Introduction

Geography, as a field of learning, is related to the study of location and spatial relations of things and events on the surface of the earth. Geography is fundamentally a holistic discipline, studying things and events in their total context. This implies study of systems of a really inter-connected and inter-dependent parts of diverse origin. A geographer, therefore, is a person who asks questions about the significance of location, distance, directions, spread and spatial succession.

The face of the earth is a zone extending as far down below the surface as man has been able to penetrate and as far as above the surface as man normally goes. All science and all art are derived from observations made in this zone. But, geographers are concerned with 'territorial space'.

Geographical queries begin with asking a simple question, *i.e.* "where?" An answer to this leads to us to some specified location over terrestrial space. Asking questions about location is one of the distinguishing characteristics of the field of geography. The other questions e.g. 'how' and 'why', etc. follow later. Geography as a discipline is concerned with five sets of questions (Dikshit, 1997):

- *Generic questions*: relating to the kind (class) of phenomena distributed on the earth's surface;
- *Genetic questions*: concerned with the sequences of events and interaction that have gone making of present day landscapes;
- *Theoretical questions*: relating to formulating rules, laws and generalizations;

- *Remedial questions*: concerned with the application of geographic concepts to the real life problems; and
- *Methodological questions*: concerned with the improvement of our scientific skills.

Taken together, all these questions take care of distributional and locational aspects of the natural and cultural features. The first two questions provide inventorised information of *what* features and *where* located. We have seen that this remained a very popular approach during the ancient and medieval period. However, these two questions did not make geography a scientific discipline till the third question was added. The third question is related to the explanation or the causal relationships between features and the processes and phenomena. This aspect of geography is related to the question, '*why?*'. The fourth question makes geography more and more anthropocentric; whereas attempts to answer fifth question have lead to change and development in the discipline.

Today geography is recognized as a spatial science, concerned with the study of the location and arrangement of phenomena (physical, biotic and human) on the surface of the earth and the processes that generate these distributions. With the advancement in geography, its nature (meaning, content, purpose and scope) has also changed with increased dependence on other disciplines.

Definition

Eratosthenes, who lived in 3rd century B.C., coined the term 'geography' (from '*geo*' meaning 'the earth' and '*graphe*' meaning 'the description'). The traditional definition of our discipline had been derived from the literal meaning of this term, *i.e.* '*Geography is the description of the Earth*'. Throughout Classical Phase of its development, geography was considered as a descriptive field of study.

The enquiries of geographical nature had begun with the basic question, *i.e.* "what is where?" The emphasis of study of the classical schools of thought particularly during the Greek, Roman and Arab period was on this very question. The nature of query shifted to "why what is where?" after the Age of Discovery. However, a further refinement was seen in the Modern period, when geographers

began to seek answer to the questions as "how and why what is where?"

In an attempt to answer each set of these questions, geography has gained a new and more meaningful definition every time. Today the traditional definition of geography is not acceptable. Because, this definition is considered incomplete; it is general and also vague; it is too simple to represent the true nature of contemporary geography; and the traditional definition is incapable of defining the actual domain of the field.

Geography, as a discipline, has been defined in a number of ways (Adhikari, 1992, 5):

- Geography is concerned to provide accurate, orderly, and rational description and interpretation of the variable character of the Earth Surface (Hartshorne, 1969).
- Geography has to be conceived as the science concerned with the formulation of the laws governing the spatial distribution of certain features on the surface of the earth (Schaefer, 1953).
- Geography is the study of spatial distributions and space relations on the earth's surface (Ackerman, *et al.*, 1965).
- Geography seeks to understand the Earth as the world of man, with particular reference to the differentiation and integration of place (Broek, 1965).
- Geography can be regarded as a science, concerned with the rational development, and testing, of theories that explain and predict the spatial distribution and location of various characteristics on the surface of the Earth (Yeates, 1968).
- Geography is the study of spatial organization expressed as patterns and processes (Taffy, 1970).
- Geography offers a broad synoptic view of spatial relationships in human affairs (Smith, 1977).
- The focus of all geographical enquiry is place. This implies location on the Earth's surface, the relationship between it and other locations, and the processes affecting changes in those relationships (Jones, 1984).

