

Research Trends in Field of Geology: A Case Study of Banaras Hindu University

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ABSTRACT

In modern time, the work of the library is not confined only to the transaction of the books, but it has become the centre of dissemination of information. Research has always been regarded as the most important intellectual activity in the higher education system. In this paper, the research works at the Ph. D level in Geology carried out in Department of Geology, Banaras Hindu University, Varanasi during past 93 years (1939 - 2013) have been analyzed to find out the trends and areas of research, growth pattern and productivity of Department along with broad subject areas in the discipline. This study presents the analysis of the study with the primary goal of appraising the perspective of geological research community to make them aware of the present direction of research in geology.

Keywords: Geology, Structure & Tectonics, Geochemistry, Remote Sensing, Photogeology, Geomorphology, etc

1. INTRODUCTION

In higher education system, research has always been regarded as the most important intellectual activity which provides dependable solutions to the problems being manifested in various fields of knowledge. Research is the medium of recognition not only to the nation and the department/university but also to the research scholar. In modern competitive world, no university can afford to remain stagnant; it has to evolve continually and consciously by adding new ideas, inventions and discoveries in different fields of knowledge through research. Research is directly responsible for the social

and economic development of a country. Research has been regarded as a determinant force in supporting and shaping a sustainable future of a nation. Research would be a way to harness and find means to manage the social and economic needs of the world. Former president of India, Dr. A. P. J. Abdul Kalam has rightly marked, "the importance of research cannot be underestimated today when it has emerged as the driving force in the process of self-reliance in all cutting-edge technologies. In certain universities, research has been the main contributor and guiding force in realising its core competence" [1].

BANARAS HINDU UNIVERSITY

Banaras Hindu University is an internationally reputed temple of learning, situated in the holy city of Varanasi. This Creative and innovative university was founded by the great nationalist leader, Pandit Madan Mohan Malviya, in 1916 with cooperation of great personalities like Dr Annie Besant. It has produced many great freedom fighters and builders of modern India and has immensely contributed to the progress of the nation through a large number of renowned scholars, artists, scientists and technologists who have graced this university.

The area of the main campus of this premiere Central University is 1300 acres, having well maintained roads, extensive greenery, a temple, an air strip and buildings which are an architectural delight. The university comprises 3 Institutes, 14 Faculties 140 Departments, 4 Inter disciplinary Centers, a constituent college for women's and 3 Constituents Schools, spanning a vast range of subjects pertaining to all branches of humanities, social science, technology, medicine, science,

fine arts and performing arts. It has 6 centres of Advanced Studies, 10 Departments under Special Assistance Programme and a large number of specialized Research Centers. Four Degree Colleges of the city are affiliated to this University.

The University family consists of about 15000 students, about 1700 teachers, and nearly 8000 non-teaching staff. A large number of students from foreign countries like the U.S.A, the countries of Europe, Asia, Middle East, Africa etc., come to study here. The university has taken a leadership role in promoting new ideas, the spirit of integration of the world, and cultivation of intellect and culture [2].

DEPARTMENT OF GEOLOGY

The full fledged Department of Geology was established on January 22, 1923 under the leadership of late Prof. Krishna Kumar Mathur. As the premier institution of Geology in the country, the Department has produced eminent scholars who have often headed most of the leading geological organizations of India such as Geological Survey of India (GSI), Oil and Natural Gas Commission (ONGC), Atomic Minerals Division (AMD), Central Ground Water Board (CGWB), Mineral Exploration Corporation Limited (MECL), Coal India Limited (CIL), National Mineral Development Corporation (NMDC), and have also contributed in top capacities in teaching and research institutions at national and international levels [3].

