy	13	1.05%	771	62.49%	Europe
35	20	Journal of Environment management	12	0.97%	783	63.46%	Switzerland
36	21	Saudi Journal of biological sciences	12	0.97%	795	94.43%	Saudi Arabia
37	22	African journal of Ecology	11	0.88%	806	65.31%	Africa
38	22	Journal of Tropical geography	11	0.88%	817	66.19%	Singapore
39	23	Journal of primatology	10	0.80%	827	66.99%	USA
40	24	Journal of Mammalogy	10	0.80%	837	67.79%	Africa
41	24	Journal of Insect conservation	10	0.80%	847	68.59%	Italy
42	25	Journal of plant science	9	0.72%	856	69.31%	Isreal



43	25	Australian Journal of crop science	9	0.72%	865	70.03%	Australia
44	25	Journal of Molluscan studies	9	0.72%	874	70.75%	Europe
45	25	Journal of the royal society of western Australian	9	0.72%	883	71.47%	Australia
46	26	Herpetological Journal	8	0.64%	891	72.11%	USA
47	26	Journal of Range management	8	0.64%	899	72.75%	India
48	26	Journal of Arid Environments	8	0.64%	907	73.39%	Africa
49	26	Journal of Forestry	8	0.64%	915	74.03%	Brazil
50	27	Journal of Climatology	6	0.48%	921	74.51%	Newzealand
51	27	Journal of International development	6	0.48%	927	74.99%	Switzerland
52	27	Journal of qualitative methods	6	0.48%	933	75.47%	Europe
53	27	Journal of Psychological assessment	6	0.48%	939	75.95%	Africa
54	28	African journal of Ecology	5	0.40%	944	76.35%	India

55	28	Journal of Entomology	5	0.40%	949	76.75%	Europe
56	28	European journal of social science research	5	0.40%	954	77.15%	Europe
57	28	Journal of geographical system	5	0.40%	959	77.55%	USA
58	28	Journal of Tourism research	5	0.40%	964	77.95%	India
59	28	Journal of the Royal society of western australian	5	0.40%	969	78.4%	Australia
60	28	Journal of Rural studies	5	0.40%	974	78.8%	India
61	28	Journal of Biogeography	5	0.40%	979	79.2%	USA
62	28	Natural areas Journal	5	0.40%	984	79.6%	India
63	28	Journal of animal of Ecology	5	0.40%	989	80%	Uk
64	28	Journal of Environmental	5	0.40%	994	80.4%	USA

		changing and landscape management					
65	29	Journal of Applied Ichthyology	4	0.32%	998	80.72%	China
66	29	Journal of Remoting	4	0.32%	1002	81.04%	USA
67	29	Journal of Coastal Research	4	0.32%	1006	81.36%	Brazil
68	29	Journal of cultural sciences	4	0.32%	1010	81.68%	India
69	29	Journal of Plant Ecology	4	0.32%	1014	82%	Europe
70	29	Journal of Botany	4	0.32%	1018	82.32%	India
71	29	Journal of Agronomy	4	0.32%	1022	82.64%	China
72	29	Journal of Biological Science	4	0.32%	1026	82.96%	Africa
73	29	Journal of Psychological Assessment	4	0.32%	1030	83.28%	Australia
74	29	Journal of royal Statistics society	4	0.32%	1034	83.6%	UK

75	29	Journal of Tropical geography	4	0.32%	1038	83.92%	Brazil
76	29	Journal of Insect conservation	4	0.32%	1042	84.24%	India
77	29	Journal of Geographic Information system	4	0.32%	1046	84.56%	USA
78	29	Journal of Zoology and wild life medicine	4	0.32%	1050	84.88%	USA
79	29	Journal of Human Environment	4	0.32%	1054	85.2%	India
80	29	Journal of the linean society	4	0.32%	1058	85.52%	Switzerland
81	29	Journal of Crop science	4	0.32%	1062	86.84%	India
82	29	Journal of Molluscan studies	4	0.32%	1066	86.16%	Africa
83	29	Journal of Environmenatl Education	4	0.32%	1070	86.48%	Australia
84	29	Journal of Parasitology	4	0.32%	1074	86.8%	UK
85	29	Jouournal of Experimental Zoology	4	0.32%	1078	87.12%	USA

86	29	Journal of Anthrological sciences	4	0.32%	1082	87.44%	China
		Remaining 62 titles cited less than 3 times	155	12.56%	1237	100%	

Table 2 gives the rank list of journals cited by researchers or the 155 journals, 86 journals has been cited at least 4 times. These 86 journals accounts for 1082 (87.44%) out of 1237 citations.