Thus, in its simplest form Geography may be defined as ***the study of spatial location and distribution of various phenomena on the surface of the earth.***

Today geography is known as the science of spatial distribution. The 'spatial' here means 'pertaining to physical or real space', which is solid, observable and measurable. The geographers are concerned with 'physical space' and not the astronomical, microscopic or abstract space. It is 'topographical space', *i.e.* over the surface of the earth. The 'distribution' of any element (physical, biotic or human) is spatial in nature, if it occupies a portion of the earth's surface, or has a location over it, and which is also a phenomenon of specified magnitude, so that it could be physically identified, measured and represented on a map. However, no spatial distribution on this surface of the earth is static; it is dynamic.

Related with the term 'spatial distribution' in geography are the concepts of *Pattern*, *Process* and *Stage*. The various phenomena or activities on the surface of the earth are not just localized in any place, anywhere or everywhere in the same manner or fashion. They form certain kinds of patterns (as dense, sparse, concentric, sectoral, linear, zonal, etc.). There are several processes involved behind the existing distributions, shaping them in various forms, shapes and patterns. These processes help to understand the causal connections among various elements of spatial distribution. An understanding of the process helps to answer the question "how and why what is where". For instance, the existing landforms are the result of the processes like weathering, mass wasting, etc.; or the rainfall distribution is the result of the processes like evaporation, transpiration and precipitation; or the processes like communication, transportation, migration, etc. lead to the emergence of human settlements.

The interplay of 'time' and 'space' bring change in spatial distribution. The change, whether negative or positive, perceptible or imperceptible, is inherent and is bound to come with time. Thus, every spatial distribution has to be studied in terms of its chorological (area) and chronological (related to time) aspects.

Nature of Geography

Geography is the study of locational and spatial variation in natural and human phenomena on the Earth. The special skills of geography are those related to the significance of location and the spatial relation of things and events. Geography addresses both the questions of *where*, as well as *why* phenomena occur in particular places. Geography is both an art and a science. Although it is different from

other sciences in its subject matter and methodology, it is closely related to other disciplines at the same time.

Geography is not an encylopaedic description of places. To know by heart a whole gazeteer full of them would not, in itself, constitute anyone a geographer. Geography has higher aims than this, *i.e.* to trace out the great laws of nature and to mark their influence upon man.

Geography deals with an enormous range of phenomena, ranging from physical, biotic to human. The four spheres, namely, lithosphere, atmosphere, hydrosphere and biosphere constitute the geographic environment. This makes geography is highly interdisciplinary, drawing upon and contributing to numerous other fields of knowledge.

Although geographers carefully identify distribution and discuss the variables that cause distributions, geography is an observational, rather than an experimental science. Both observational and experimental sciences demonstrate how regular occurrences are produced by the predictable interactions in a number of variables. It is possible in experimental sciences, under laboratory conditions, to control and introduce the variables separately in order to observe their effect upon the situation. But in an observational science occurrences must be obseved as they naturally occur. Therefore, exploration or fieldwork is a basic research technique in geography.

Fundamentally speaking, Geography deals with location, place, regions, and man-environment interaction. *Location* is studied in terms of its absolute and relative sense. The absolute location is based on coordinate grid system of latitudes and longitudes. The relative location, on the other hand, is used to understand location in relation to others. *Place* is a location having distinctive features which give it meaning and character that is unlike any other location. Then, geography makes sense of the world by compressing and synthesizing vast amounts of information into spatial categories of similar traits called *regions*. The non-overlapping areas of essential uniformity in one or a few combinations of physical or cultural features are Formal regions, e.g. the Corn Belt area of United States where corn is predominantly grown. But, a region with a system of location defined by interaction and connection of a particular activity (function) is identified as a Functional region, e.g. the airline networks, newspaper delivery area or economic trade region.

Geographers tend to organize their thoughts around five major themes (Harvey, 1969, 114-116):

(1) The Areal Differentiation Theme;
(2) The Landscape Theme;
(3) The Man-Environment Theme;
(4) The Spatial Distribution Theme; and
(5) The Geometric Theme.

These five major themes presented here are neither mutually exclusive nor entirely inclusive of all geographic work. But each in its way is capable of defining the 'nature' of geography.

