Unit 1

Fundamentals of Geography

Chapter Outline

YMBFQ

Learning Objectives:

- *Define the concept of geography*
- *Appreciate the developments of geography*
- *Understand the traditions and themes of geography*
- *Associate the relationship of geography with other disciplines*
- *Identify the approaches to study geography*
- *Examine various branches of geography*
- *Appreciate the tools, skills and scopes of geography*

1.1 Introduction

"The study of Geography is about more than just memorising places on a map. It is about understanding the complexity of our world, appreciating the diversity of cultures that exists across continents. And in the end it is about using all that knowledge to help bridge divides and bring people together" - Barak Obama, Former President of USA.

The subject 'Geography' is considered as 'The Mother of all Sciences' as most streams of sciences took root from geography. It is a subject much needed in everyday life. Just as an intellectual understands the value of a library, a financier understands the value of money, a parent understands the value of their child a geographer understands the value of our planet earth and the wealth of resources it offers to us.

1.2 Defining Geography

Geography is one of the oldest earth sciences and its roots date back to the works of the early Greek scholars. The term '**Geography**' was coined by the Greek scholar **Eratosthenes** who combined two Greek words 'Geo' (The Earth) and 'Graphien' (to describe). Therefore, in the literary sense, geography is the description of the Earth. Over the ages, geography has become the art and science of studying the physical characteristics of the earth and man's role in adapting to and modifying the environment.

Geography was born through explorations and discoveries. Earlier, the aim of geography was to discover new lands, sea routes, prepare maps and describe them. Later, its emphasis had shifted to scientific investigation of earth's landforms, oceans and atmosphere, as well as the interactions with human beings and the environment.

In essence, geography can be defined as

- A multifaceted discipline
- Studying intra and inter relationships of various spheres of the earth
- Collects and analyses relevant data, applies the latest tools and methods to prepare maps and visuals
- Provides sustainable solutions to human and environmental issues of the earth.

1.3 Evolution of Geography

Ancient Greek scholars who laid the foundations and gave a solid form to geographic studies and on these foundations, the pillars of modern geography were erected by others in the subsequent ages. The Romans, the Arabs, the Indians, the Chinese, the Germans, the French, the British and the American geographers have contributed to the development and enrichment of the subject.

The Greek philosophers and scientist focused on the spatial nature of human and physical features of the Earth. The first Greek geographer was Herodotus (484 - 425 BCE) who wrote a number of volumes on the human and physical geography of the Persian Empire. The other early Greek contributors to geography are, Thales, Aristotle and Eratosthenes (276 - 194 BCE).

Geographers study the location of the activities, carefully identify patterns using maps and find out the reasons for these patterns. The areas are then described based on the distribution of land forms, population, housing and agriculture.

The development of geography can be summarised in three phases namely (1) The age of discovery (1400-1800), (2) The period between 1800 and 1950 and (3) The period after 1950.

1.3.1 The age of discovery between 1400-1800

The period between 1400 and 1800 was when the subject matter and the methodology of geography were not fully developed. This period was characterised by exploration, discovery and conquest through the voyages of Vasco da Gama and Christopher Columbus. Numerous journeys of geographical exploration were commissioned by a number of Nations in Europe (Figure. 1.1, 1.2, 1.3 and 1.4). Most of these voyages were financed because of the potential commercial returns from resource exploitation. The voyages also provided an opportunity for scientific investigation and discovery. Making of maps (cartography) was