Analysing the ranking of journals, biological conservation for 4.12% citations and is followed by Journal for nature conservation with a share slightly more than 3.39% of the citations. And Journal of Agriculture economics 3.15% occupies the third place with 3.15%.

### **APPLICATION OF BRAD FORD'S DISTRIBUTION**

Samuel element Brad ford, is a pioneer of Bibliometrics, should be considered for his classic paper “sources of information on specific subjects”, which is the first paper published on observations on scattering pattern of journal in the area of arranged by decreasing order of sources items contributed by the journals very productive sources, large number of sources which were moderately productive and still a large number of sources of constantly distinguishing productivity. In the list of periodicals ranked by the distinguishing productivity, identified three groups of periodicals that produced approximately the same number of articles on the subject, but the number of periodicals in these three equi productive zones increased by a constant factor.

Brad ford states his law as follows if scientific journals are arranged in order of decreasing productivity of articles on a given subject, they may be divided into a nucleus of periodicals more particularly devoted to subject nucleus, when the zones will be.

$$1: n: n^2$$

Brad ford plotted the partial sums of references against the natural logarithm of the partial sum of numbers of journals, and he noticed that the resulting graph is a straight line. On the basis, he gave the following linear relation to describe a scattering phenomenon.

$$F(x)=a + b \log x.$$

$F(x)$  is the cumulative number of references contained in the first  $x$  most productive journal;  $a$  and  $b$  are constants.

In the present study the journals identified and ranked were 158 number. Which in total 1237 citations. These 158 journals were demarked into 3 zones such that produced one-third after total of relevant papers/ articles.

**Table no.3 Bradford's Law of Scattering in 3 zones**

Zone	Journals	Citations	Percentage
1 <sup>st</sup> zone	21	567	45.83%
2 <sup>nd</sup> zone	48	340	27.48%
3 <sup>rd</sup> zone	86	330	26.67%
<b>TOTAL</b>	<b>155</b>	<b>1237</b>	<b>100%</b>

The above table No.5 indicates that, the first zone contained a small number of productive journals, which are 21 number contributing 567 citations. The second zone contained a large number of moderately productive journals which are 48 in number contributing 340 citations. The third zone contains a still larger number of journals of low productivity which were totally 86 in number contributing 330 citations. This is almost follows the ratio of 21:48:86 which is in agreement with Bradford's Law of scattering.