Geographers vary considerably in their interests. Some are more concerned with the natural phenomena and some with the human artifacts, while some tend to focus their attention on the man-land interactions and stress the idea of geography as 'ecology'. But implicit in all these branches of the subject is a concern with location and spatial patterns, and a curiosity about the terrestrial space in which the patterns came to be as they are. The physical space is the binding factor. There is no more essentially geographical activity than explaining a spatial distribution.

As spatial interrelationships are of vital importance to this synoptic science, the maps are a key tool. Map is a representation of a geographic area, usually a portion of the earth's surface. The classical cartography has now been joined by great advances in computer technology. With this, the analytical and spatial data management tools available to geographers, including Geographic Information Systems and spatial data analysis, are now allowing geographers for more rigorious, quantitative analysis of spatial phenomena.

A geographer's task calls for gathering, representation and analysis (explanation) of the information related to location and distribution of various phenomen on the surface of the earth. A geographer is a person who asks question about the significance of location, distance, direction, spread and spatial succession. He deals with problems of accessibility, innovation, diffusion, density and other derivations of relative location (James, 1972). Modern geography is a spatial science, increasingly focusing on the study of spatial aspects of social and economic phenomena, and thus being pre-eminently

anthropocentric. The space of geography is that of the earth's surface, the home of man.

Thus, the nature of geography is integrative, interdisciplinary, empirical and also anthropocentric.

Scope of Geography

The 'scope' of geography covers its whole sphere of influence, the range of study and the practical importance of the discipline. More precisely, it may be understood in three ways, viz.: Geography as a discipline of knowledge and research (academics), Geography as a sister-discipline to other fields of study, and Geography as a discipline of profession.

Geography, as a branch of learning, is focused on understanding the relationship between man and nature. The edifice of geography as a discipline is built on the experiences of successive generations of mankind in trying to comprehend the world, of which their homeland forms a but small part. The thrust for geographical knowledge is as old as human curiosity. There is a natural urge in man to gain knowledge about the lands and peoples lying beyond his own territory. As human beings we are concerned with what man knows about himself, the earth on which he lives and the universe in which he exists.

Geography has been defined differently at different times, depending upon the demands made on it. For instance, in the early stage of its growth it was concerned with 'what is where' and fixing absolute locations. After the Age of Discovery it was required to organize the mass of information about different lands and people. It was followed by the areal differentiation view, and so on. But, according to a recent definition of geography its overriding problem is concerned with a 'full understanding of vast system on the earth's surface comprising man and the natural environment' (Ackerman, et al., 1965, 1).

The field of geographical study appears to be so broad that it merits the remark—'it is fit subject for encyclopedia, but far too inclusive for a scientific discipline'. But there is no reason for despair. Geography has a domain of its own—the terrestrial space, which makes it distinct from other disciplines. The broad emphasis is on the spatial arrangement of phenomena and their interrelationships, and all those processes that are responsible for spatial patterns are taken into account. Geography shares the man-environment system with many earth, biological and social sciences. While focusing its attention on spatial patterns and processes geography performs a function that no other discipline does, *i.e.* integrating the data from a number of disciplines and conceptualing the total unity of the earth, a holistic view which no other discipline can achieve by itself, and which is the ultimate objective of man's quest. Geography is the backbone of human knowledge and is, therefore, the most important science.

The Greek Scholar, Eratosthenes, first used the word 'geography' in the 3rd century B.C. It is derived from Greek 'geo' (the earth) and 'graphe' (description), so that geography as a discipline

is focused on the description of the world of man on the earth's surface. As a discipline, "geography is concerned to provide accurate, orderly and rational description and interpretation of the variable character of the Earth's surface" (Hartshorne, 1959). By the phrase "earth's surface", the geographers imply the zone extending as far down below the surface as man has been able to penetrate and as far high above the surface as man normally goes. Since man's reach above as well as below the earth's surface is relative to the level of his technological progress, the thickness of this zone of study has been progressively increasing.

In the modern period, the prestige of geography as a useful branch of knowledge has been further enhanced owing to the valuable service rendered by geographers in the context of inter-disciplinary work in the study of nature and society. The geographers' locational perspective and their cartographic expertise have proved particularly useful. This has led to liberal funding for geographic research and education.