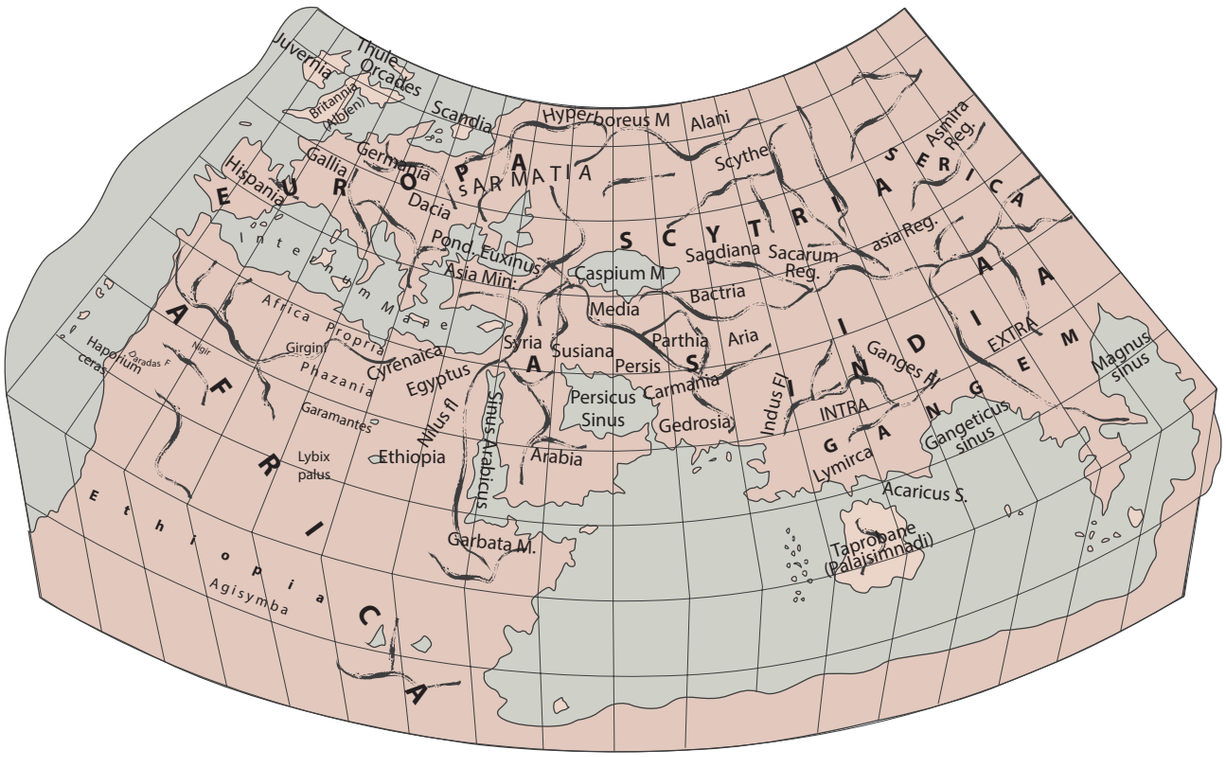

Figure 1.1 Ptolemy's World Map

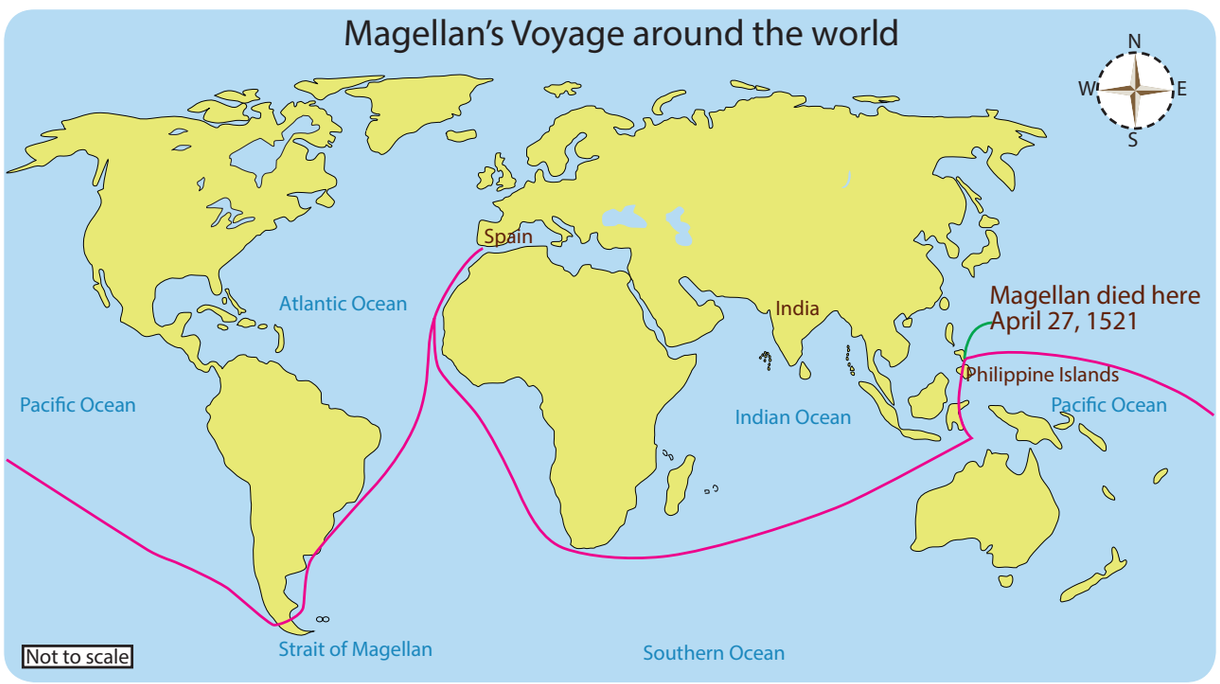

Figure 1.2 Magellen's Voyage around the World

Figure 1.3 Vasco da Gama

HOTS

How might the ship that Columbus traveled have sailed at the time when no engine and power fuel available?

Figure 1.4 Christopher Columbus's Voyages to America

important in the discipline of geography due to the emphasis on location of phenomena on the earth surface, e.g. location of trade routes, relief features and settlements.

1.3.2 The period between 1800–1950

The period between 1800 and 1950 was characterised by the work of various individual philosophers who helped to expand the scope of geography. The discipline of geography became more distinct as a subject matter. Geographic knowledge saw strong growth in Europe and the United States in the 1800s. This period also saw the emergence of a number of societies interested in geographic issues. In Germany, Alexander Von Humboldt, Carl Ritter and Friedrich Ratzel made substantial contributions to human and physical geography. Humboldt's publication 'Kosmos' in 1844, examines the geology and physical geography of the earth. This work is still considered by many academics as a milestone contribution to geography.