This Department is unique in the country in having competent and distinguished faculties in almost all branches of Geology such as Mineralogy, Crystallography, Structure and Tectonics, Petrology (Igneous, Metamorphic and Sedimentary), Stratigraphy, Paleontology (Invertebrate, Vertebrate, Micropaleontology, Paleobotany), Oceanography, Geochemistry, Fuel Geology (Coal and Petroleum), Hydrogeology, Economic Geology, Engineering Geology, Remote Sensing & Photo Geology, Mineral Exploration & Geomorphology. The Department integrates theory, modeling, experiment, measurement and observation in order to reach a full understanding of the problems which we are facing. Although research is rooted in fundamental science, much of it is applied to the exploitation of earth resources and management of the environment.

The Department finds itself singularly fortunate in being equally strong both in hard rock domain, soft rock domains and third group of structure and tectonics, hydrogeology, engineering geology and remote sensing with the help of research from Department of Science and Technology (DST). As geologists, the products of Geological Institution are responsible to locate and assist

in the extraction of mineral deposits such as gold, metallic ores, coal, petroleum and even building materials and economically useful clays.

The UGC upgraded the Department to COSIST (1992) and to Special Assistance Programme (SAP until March 2009). At present the DST has sponsored our Department under FIST (until March 2008) programme. With recognition in the national and international arena for its path breaking researches in geological sciences, the Department has been elevated to a Centre of Advanced Study in 2010 and also upgraded to FIST level II.

The UG and PG programmes following rigorous semester system. The Department possesses a 3 year (6 semesters) B.Sc. (Hons.) Geology, 2 year (4 semester) M.Sc., Petroleum Geosciences and 3 year (6 semesters) M.Sc. (Tech.) Geology.

STATUS OF RESEARCH IN THE FIELD OF GEOLOGY IN DEPARTMENT OF GEOLOGY

In the Department, researches are perused by self-organized research groups. Since all the themes we are addressing, require multi-disciplinary approaches, there is regular communication and interaction across group boundaries and with many groups outside the Department and the University. For many decades, the Department has used the fascinating Himalayas, South, Western India, and Central India as natural laboratories. However, our activities also focus on the Indo-Gangetic plains and even Indian Ocean.

In appreciation of the excellent research carried out by the Department, it has been liberally funded by many Government agencies. In recognition of internationally significant scientific contribution to the geological sciences, several faculty members have been invited by foreign institutions for collaborative researches, invited lectures, congresses, symposia and seminars. Presently several active research programmes with German, U.S., French, British, Canadian, Japanese, Brazilian, and Mexican scientists are in progress. Many faculty members are also actively involved in global research programmes as members of International Union of Geological Sciences (IUGS), International Geological Correlation Programme (IGCP), International Sub-Commission of Stratigraphy (ISJS), Deep Sea Drilling Programme (DSDP) and Ocean Drilling Programme (ODP).

One hundred fifty three (153) Doctoral dissertations so far have been successfully defended at Department for the award of Doctor of Philosophy (Ph. D) in Geology.

SCOPE AND LIMITATIONS

The first research work in Department of Geology was awarded in 1939 with the registration of Mr. G. W. Chiplonker under supervision of Dr. Rajnath. The study covers research works in Geology at the Ph. D level only accepted for doctoral degree by Department of Geology, Banaras Hindu University, Varanasi. The study does not consider the research works in Geology registered in the university and data is collected from the Thesis Section of the Central Library. The period of coverage is from 1939 to 2013, a period of 93 years.

OBJECTIVES OF THE STUDY

This study is restricted to Banaras Hindu University. The objectives of this study are as given below:

1. To find out the research trend in Geology;
2. To know the subject wise distribution of research works in Geology;
3. To identify the thrust areas of research in Geology;
4. To determine the diversity and trends of research in field of Geology; and
5. To identify the contribution of teachers in awarding doctoral degrees.

METHODOLOGY

The main source of data/information is Database of Sayaji Rao Gaekwad Library, Central Library, Banaras Hindu University, Varanasi which lists out the doctoral theses accepted by Banaras Hindu University in her database. The data collected pertains to the name of Ph. D scholars, topics of research, name of single/joint supervisors, years of award and the name of the subject under study. These doctoral dissertations have been listed out and analysis has been made. The year wise distribution of categories during the study period has also been made. All the 153 doctoral dissertations awarded during the period of 93 years have been considered for the study. The theses were grouped according to subject categories.