Thus, though the word is originally derived from the ancient Greek "geographe", meaning 'the description of the earth', the modern geographical scope extends far beyond describing the earth. Today, the geographers' ambit includes spatial analysis, the creation of theoretical models involving extensive use of mathematics, as an essential component. If one wishes to study the subject, he should be interested in the earth, its produce and its people and their activities. Mathematical ability would be an advantage, as would basic drawing skills. Besides, a geographer's work calls for practice and meticulousness to handle detailed tasks and analyze data.

As geography has a number of sister-disciplines (Fig. 2.1), it also provides assistance in the understanding of various other disciplines. In fact, geography serves all those disciplines that serve it. For instance, geography and history have always gone hand in hand, the common thing between the two being 'description', *i.e.* in terms of space for the former and in terms of time for the latter. More recently we find that geography has become the backbone of the fields like Remote Sensing and Geographic Information System (GIS).

Beside its academic growth, the professionalization in geography is also increasing day by day. Penetrating in so many spheres, geography opens job avenues in numerous areas, and the discipline is becoming more and more job-oriented. A graduate or

post-graduate in geography, for instance, has a lot of scope being absorbed in the fields of Education, Administration, Research, Cartography, Town and Country Planning, Surveying and Civil Services. The job prospects are also open in the departments of Remote-Sensing, GIS, Demography, Defence, Meteorology, Soil Science, Forestry, Industry, Agriculture and Environmental Studies.

The students of geography can opt for teaching at school and college level, and take up professions as TGTS (Trained Graduate Teachers) or PGTS (Post Graduate Teachers) in the school level and as Lecturers, Readers or Professors at university level. B.Ed. or M.Ed. is desirable at school level, whereas, at university level it is M.Phil. and Ph.D. In the field of administration, the jobs may be taken through UPSC (Union Public Service Commission), All India Central Services, SPSC (State Public Service Commission), SSC (Staff Selection Commission) and Block Development Offices.

Remote Sensing and GIS is the recently emerging area of job prospects for the geographers. This field also opens a booming career options for the students of geography those who wish to be a breed apart in the corporate world. The geoinformatic[3] institutes like SIG (Table 2.1) aim to train and impower the students with analytical decision-making and management skills, besides enabling them to offer complex geoinformation solutions in infrastructure development, natural resources monitoring and urban development wherein the data are analysed and used in areas like disaster management, environment, logistics and asset management, to name a few. A number of institutes offer courses of different types and durations in this field. A list of such institutes is given in Table 2.1.

Computer technology is now overwhelming the world and computers can handle vast amount of information in comparison to the traditional skills. Therefore, Computer Assisted Cartography (CAC) is emerging as another field of profession. Particularly the young generation of geographers has a considerable degree of mastery over this technology. A number of Organisations are offering professional courses in this field. They are listed in Table 2.2.

Table 2.1: Remote Sensing and GIS Institutes in India

Institute	*Address*
1. Birla Institute of Technology	Mesra, Ranchi, Bihar.
2. Centre for Spatial Database Management and Solutions (CSDMS)	A-33, Sector-22, NOIDA-201301
3. Electronics Development and Research Centre	NOIDA
4. GEO Concept Coordinates	Saket, New Delhi.
5. GIS Institute	G-4, Sector-39, NOIDA,-201301.
6. Indian Institute of Remote Sensing	4, Kalidas Road, Dehradun, Uttaranchal.
7. National Remote Sensing Agency	Department of Space, Government of India, Hyderabad-500037.
8. NIIT GIS Ltd.	Kalkaji, Delhi-110019
9. PENTASOFT Technologies Ltd.	International Trade Tower Nehru Place, New Delhi.
10. Riding Consulting Engineers India Pvt. Ltd.	Safdarjung Enclave, New Delhi-110029
11. Rolta India Ltd.	Rolta Bhawan, Andheri, Mumbai-40093.
12. Symbiosis Institute of Geoinformatics (SIG)	SIMS Campus, 2nd Floor, Range Hills Corner, Kirkee Cantt., Pune-20 Email: admissions @sigpune.com

Table 2.2: Organisations Offering Courses in Computer-Aided Cartography

1. All India Land Use and Soil Survey, IARI Campus, PUSA, New Delhi.
2. Department of Geography, Jamia Millia Islamia University, Jamia Nagar, New Delhi.
3. Directorate of Census Operations (all states).
4. National Atlas and Thematic Mapping Organization (NATMO), Calcutta.
5. National Bureaus of Soil Survey and Land Use Planning (NBSS and LUP), Amravati Road, Nagpur, Maharashtra.