There are two schools of thought that emerged during this period as an attempt to explain the relationship between human beings and their environment. These were *environmental determinism* and *possibilism*. Proponents of environmental deterministic school of thought such as Mackinder, Ellen Semple and Huntington believed that human actions and activities were moulded by the physical (natural) conditions. In several developing countries, human beings are susceptible to natural disasters such as drought, famine, floods and earthquakes. Human beings under such natural conditions usually surrender to nature. A good example of environmental determinism is the influence of the natural environment on human activities such as nomadic pastoralism. Nomadic pastoralism is so much dependent on the natural environment. Pastoralists do very little to modify their environment.

Ratzel

La Blache

The proponents of possibilistic school of thought, such as Vidal de la Blache saw the environment as a limiting factor rather than as a deterministic force. According to the possibilism school of thought, human beings have several alternatives in their environment and their actions are influenced by the decisions they make in the environment. For instance, humans can survive in hot or extremely cold conditions due to their ability to modify the environment to suit them. A good example is that in many arid countries such as Israel, humans have overcome the constraints set by the natural environment such as low rainfall, high temperatures and poor soils.

1.3.3 The period after 1950

Until 1950s, geography was more of an art subject where facts were established by casual observation in the field rather than by careful measurement and hypothesis testing. In the 1950s there was a new development in the discipline and several laws were established to explain geographical phenomena. Using the laws, it is possible to predict what will happen in the future. If we can predict

successfully, we can plan and limit the extreme possibilities.

One of the important developments in this period was the use of quantitative techniques in physical and human geography. These techniques refer to various statistical tools that are used to synthesise the data from maps, field, laboratories and questionnaires. Quantification came about as a result of the expanding scope of the discipline as well the need to understand the processes that were becoming more diversified and complicated.

The quantitative revolution involves the use of statistics, mathematical equations and the use of deterministic models. Many geographers believed that numbers are more precise, and therefore perceived as more scientific compared to words. The map, both as graphic language and visual representation, continues to be used as a geographical tool and at present with the valuable assistance of remote sensing and Geographical Information Systems, map making has become digital and easier especially due to advances in computer and software technologies.

1.4 Themes of Geography

In any subject there will be certain themes, around which the scholars work and contribute. In this way, geography subject also has certain traditional themes. Let us look at them carefully. In 1963, **William D. Pattison** identified the core themes of geographic studies as **'The Four Traditions of Geography'**. These distinct, but related, traditions, of the discipline are: Spatial tradition (areal distributions and spatial patterns. Examples: Population movement) Area studies tradition, (hierarchy of areas, small to large) Man-land tradition (relationship between man and his physical environment) and Earth science tradition (processes of the earth).

Five Themes in Geography

Themes of Geography are the educational tools for understanding the geography subject in detail. It was adopted in the year 1984 by the Association of American Geographers and these five themes were published in the National Council for Geographic Education/Association of American Geographers' publication Guidelines for Geographic Education.

Like the major traditions identified in geography, the significant themes of the subject are also identified. The Association of American Geographers put forward the 'Five themes of Geography' and it has been widely accepted by geographers worldwide (Figure 1.5). The themes are location, place, human – environment interaction, movement and regions.

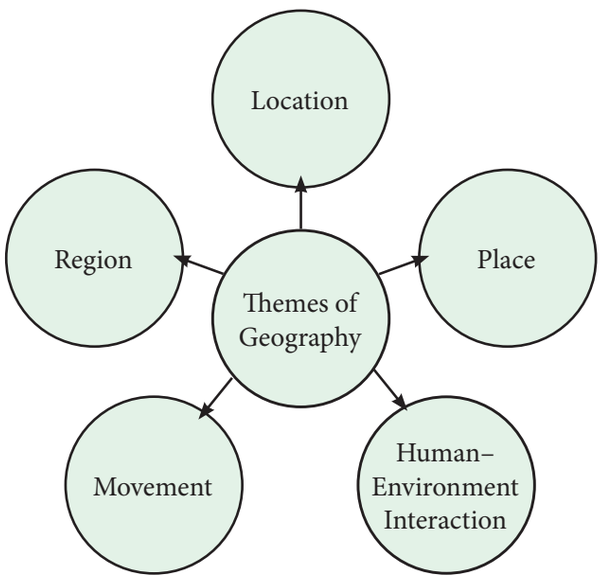

Figure 1.5 Themes of Geography

1.4.1 Location

Every point on the earth has a location. The location can be described in two different ways:

- *Absolute location* is a location as described by its latitude and longitude on the earth. For example, the coordinates of (Chennai Central Railway station) puratchi thalaivar Dr. M.G. Ramachandran Centeral raiway station Railway station are 13°04'56" N latitude and 80°16'32" E longitude.
- *Relative location* is the position of a place in relation to another well-known landmark. For example, Kallanai Dam or Grand Anicut is located roughly 350 km south –southwest of Chennai City. The absolute and relative location related surveys and studies fall under this category.

1.4.2 Place

A place is an area that is defined by everything in it. All places have features that give them personality to distinguish them from other places. A number of place names in Tamil Nadu, like St. Thomas Mount, Fort St. George, Mint, and George Town are examples to this theme.

