Journal of Advances and Scholarly Researches in Allied Education
Vol. XIV, Issue No. 1, October-2017, ISSN 2230-7540

Development of Modern Geographical Thinking in India

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Abstract – Geographical perceptions can be traced from very ancient cultures, although geography as all sciences developed during the Enlightenment, but it was in the early nineteen century when it was firmly established based in many aspects in the Darwinian revolution. Chinese geographical writings are considered the first predecessors, followed and developed during the Greek and Roman times. Pilgrimages, travels for trade and the discovery of new lands contributed significantly to the geographical knowledge, as it did the astronomical discoveries. The Germans, Humboldt and Ritter, are considered the fathers of modern geography, the first on the line of physical geography and the second on the human aspects. After them and up to the present, new directions have developed within geography, mainly due to the overview of quantitative and technical tools and to the recent globalization.

Keywords: Development, Modern, Geographical Thinking, India, Globalization, Cultures, etc.

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INTRODUCTION

India, home of one of the world's earliest civilisations, has a long-standing intellectual tradition. The geographical studies in India began with the dawn of Indian Civilization in ancient times. Occupying a strategic location in Asia, Indian history is at crossroads of cultures from China to Europe. The contributions of Indian scholars in the ancient period are parallel to that of Chinese, Greeks and Romans (Dikshit, 2001). In this geographically diverse subcontinent of Eurasia, discoveries on nature and humanity from Upanishads and Vedas led the development of various indigenous knowledge systems. The vast galaxy of seer scientists, philosopher-poets and sages left behind a wealth of history of thought. In fact several inventions and discoveries believed to have originated in the Western world have been studied centuries earlier by our ancestors. Looking back at the roots of Indian geography reveals very rich and strong Indian intellectual heritage, a legacy of over 2000 years old. However, the formal foundations of academic geography in India were laid in the colonial period as late as 1920s (Dikshit, 2006) Beginning in the 8th century, India was exposed to Islamic geographical concepts and ideas; and Muslim geographers began to take place beside Hindu scholars in contributing to the maturing of geographical study in India. The arrival of the British and other European colonial powers in the 17th century forced an adjustment in Indian intellectual circles. Indian geography's progress in the modern times has been spectacular after Independence. After independence, geography acquired new functions in the context of national development, expansion of the educational system and strengthening of planning projects. The complete image of Indian geographical thought demands a thorough critical screening of the inherited wealth from the past and the contemporary practices which together have decisive influences on the future directions. But, the major thrust of discussion here is on the significant developments in Indian geography during the last hundred years (contemporary phase); the major leadership in the development of Indian geography; paradigmatic changes; and the challenges faced by Indian geography.

REVIEW OF LITERATURE:

The history of geography is closely connected with the history of human society and its development. It is part of human interests, and precedents can be found in all ancient cultures. But as a science, geography is relatively young and many of its fundamentals appear during the nineteenth century. For Kish Geography is as old as man's search for soil to dig for plantings, for a path that leads to water, for a trail to a place where hard rock for arrowheads may be found.

But Geography is also as new as man's current search for ways to relieve urban congestion, to establish well-marked international boundaries, to describe and analyze vegetation patterns in remote parts of the earth. While the first geographical references are from travelers describing the

landscapes and the people living in them, the first scientific studies are from mathematicians and physicists interested in the environment.

It can thus be said that the foundations of geography are in the natural sciences, from the need to explain the physical environment and also on the idea of the influence of this environment on humans and society. Livingstone asserts that for generations, geography has been intimately involved in exploration, at least since the time of Muslim scholar-travelers, the voyages of the Scandinavians, Chinese, and medieval Christian adventurers.

But it was with the European voyages of reconnaissance, during the fifteenth and sixteenth centuries, that this first-hand knowledge of the world contributed most decisively to coherent body of geographical knowledge of the terrestrial globe. The significance of scientific travel was mainly due to Alexander von Humboldt through his explorations in South America. The knowledge explosion occasioned by the European voyages of exploration brought new cartographic challenges and accomplishments.

Although around the Mediterranean, Portola no Sea charts had been circulating for a long time and there already existed various Mappaemundi, the new lands discovered had to be reduced to paper. Gerard Mercator solved some of the mathematical problems associated with transferring a sphere to a flat surface with his famous map projection. In the following centuries, geography's close links with cartography continued to be maintained. The map, as both graphic language and visual representation, continues to be used as a geographical tool, at present with the invaluable assistance of remote sensing and Geographical Information Systems.