DATA PRESENTATION

Under this study, data of 153 Ph. Ds awarded was collected from 1939 to 2013. Quantitative analysis of the data has been presented under the following tables to be analyzed according to objectives.

Table 1. Year-wise Distribution of Theses Awarded

Sl. No.	Year	Number of Theses Awarded
1.	1939	1
2.	1956	1
3.	1957	1
4.	1958	2
5.	1959	1
6.	1961	4
7.	1962	2
8.	1963	4
9.	1964	2
10.	1965	1
11.	1966	3
12.	1967	2
13.	1969	5
14.	1970	2
15.	1971	4
16.	1972	5
17.	1973	1
18.	1974	3
19.	1975	3
20.	1976	1
21.	1977	2
22.	1978	7
23.	1979	3
24.	1980	4

25.	1981	4
26.	1982	3
27.	1983	4
28.	1984	4
29.	1985	1
30.	1986	3
31.	1987	5
32.	1988	6
33.	1989	3
34.	1990	8
35.	1991	2
36.	1992	10
37.	1993	4
38.	1994	6
39.	1995	4
40.	1996	3
41.	1997	2
42.	1998	4
43.	1999	2
44.	2001	3
45.	2002	3
46.	2006	1
47.	2008	6
48.	2009	1
49.	2010	2
50.	2012	1
51.	2013	4
	TOTAL	153

Table 2. Distribution of Awarded Theses across Categories

Sl. No.	Categories	Number of Theses Awarded
1.	Crystallography	5
2.	Economic geology	22
3.	Engineering geology	20
4.	Fuel geology(Coal and Petroleum)	15
5.	Geochemistry	46
6.	Geomorphology	26
7.	Hydrogeology	20
8.	Mineral exploration	11
9.	Mineralogy	10
10.	Oceanography	7
11.	Paleontology (Invertebrate, Vertebrate, Micropaleontology, Paleobotany)	10
12.	Petrology (Igneous, Metamorphic and Sedimentary)	60
13.	Remote Sensing and Photogeology	41
14.	Stratigraphy	14
15.	Structure and tectonics	48

Table 3. Distribution of Research Supervisor Contributing Ph. D work

Sl. No.	Name of Guides	Number of Research Works	% age

1.	Rajnath	14	9.15%
2.	S. G. Karkare	14	9.15%
3.	M. S. Srinivasan	11	7.18%
4.	R. K. Lal	9	5.88%
5.	A. K. Bhattacharya	8	5.22%
6.	V. K. Gairola	7	4.57%
7.	M. P. Singh	5	3.26%
8.	N. K. Mukherjee	5	3.26%
9.	R. S. Sharma	5	3.26%
10.	Arup Deb	4	2.61%
11.	B. D. Tiwari	4	2.61%
12.	C. S. P. Singh	4	2.61%
13.	M. N. Mehrotra	4	2.61%
14.	R. M. Singh	4	2.61%
15.	H. B. Srivastava	3	1.96%
16.	R. N. Tiwari	3	1.96%
17.	S. K. Agrawal	3	1.96%
18.	Jai Krishna	3	1.96%
19.	Anand Mohan	2	1.30%
20.	B. K. Chatterjee	2	1.30%
21.	H. P. Sengupta	2	1.30%
22.	I. C. Pande	2	1.30%
23.	K. R. Surange	2	1.30%
24.	M. N. Mehrotra	2	1.30%
25.	R. C. Sinha	2	1.30%
26.	Rajesh Kumar Srivastava	2	1.30%
27.	Ramashray Prasad Singh	2	1.30%
28.	S. Kanjilal	2	1.30%
29.	S. N. Talukdar	2	1.30%
30.	S. N. Verma	2	1.30%
31.	A. D. Singh	1	0.65%
32.	A. V. Ulabhaje	1	0.65%
33.	Bhanu Prakash	1	0.65%
34.	D. C. Mishra	1	0.65%
35.	G. K. B. Navale	1	0.65%
36.	Jokhan Ram	1	0.65%
37.	M. G. K. Menon	1	0.65%
38.	Meenal Mishra	1	0.65%
39.	Meera Agrawal	1	0.65%
40.	R. N. Mathur	1	0.65%
41.	Satyendra Singh	1	0.65%
42.	U. K. Shukla	1	0.65%
43.	V. D. Shukla	1	0.65%
44.	V. S. Dubey	1	0.65%
45.	V. Srivastava	1	0.65%
46.	Not known	4	2.61%
	Total	153	