Besides the above, there are a score of other institutes offering different professional courses where the students of geography may be absorbed (Table 2.3):

Table 2.3: Professional Courses and Institutes

Field	*Institute*	*Course*
Demography	**International Institute for Population Sciences** (Deemed University), Deonar Mumbai-400088.	Masters in Population Studies
Environment	**G.B. Pant Institute of Himalayan Himalayan Environment and Development, Almora, Uttaranchal.**	
	National Institute of Environment and Management, Alkapuri, Kurshi Road Lucknow, Uttar Pradesh	Post-Graduate diploma in Environmental Management
Forestry	**Institute of Forestry Research and Human Resource Development,** Chhindwara, Madhya Pradesh.	Post-Graduate diploma in Forest Management.
Planning	**School of Planning and Architecture** 4, Block-B, Indraprastha Estate Delhi-110002	Masters Program with specialization in (a) Environmental Planning; (b) Regional Planning; and (c) Urban Planning.
	Centre for Development Studies and Activities (CDSA), School of Development Planning (SDP), Pune	(a) M.A./M.Sc. in Development Planning and Administration; and (b) Diploma in Development Planning
Social Science	**Delhi School of Social Work,** University of Delhi	Masters Program in Social Work
	Tata Institute of Social Sciences Deonar, Mumbai.	M.A. in Social Work with specialization in (a) Criminology (b) Family and Child Welfare (c) Urban and Rural Community Development (d) Social Welfare Administration
Tourism	**Indian Institute of Tourism and Travel Management,** Govindpuri, Gwalior-474011, Madhya Pradesh.	Diploma and Degree in Tourism and Travel Management

To conclude, inspite of its interdependence cutting across on so many sister disciplines, one cannot deny that geography in itself is an independent field of study. It is the science of place, *i.e.*, the study of the surface of the earth, the location and distribution of its physical and cultural features, the areal patterns or places that they form, and the interrelation of these features as they affect humans. Geography is a synoptic science that uses the same elements as the other sciences but in a different context. It integrates data spatially, making elaborate use of maps as its special tool. Geography may be studied by way of several interrelated approaches, *i.e.*, systematically, regionally, descriptively, and analytically. Not only the definition, purpose and methodology of geography is changing, but its scope and subject matter is also widening with time.

NOTES

1. Computer-aided design (CAD) is the use of a wide range of computer-based tools that assist engineers, architects and other design professionals in their design activities. It is the main geometry authoring tool within the Product Lifecycle Management process and involves both software and sometimes special-purpose hardware. Current packages range from 2D vector based drafting systems to 3D solid and surface modellers. CAD is sometimes translated as "computer-assisted", "computer-aided drafting", or a similar phrase. Related acronyms are CADD, which stands for "computer-aided design and drafting". CAID for Computer-aided Industrial Design and CAAD, for "computer-aided architectural design". All these terms are essentially synonymous, but there are some subtle differences in meaning and application. CAD is used to design, develop and optimize products, which can be goods used by end consumers or intermediate goods used in other products. CAD is also extensively used in the design of tools and machinery used in the manufacture of components. CAD is also used in the drafting and design of all types of buildings, from small residential types (houses) to the largest commercial and industrial structures (hospitals and factories). CAD is mainly used for detailed engineering of 3D models and/or 2D drawings of physical components, but it is also used throughout the engineering process from conceptual design and layout of products, through strength and dynamic analysis of assemblies to definition of manufacturing methods of components. CAD has become an especially important technology with benefits, such as lower product development costs and a greatly shortened design cycle, because CAD enables designers to lay out and develop their work on screen, print it out and save it for future editing, saving a lot of time on their drawings.
2. Electromagnetic radiation is generally described as a self-propagating wave in space with electric and magnetic components. These components oscillate