Student Activity

1. Find the absolute location of your district.
2. Find the important towns within a radius of 100 km from your residence or school along with their direction.
3. Find how the name of your village or town came into existence.
4. Find the total population of your town or village as per 2011 census.
5. Find the altitude of your village or town from Mean Sea Level.

- Toponym: A place name, especially one derived from topographical feature.
- Site: An area of ground on which a town, building, or monument is constructed.
- Situation: The location and surroundings of a place.

1.4.3 Human-Environment Interaction

The theme describes how people interact with the environment and how the environment responds. This is studied with reference to the following three key concepts:

- Dependency: How humans depend on the environment (Example: For water, fresh air, sunlight etc.)
- Adaptation: How humans adapt to the environment (Example: Life in polar and desert regions)
- Modification: How humans modify the environment (Example: Construction of Underground Metro rail, Agriculture in Israel).

1.4.4 Movement

Movement is the network of travel of people, goods and ideas from one location to another. Examples: Rural-urban migration and metro train commuting in Chennai. **Air transport** which carries people and goods and the **internet** that allows access to ideas and knowledge across the world are also examples of this kind.

1.4.5 Region

Regions are areas with distinct homogenous characteristics such as climate (Monsoon regions), natural vegetation (Tropical rain forests), crops (Corn Belt of USA), major landforms (Himalayan region), industries (Bangalore and Hosur) etc.

1.5 Geography's Relation with Physical and Social Science Disciplines

While defining geography, we have seen that some branches of geography have strongest affiliations with subjects like mathematics and environmental sciences, while others have very close connection with history and sociology. Some subjects deal with distinctive type of phenomena while geography examines several kinds of phenomena together. The diagram (Figure 1.6) gives clear idea about the relationship of geography with other disciplines.

Relations with Physical Sciences

1.5.1 Astronomy, Mathematics, Computer Science and Geography:

Astronomy basically deals with the celestial bodies including stars, planets, satellites, their motions, constellations, as well as different kinds of phenomena occurring in the outer space. The precise location, nature of movements, form and size of celestial bodies, including those of the solar system, have been accurately measured with the help of mathematics. The interaction of astronomy, mathematics

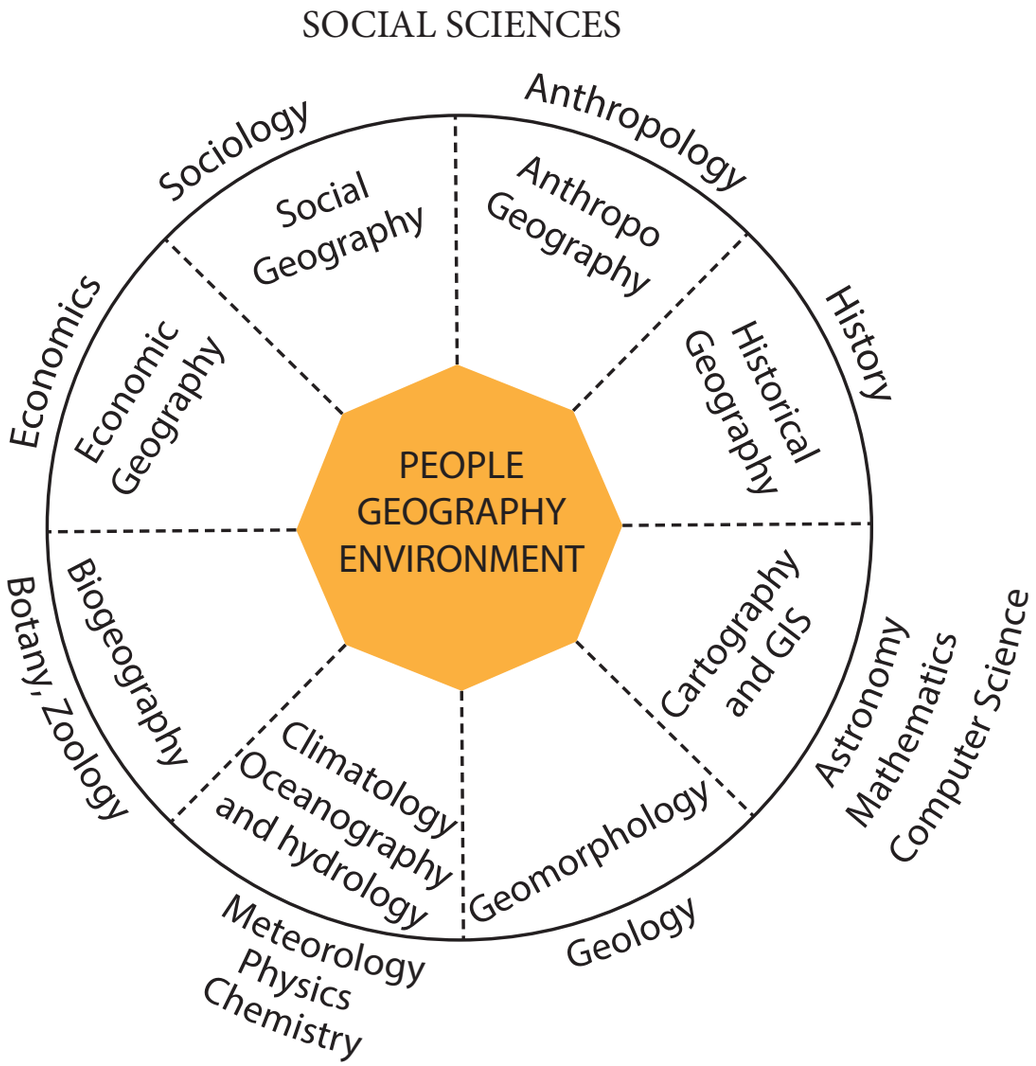

Figure 1.6 Relationship of Geography with Physical and Social Science Disciplines

and computer science with geography has paved way for the development of modern cartography and GIS.