DATA ANALYSIS AND FINDINGS OF THE STUDY

The analysis of data represented point-wise of the objectives.

1. Year-wise distribution of theses awarded

The Table 1 represents the year wise distribution of theses which shows that the highest numbers of theses, i.e. 10 were awarded in the year 1992, while lowest number of 01 thesis was awarded in 11 years of the study period. Total number of 153 theses in Geology has been produced during the last ninety three years period.

2. Distribution of awarded theses across categories

In order to determine the direction of Geological research in broad subject categories, the analysis has been made in Table 2. Taking consideration of research works in Geology, 15 broad subjects have been categorized. It is found that the subject area 'Petrology', 'Structure & Tectonics', 'Geochemistry', and 'Remote Sensing & Photogeology' is having the highest number of 60, 48, 46 and 41 doctoral dissertations awarded respectively. It appears that the above topics have attracted the attention of scholars of Geology in order to know the needs of the users to develop knowledge of formation of the Earth.

Petrology appears to have attracted the attention of Geology scholars in which 60 theses have been produced. The subject area of Structure & Tectonics has 48 theses, Geochemistry has 46 these during the period and Remote Sensing & Photogeology has 41 theses. The topics like Geomorphology, Economic Geology, Engineering Geology, Hydrology, Fuel Geology and Stratigraphy have got importance among geologists for research work and numbers of theses covering these topics are 26, 22, 20, 20, 15 and 14 respectively. The Mineral Exploration, Mineralogy and Palaeontology are topics which got some importance and each topic is covered in 11, 10 and 10 theses awarded respectively. Other subject areas like Oceanography and Crystallography as indicated in the table have 07 to 05 theses produced during the study period.

3. Distribution of research supervisor contributing Ph. D work

The Table 3 shows the contribution of Research Supervisors towards the creation of Ph. D theses in Geology during the period of study. This table shows that 14 Ph. D scholars have been guided by Prof. Rajnath and Prof. S. G. Karkare each. Prof. M. S. Srinivasan has supervised 11 Ph. D scholars. Prof. R. K. Lal, Prof. A. K. Bhattacharya and Prof. V. K. Gairola have guided 09, 08, and 07 research scholars of the Department for their research works respectively.

CONCLUSION

The geologists in Department of Geology, Banaras Hindu University, Varanasi have concentrated on conducting research work at doctoral level in order to develop a knowledge base for understanding the geological phenomenon. The present paper has undertaken to trace the development of Geological research at doctoral level for the last 93 years period i.e., 1939 to 2013. It is identified that the highest number of

theses i.e., 10 has been produced in the year 2012 while the lowest being in the eleven years of the study period. Petrology appears to be the only broad subject area which has attracted the attention of geologists in which highest number of Ph. D works have been done followed by Structure & Tectonics, 'Geochemistry', and 'Remote Sensing & Photogeology'. Thus subject area of Structure & Tectonics, Geochemistry, Remote Sensing & Photogeology, Geomorphology, Economic Geology, Engineering Geology, Hydrology, Fuel Geology and Stratigraphy have been the area of attraction for the researchers. Prof. Rajnath and Prof. S. G. Karkare of the Department have produced maximum number of Ph. D Scholar which is 14 each.

We hope that the Department will progress in producing qualitative scholar as Ph. D degree holder in future.

2. REFERENCES

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