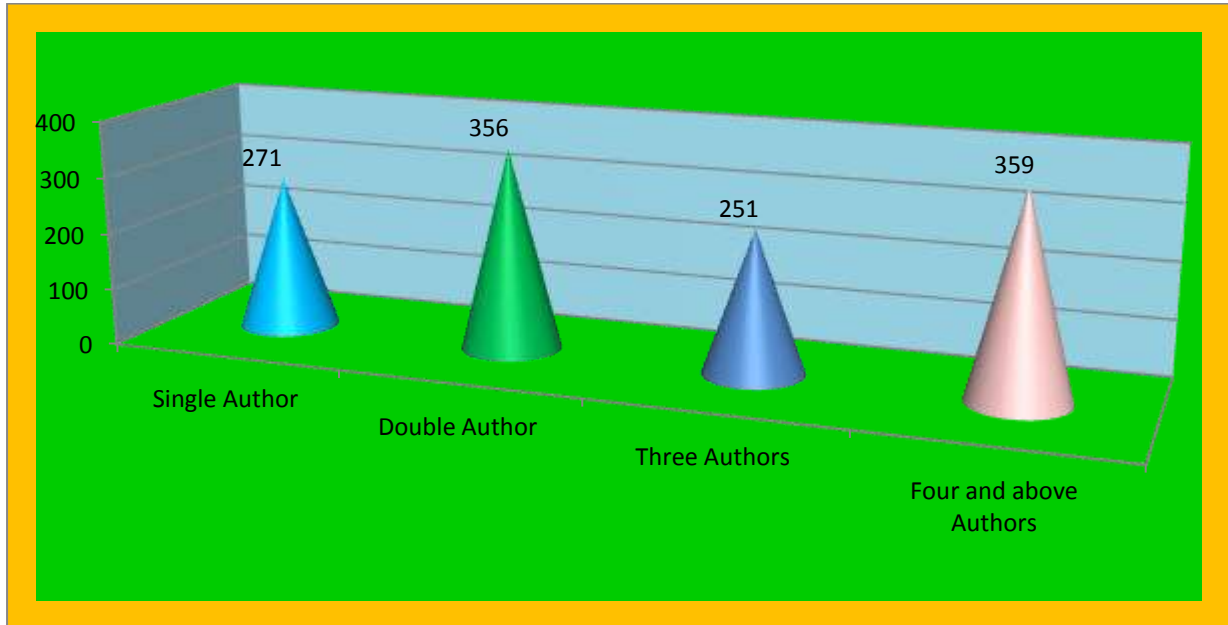
It can be stated that nuclear Zone contains a small number of highly productive journals. The second zone contains a larger number of moderately productive journals and the third zone (outer zone) contains a much larger number of journals of low productivity.

**Table-4 Authorship pattern of Journal Citations**

Number of Authors	Number of Citations	Percentage
Single Author	271	21.90%
Double Author	356	28.77%
Three Authors	251	20.29%
Four and above Authors	359	29.29%
<b>Total</b>	<b>1237</b>	<b>100%</b>

Table 6 shows the authorship pattern as reflected in Journal articles. Four and above articles contributes aggregate to 359(29.02%) followed by double author contributions with

total of 356(28.77%), single author contributions of 271(21.90%), and three author contributes 251 (20.29%) respectively.



**Figure-4 Authorship pattern of Journal Citations**

#### 4. FINDINGS AND CONCLUSION

##### 4.1 Findings

The following are some of the major Findings that were identified from the study.

##### 4.2 Volume and Year Wise distribution of citations

It is observed from table 1 that the highest number of Citations in volume 20 , issue no 1-6, 692citations (22.30%) of in the year 2012 this journal.

##### 4.3 Rank list of journal

In the observed table-4 that the Journal of Biological conservation 51(4.12), Journal for Nature conservation 42 (3.39%), Journal of Agriculture economics 39 (3.15%) as the rare top three journals used by the researcher among the rank list of journals.

##### 4.4 Brad ford's distributions

It is observed from the table 5 indicates that, the first zone contained a small number of productive journals, which are 21 number contributing 567 citations. The second zone contained a large number of moderately productive journals which are 48 in number contributing 340 citations. The third zone contains a still larger number of journals of low productivity which were totally 86 in number contributing 330 citations. This is almost follows the ratio of 21:48:86 which is in agreement with Bradford's Law of scattering. The study confirms that see journal use pattern in the field of zoology researches fits well with Brad fords scattering.

##### 4.5 Authorship pattern of journal citations

Authorship pattern shows in the tables 6 indicate Four and above Authors

359 (29.9. %), followed by Double Author 356 (28.77%), and Single Author 271 (21.90%), followed by Three Authors 251(20.29%).

## 5.2 Conclusion

The present investigation is mainly intended to describe the characteristics features of journal of nature conservation in the field of zoology. A citation analysis is one of the most widely used methods of bibliometrics to analyse the productiveness of periodicals. The study identified and brings out the list of core journals which are more productive in field of Zoology. The findings of the study may be used by the faculty members of department of Zoology and also they may recommend these sources to the post graduate students and research scholars. Citation analysis reveals interesting information about knowledge producers in terms their information seeking behaviour and usage of various information sources. It can highlight the familiarity awareness and usage of knowledge procedures regarding the online and print information sources. It is also useful to researchers and academic librarians, they exemplify a citation analysis process useful to determine core journals in other interdisciplinary fields.

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