1.5.2 Geology and Geography:

Geology is the study of rocks, their types, distribution, mineral content, petroleum, etc. The subject investigates all these phenomena, classify them and put them in a sequence. Geography interacts with the subject in studying the distribution of exposed rocks, interaction with climate and human activities, economic prospects of the minerals and so on. Interaction between geology and geography leads to formation of the new branch of study called geomorphology, the study of landforms.

1.5.3 Physics, Chemistry and Geography:

As geography is the study of variable phenomena on the earth's surface, the dynamic mechanism of the phenomena requires to be studied within the framework of physics. The physics of atmosphere is studied under climatology and the physics of hydrosphere through oceanography, and both the subjects investigate, interpret and explain the atmospheric and hydrological processes. The chemical contents of rocks, soil, surface and groundwater, atmosphere are the interests of the geographers.

1.5.4 Botany, Zoology and Geography:

The systematic branches of botany and zoology have traditionally been confined to the classification and description of various kinds of species on the earth's surface. Geography, being the study of the spatial section of earth's surface, attempts to study the distributional aspects of flora and fauna especially with reference to climate and relief. The integration among these subjects has given birth to biogeography.

Relationship with Social Sciences

1.5.5. Economics and Geography

Economics is concerned with how human needs and wants are satisfied with the available resources. Economic geography is concerned with the study of resources endowment and patterns of utilisation. The economic activities of the human beings including agriculture, fishing, forestry, industries, trade and transport are studied in this branch. The economic activities are highly influenced by the relief and climatic factors of the region or the country. Therefore, economics and geography have close links with each other, especially for integrated resources development.

1.5.6 Sociology and Geography

Sociology is mainly concerned with the institutional aspects of the society. A number of investigations including social behaviour, movement of people between rural-urban areas, spatial interactions between social groups, the relations between innovation and tradition in rural and urban areas etc., have been jointly undertaken by sociologists and geographers in different countries of the world. Social geography is the logical expression of the interaction between sociology and geography as it studies social phenomena in spatial context.

1.5.7 Anthropology and Geography

Anthropology attempts to study human races and their classification. Both anthropology and geography seek to identify and classify the human races on the basis of their habitat and cultural traits and attempt to study the variable racial phenomena on the spatial context of the earth's surface. The relationship between anthropology and geography has resulted in

the development of 'anthropogeography' or geography of humans.

1.5.8 History and Geography

History is a framework of events as per time and place. Geography attempts to study these events with reference to the physical earth and depict the places of historical events using thematic maps. Anyone who attempts to study any historical events of India should always integrate the temporal and the spatial phenomena of that period together to arrive at a conclusion.

1.6 Approaches to the Study of Geography

Geography has undergone several changes in its approach. The earlier geographers were descriptive geographers. Later, geography came to be developed as an analytical science. Today the discipline is not only concerned with descriptions but also with analysis as well as prediction. There are two distinct approaches or methods to study geography. They are:

1. Systematic approach and 2. Regional approach

1.6.1 Systematic Approach

Systematic or nomothetic approach was introduced by Alexander Von Humbolt, a German geographer (1769-1859). In this approach a particular phenomenon is considered for detailed understanding. The study of specific natural or human phenomenon that gives rise to certain spatial patterns and structures on the earth surface is called systematic study. Generally, systematic geography is divided into four main branches.

i. Physical Geography: Study of various elements of earth systems like atmosphere (air), hydrosphere (water), lithosphere (rock) and biosphere (life) and their distributions.

CASE STUDY

Born on 14 September 1769 Alexander Von Humboldt was a Prussian polymath, geographer, naturalist, explorer. Humboldt's quantitative work on botanical geography laid the foundation for the field of biogeography. Humboldt resurrected the use of the word *cosmos* from the ancient Greek and assigned it to his multi-volume treatise, *Kosmos*. He was the first person to describe the phenomenon and cause of human-induced climate change, in 1800. He described the Guanoco asphalt lake as "The spring of the good priest". Humboldt and Bonpland discovered dangerous electric eels, whose shock could kill a man. His stay in Ecuador was marked by the ascent of Pichincha and their climb of Chimborazo, where Humboldt and his party reached an altitude of 19,286 feet (5,878 m). This was a world record at the time. U.S President, Jefferson later referred to Humboldt as the most scientific man of the age.

ii. Biogeography, including environmental geography: It focuses on various kinds of forests, grasslands, distribution of flora and fauna, human-nature relationships, quality of the living environment and its implications for human welfare.

iii. Human Geography: It describes the human culture, population, dynamic socio economic and political aspects.

iv. Geographical methods and techniques: It is concerned with methods and techniques for field studies, qualitative, quantitative and cartographic analysis.