The Roots of Indian Geography: 'Geography' in Hindi is called "Bhugol"; 'bhu' meaning 'the Earth' and 'gol' meaning 'round', i.e. 'the study of round earth'. Indian astronomers propounded the theory that the earth is a sphere. The ancient Indian scholars were adepts in all fields known to humanity. Some of these scholars are listed below with their major field of study (Table 1) (Ginsburg, 1994).

This interdisciplinary knowledge lies at the root of geographic development. Acharya Kapil contributed to the science of cosmology. Acharya Bhardwaj is known for outstanding discoveries in aviation science. Baudhāyana was an Indian mathematician, noted for writing the earliest Sulba Sutra, 4 the texts dealing with geometry and mathematical principles. Acharya Charak, crowned as the 'father of Medicine', produced Charak Samhita as his most renowned work, in which he has described the functions and medicinal properties of some hundred thousand plants (Leslie, 2003).

Table 1: The Earliest Known Indian Scholars

Name	Field
Acharya Kapil (3000 BC)	Cosmology
Acharya Bharadwaj (800 BC)	Aviation technology
Baudhāyana, (800 BC)	Mathematics
Acharya Charak (600 BC)	Medicine
Acharya Kanad (600 BC)	Physics (Atomic Theory)
Acharya Sushrut (600 BC)	Medicine (Surgery)
Gautama Buddha (563 to 483 BC)	Philosophy
Pānini (400BC)	Grammar
Nagarjuna (100 AD)	Chemistry
Āryabhatta I (476–550 AD)	Mathematics & Astronomy
Varahamihir (499-587 AD)	Astrology & Astronomy
Brahamgupta (598-668)	Mathematics & Astronomy
Bhāskara I (600 - 680)	Mathematics & Astronomy
Adi Shankara (788 AD - 820 AD)	Philosophy
Aryabhata II (about 920)	Mathematics & Astronomy
Sridharacharya (AD 991)	Mathematics
Brahmadeva (1060- 1130)	Mathematics & Astronomy
Bhaskaracharya (1114-1183 AD)	Algebra

Acharya Kanad, a genius in philosophy, was the pioneer expounder of realism, law of causation and the atomic theory. Acharya Sushrut, with his Sushruta Samhita, was another giant in the arena of medical science and his is an unparalleled work of the medical science of ancient India, popular as Ayurveda. Siddhārtha Gautama was a spiritual teacher who founded Buddhism. Panini is known for his Sanskrit grammar, and his Ashtadhyayi is the foundational text of the earliest known grammars of Sanskrit that stands at the beginning of the history of linguistics. Nagarjun was an extraordinary wizard of science whose research produced maiden discoveries and inventions in the faculties of chemistry and metallurgy (Joseph, 1997).

The Indian scientists, like Aryabhatta-I, Varahmihira, Brahmagupta, Aryabhata-II, Sridhara and Bhaskaracharya, have shaped the course of mathematics and astronomy for the world to marvel upon. Aryabhatta's Magnum Opus, Āryabhatīyam (498 B.C.), was the summary of Hindu mathematics up to the time. It was recognized as a masterpiece and through its translation European mathematicians got enriched by the facts that Aryabhatta discovered 1,000 years before Copernicus and Galileo. Adi Shankara was an Indian philosopher who stressed the importance of Vedas, and his efforts helped Hinduism to regain strength and popularity.

Ancient Indian contribution to geography came through various fields of learning as Philosophy, Cosmology, Mathematics, Astrology & Astronomy, Physics, Chemistry & Metallurgy, Science & Technology, Medicine, and Linguistics. In fact, the Indian scholars contributed significantly in the growth and development of geography and its allied sciences. Although, the classical Indian scholars have richly contributed to the various fields of geographical study as physical geography, regional geography, climatology, mathematical and practical geography, their knowledge, particularly in astronomy (Khagol Shashtra), was fascinating.

Geographical Inheritance: Although geography was not then developed as a formal discipline, early Indian scholars had a well-developed geographical sense and clearly understood spatial relationships. The earliest mention of geography as a discipline is traced to Bhagwat Purana, the 8 th century puranic text when Bhugol, or Bhoogol, a vernacular term for geography in most Indian languages, is derived from Sanskrit. A large amount of geographical information is contained in the Mahabharata and Ramayana: the two great epics still unsurpassed in the classical Indian literature.