1.6.2 Regional Approach

It is otherwise called as ideographical approach. It was developed by Carl Ritter (1779 – 1859), a contemporary of Humbolt. The regions could be classified based on a single factor like relief, rainfall, vegetation, percapita income or there could also be multi-factor regions formed by the association of two or more factors. Administrative units like states, districts and taluks can also be treated as regions. The main sub branches of regional geography are : i) Regional studies ii) Regional analysis iii) Regional development and iv) Regional planning.

1.6.3 Geographical Data Matrix

The matrixis a simple method of arranging information in rows and columns for better understanding of complex spatial problems. **Brian J.L. Berry** adopted this method from anthropology for studying geography more effectively.Geographic data can be arranged in a rectangular array or matrix. Row-wise group of variables represent the systematic or topical branches of geography while, regions are represented by columns. Berry has explained that regional synthesis could be derived with the help of a series of geographic matrices in correct temporal sequence. Each time period has been taken to be equivalent to a 'slice' of the three-dimensional cake. The diagram of ***'Third Dimension'*** makes it possible to examine rows and columns, cutting across time.

1.7 Branches of Geography

Based on content and the available techniques, the discipline can be divided into three major domains. Each one has many sub divisions which deal with specific objectives (Figure 1.7).

a. Physical Geography b. Human Geography and c. Geographic Techniques.

1.7.1 Physical Geography

It is the study of natural features of the earth such as land, water, air and living organisms. The changes taking place within and among these natural features and their resultant features are studied under its various branches. The branches of physical geography are:

i. ***Geomorphology*** deals with the distribution of land forms, their origin and the forces causing changes over these landforms. Geology provides basic information to the study of geomorphology.

ii. ***Soil Geography*** is a study related to soil formation, soil profile, soil types, their fertility level and distribution. Soil erosion and conservation measures are also dealt in this branch.

iii. ***Climatology*** deals with the study of global and regional weather and climatic conditions by analysing relevant statistical data. Meteorology provides basic information on the composition, structure and the changes in the atmosphere.

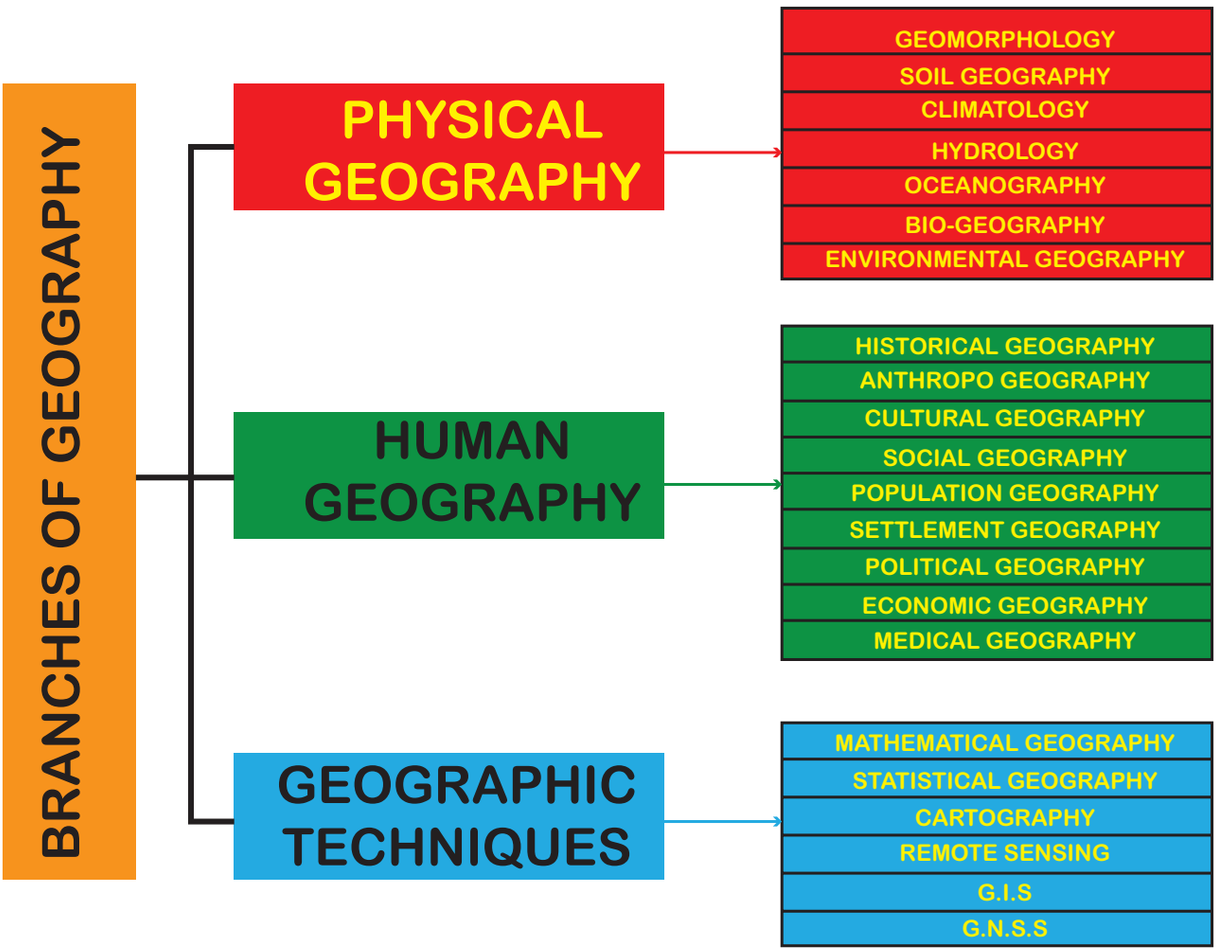

Figure 1.7 Branches of Geography

iv. ***Hydrology*** encompasses the study of earth's realm of water such as oceans and surface water bodies like rivers, reservoirs and ponds. It also makes a study of underground water and its recharge and also pollution of water bodies.

v. ***Oceanography*** is the study of seas and oceans. The shape, size, depth and bottom relief of ocean, distribution of oceans, ocean currents and various life forms existing in ocean are also studied under oceanography.

vi. ***Biogeography*** is a study of ecosystems over geographical space. It also analyses the changes in the ecosystems. *Phytogeography* or plant Geography, *Zoo Geography* or animal geography and *Ecology* are the branches of biogeography.

vii. ***Environmental Geography*** is the study of environmental issues arising out of misuse of various spheres of the earth and their implications. The ozone layer depletion, global warming, melting of polar ice caps, rising sea level and other related aspects are also given due importance. It also tries to give sustainable solutions to these problems.

1.7.2 Human Geography

Human Geography is concerned with the changes made by the humans over the natural or physical landscape. The ethnic and political aspects are taken into

consideration. The issues like climatic change, natural and anthropogenic disasters are also the major concerns.

i. ***Population Geography*** is the study of distribution and density of population, the changing patterns in age and sex composition, birth and death rates, life expectancy, literacy level and dependency ratio, migrations at national and international level and the causes and consequences of migration.

ii. ***Settlement Geography*** deals with the characteristics of rural and urban settlements and transportation network. It seeks better understanding of the present landscape and plans for the future. The study is more important for town and country planning.

iii. ***Historical Geography*** tries to picturise the geography of an area or region as it was in the past and studies how it has evolved over time. The forces involved in transforming region such as colonisation by the Europeans or a natural disaster are also included in the study.

iv. ***Anthropo Geography*** deals with the distribution of human communities on the earth in relation to their geographical environment.

v. ***Cultural Geography*** gives emphasis on the location and diffusion of customs and cultural traits such as food habits, skills, clothing and beliefs and social organisations and their developments in different parts of the earth.

vi. ***Social Geography*** is closely related to cultural geography. It examines the relationships among the social groups and their social relationships in the places of their living.

vii. ***Political Geography*** tries to understand the countries and their neighbours, problems of resources sharing, boundaries and territorial limits. This branch is also concerned with understanding the political behaviour of the population, relations between independent states, and patterns of voting and delimitation of electoral constituencies.

viii. ***Economic Geography*** deals with the distribution of economic activities such as, primary, secondary and tertiary. The primary activities include food gathering, hunting, animal rearing, agriculture, and mining. The secondary activities include manufacturing and the tertiary activities include the service sectors such as trade, transport, communication tourism and other related areas.

xi. ***Medical Geography*** mainly deals with study of geographical aspects of origin, diffusion and distribution of various communicable diseases and health care planning.

1.7.3 Geographic Techniques

Geography has developed a number of methods and tools to investigate and identify the spatial structures and patterns. Besides, it also lends or borrows some methods and tools to measure and investigate precise understanding of the spatial locations and patterns.

i. ***Mathematical Geography*** deals with the study of earth's size and shape, motions of the earth, concept of time and the time zones.

ii. ***Statistical Geography*** is concerned with the practice of collecting, analysing and presenting data that has a geographic or areal dimension, such as census data.

iii. ***Cartography*** is the study of making maps of various scales using authentic information.

iv. ***Remote Sensing*** is the art, science and technique of capturing the earth surface features using sensors or cameras in airplanes or satellites, processing and presenting the spatial information to users.

v. ***Geographic Information System (GIS)*** is a computer-based tool of the recent decades for geographical studies. It is used for storing, retrieving, transforming, analysing, and displaying data to prepare useful thematic maps.

vi. ***Global Navigation Satellite System (GNSS)*** is used to pinpoint the geographic location of a user anywhere in the world. Airlines, shipping, travel agencies and automobile drivers use the system to track the vehicles and follow the best routes to reach the destination in the shortest possible time.

Global Navigation Satellites System

GNSS is the standard generic term for satellite navigation systems that provide geo-spatial positioning with global or regional coverage. This term includes the GPS (USA), GLONASS (Russia), Galileo (Europe), Beidou (China), IRNSS (India) and other systems. The GPS was the first GNSS system of the United States and originally used for military applications. Today it is commonly used in mobiles, vehicles, agriculture and other areas that allow us to use it in all fields of mapping.