The earth studies of ancient Indian scholars dealt with its origin, sphericity, eclipses, size and dimensions, latitudes, longitudes and local time, directions or cardinal points, earthquakes and volcanoes, atmosphere and seasons, and its physical divisions. As far as the origin of the earth is concerned, many of the facts as put forward by the ancient Indian scholars were more or less accurately known. They believed in the solidification of earth from gaseous matter. The earth's crust, according to them, is made of hard rocks (sila), clayey material (bhumih) and sandy material (asma). The Puranas mention the earth to be apparently floating on the water like a sailing boat on the river. They were also aware of the fact that there is more land surface in the Northern Hemisphere. The concept of Prithvi (Earth) was the most basic in the study of geography. It has been profusely used in the Vedas and Puranas. The use of the term Bhugol for the discipline of Geography is the most appropriate and it clearly suggests that the ancient Indians endorsed the earth being a sphere, and not a flat disc as believed by some of their parallel civilizations. The facts related to the size and dimension of the earth were quite near to accuracy. It was well known to the ancient Indian scholars that the earth is an oblate spheroid slightly flattened at the poles. about 1000A.D. Akshansh and Deshantar are the terms used for 'latitudes' and 'longitudes' respectively in the ancient Indian literature. Puranas have a reference of three imaginary lines of latitudes passing through Equatorial belt, North Pole and South Pole. Accordingly, three major regions have been identified in the Literature, viz. Equatorial (Nirakshadesha), Northern Polar (Meru) and Southern Polar (Bhadvanala). The North Pole has been called as Zenith and the South Pole as Nadir. The South Pole was truly considered as the antipode of the North Pole, i.e. diametrically opposite to it. However, the world was not believed to exist beyond Equator, as the region here was compared to hell of the earth. The Eastern part, on the other hand, was believed to be 'the land of Gods'. This thinking is in consonance with that of the Europeans in the Early Medieval period, when the Dark Ages prevailed and the East in 'T-in-O' Maps was assumed to be the place of Adam and Eve. The ancient Indian scholars have also drawn Prime Meridian. These imaginary lines, the position of Sun and various stars have helped them to determine local time at various places.

In Rigveda, there is formulated idea of four main directions, viz. Purva (East), Paschim (West), Uttar (North) and Dakshin (South). By adding Zenith (Meru) and Nadir (Bhadvanala) it was raised to six. But, afterwards, ten directions have been frequently mentioned in the Puranic literature. The designation of these directions in the Puranas is significant in the sense that it bears concept of the Gods dominating in each of these directions. The ten directions and the ruling deity of each are mentioned below (Table 2).

Table 2: Cardinal Points and the Ruling Daities as per Puranic Literature

Direction	Ruling Deity
Purva (East)	*Indra* (The God of Rain)
Agneyay (Southeast)	*Agni* (The God of Fire)
Dakshina (South)	*Yama*(The God of Death)
Nairitya (Southwest)	*Niriti* (The God of Disaster)
Paschim (West)	*Varuna* (The God of Water)
Vayavya (Northwest)	*Marut/Vayu* (The God of Air)
Uttar (North)	*Kubera* (The God of Wealth)
Isana (Northeast)	*Isa* (The God of Power)
Urdhava (Zenith*)	*Brahma* (The Creator of Universe)
Adhoh (Nadir^)	*Sesanaga* (The Universal Ocean)

Environmental Geography, Ecology & Ecosystem Research: Geography, like ecology, is concerned with the distribution, organisation and morphology of phenomena on the surface of the earth and has developed similar concepts and techniques to tackle similar problems. The development of ecology as a formal branch of study has led to the use of term 'human ecology' as a scientific substitute for human geography. With Lindeman defining the ecosystem as 'any system composed of physical-chemical-biological processes within a space-time unit of any magnitude', a definition which clearly includes the operational range of geography, geographers began increasingly to use the ecosystem concept of their research. The ecosystem research in Indian geography is related to: (i) agro ecosystem; (ii) river ecosystem; (iii) socio-technical systems; (iv) settlements; and (v) human populations. First glimpses of ecosystem research in Indian geography undoubtedly appeared in agricultural and land use studies. Environmental geography, with a focus on ecology and ecosystem research, has vigorously emerged as the new research area since 1970s, and the Indian geographers have been addressing the issues of environment and development; environmental pollution; environmental degradation and hazards; environmental conservation, management and planning on different spatial scales; perceptive analysis of environment, development and quality of life; environmental problems and policies; environmental priorities and sustainable development; visualizing regional development as eco-development; ecology of urban environment

and environmental planning; morpho-ecological management; analysis of the contribution of science and technology for development of resources and human wellbeing; mapping of sustainable development; and the environmental impact assessment.

Regional Geography, Regional Planning and Development: R.P. Misra, V.L.S. Prakasa Rao, L.S. Bhatt and K.V. Sundaram have made important contributions to the field. R.L. Singh's 'India: A Regional Geography" is the magnum opus of the Indian regional geography. Although, there remains a dearth of meso and micro regional studies in India, there has been witnessed a growing emphasis the studies on regional development and planning. Two valuable volumes have been edited by R.P. Misra, and the strategy for regional and national planning worked out in these compendia deserves serious consideration. On the methodological plane the linkage of central place theory with that of growth pole is meaningful. L.S. Bhatt has recognised three levels of planning in the national context, viz. the nation/macro-level, the regional/ meso-level, and the local/ micro-level. The other works in this direction have dilated upon the economic development and rates of economic growth; need for balanced regional development; problems pertaining to regional imbalances; identification of underdeveloped districts; provision of analytical framework and indicators of regional development; delineation of planning areas; and eco-development.

Historical Geography & Geographical Thought: The most significant contribution to historical geography is certainly Schwarzberg's Atlas of South Asia32 which portrays evaluation of Indian culture, society, economy and polity from the Stone Age to modern period. Other such research works have delved into the study of early man and his culture in Palaeolithic India; perceptive analysis of the ecological background of the Chalcolithic culture in India; India's colonial dependent economy and regional inequalities; analysis of the origins of place names and settlements; reconstruction of Bharatvarsha and its physiography; and the evolution of administrative areas. As far as the Geographical Thought in the country is concerned, the related contributions have been outlined in ICSSR's A Survey of Research in Geography. S.P. Chatterjee's A Decade of Science in India: Progress of Geography (1963- 1972), Recent Trends in Indian Geography by L.S. Bhatt and P.P. Karan's work supplement the efforts in this direction.

Paradigm Changes in Indian Geography: However, considering the works carried out during the 20th century, it is clearly revealed how the focus of Indian geography shifted from much criticised 'gazetteer approach' to relatively analytical works. The main highlights of the problems with which Indian geography is faced are over-subsistence on foreign (western) concepts and methods, consequent impoverishment of indigenous methodological system, and the growing disparity in geographical research, education and related resources - personal quality, number and overall distribution. However, it is still a big challenge and acquires a greater attention, utmost care for the identity of Indian geography. The basic need is to make our own philosophical roots stronger. Geography in India started with a strong physical bias. In fact, most of the geographers of yesteryears came from geology and physical streams. Perhaps as a reaction against deterministic approach, as also in conformity with the shift in the discipline in England (most Indian geographers then were products of British universities), Indian geography moved from its physical bias and ultimately changed over to economic stream. And within the economic stream, emphasis came to be laid on British style urban geography. And, Indian geography tried to become a pure social science. The conceptual framework of the discipline has undergone changes during the last hundred years. A comparison of recent geographical research publications with those of the 1920s reveals a progressive change in the conceptual framework. During the 1920s and 1930s the discipline was concerned mainly with descriptions of regions. Its objective was to provide factual information about areas to colonial administrators. British geographers promoted this imperialist paradigm designed to serve colonial interests. The scientific publications in Indian geography in those years revealed a reluctance to explore conceptual and hence epistemological premises, and there was far too much reliance on descriptive methodology, and relationship sometimes latent, sometimes unaware with deterministic approaches. All of these pointed to a scientific community in which the prevailing attitude was that of making geography rather than thinking of geography.

CONCLUSION:

Indian geography is today at an important turning point. The foundation laid down after independence by geographers who are now in retirement is being challenged by newly developed or introduced methodologies or research techniques, such as remote sensing, quantitative analysis and GIS. At the same time, the Indian geographers are just now beginning to look beyond their own regional boundaries, indeed even to the rest of the world for research subjects. The four stages of its growth sketched above reveal that geography has moved away from the initial 'gazetteer map' to a more descriptive / analytical framework which is still in its making and there are many gaps to be filled in. The need of the hour is to develop a methodological system of Indian geography which has its distinctive traits as an intellectual and scientific discipline that can provide a meaningful synthesis of our cultural heritage and physio-technological progress, our habits and habitats, as well as our opportunities and challenges and that can be more substantive, productive and satisfying. Modern Indian Geography,

if it has to reach the status of science, must start studying our problems of life and living. Unless we identify the geographical perspectives of these problems and seek an explanation, there can be no Indian geography.

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