Students' activity

Collect the cadastral map of your Village from the Village Administrative Office and identify the location of your school or home.

1.8 Geographical Tools and Skills

Every day the news media report several geographically significant events of near by or faraway places. Such reports include the occurrence of earthquakes, floods, forest fire, landslides etc., which trigger the interests of everyone to recollect their geographic knowledge they had acquired earlier.

The essential tools of geography are maps and globes and now the digital versions of aerial photographs, satellite images, Geographical Information Systems (GIS) and Global Navigation Satellite System (GNSS).These tools have become an integral part of geography and these products help us to visualise the spatial patterns over the surface of the earth.

The GIS technique has enhanced the skills and capabilities to compare and overlay the digital layers to create maps quickly and efficiently. It helps us to study the areas affected by floods or cyclones or forest fire and the damages can be assessed accurately and losses be estimated within a very short span of time. The navigation satellites provide accurate location of these occurrences.

In recent years, geography aims to develop a set of marketable skills to the students rather than preparing the students only for the teaching in educational institutions. The job market is changing frequently.

Therefore, the teaching methodology of the subject is to be adapted to the changing trends of the society and provides a couple of specialisations to the students so that they could be acquainted with the global market and get suitable employment. The maps still remains an important visual medium for geographers although the microchip revolution is expanding exponentially to address a number of societal issues.

1.8.1 Cartography

Geographers who specialise in this branch make traditional maps, digital maps, atlases, charts, globes and models. Quantification and cartography are considered as two sides of the 'geography coin'. Owing to quantitative and computer revolutions, handling of spatial data become easier, not only for the preparation of 'instant maps' but also for statistical graphs, graphic images and models. Preparation of the computer-aided-maps and updating the existing ones become easier and faster. Creation of three dimensional models, changing the viewing angle of these models and plotting the images are made possible due to the introduction of computer expertise in cartography.

1.8.2 Land use Studies

For studies of quickly changing phenomena on the earth surface, such as floods, drought, forest fires, etc, remote sensing data provide accurate information in different scales. The remote sensing organisations employ geographers who have the knowledge to process the frequently changing earth's surface features. Even before the introduction of satellites in remote sensing, aerial photographs were widely used by geographers for natural resources surveys 0urban and regional planning. The satellite data from Landsat, SPOT, IRS and other satellites made it possible to repeatedly view each part of the earth surface at frequent intervals and thereby geographers' 'data thirst' is considerably quenched.

1.8.3 Geospatial Analysis

A geospatial analyst designs databases, analysis geographical data, uses appropriate GIS software to a wide range of applications including defence, real estate, pollution and government administrations. The skill helps to identify optimum size and ideal location, establish new or relocate existing facilities like hospitals, police station, banks, shopping centres etc.

1.8.4 Environmental Impact Assessment

This investigation requires voluminous data related to physical, social, economic and other aspects of the area under study. The data are collected from maps, satellites and field and synthesised to provide meaningful visual results. Such complex thematic visual results allow the decision makers to take appropriate steps to tackle the day to day and long term environmental issues.

1.8.5 Regional Planning

A planner who is responsible for planning an urban or a regional unit needs to have an overall view of the area. They should be able to synthesise the issues from multiple perspectives. The problems are increasingly concerned with balancing different, sometimes contradictory, interests into functional and sustainable suggestions and proposals. This specialisation is concerned with planning, housing, and smart city development projects. The regional land use maps are to be prepared to locate facilities and optimise the existing land for various uses.

1.8.6 Weather Forecasting / Nowcasting:

At present the meteorologists are using ground data and satellite data to forecast the wind direction, rainfall possibilities and cyclone movement. However, with the advancement of satellite sensors, navigation satellites and GIS technology it is possible to nowcast the weather conditions and provide live cyclone movement tracts, otherwise known as weather nowcasting.Geographers are utilising spatial and non–spatial data to analyse weather and climate parameters and conduct research concerning climate and climate changes and forecast the earth's future climate and weather conditions and their implications.

1.8.7 Surveying, Utilising Large Scale Maps/Sketches:

Surveying with instruments, starting from chain survey to differential GPS (DGPS), are an integral part of geography curriculum. The students survey and prepare sketches of various features in an area. They also survey the campuses with advanced survey instruments and prepare large scale maps. The geographical knowledge and training enable the students to interpret large scale maps of India and other countries of the world. **Ground Penetrating Radar (GPR),** one of the emerging field survey instruments, is gaining importance not only in earth sciences discipline but also in archaeology, civil engineering, city planning and other related fields.

The students of geography undergo special trainings in their college level studies and seek employment in the areas of their specialisation. Depending upon their area of specialization; geographers are employed as scientists in national and state planning commissions, water resources organizations, and land use planning units, agricultural or economic institutes or as demographers in government and research organizations.

The geographers are also employed as climatologists, geomorphologists, GIS specialists and hydrologists. Geography background is an asset for careers in travel and tourism, particularly for 'Travel Journalism'. Besides these, the geography graduates apply for civil services examinations conducted by various States of India and also the UPSC. Recent developments in geography are technological in nature and mostly computer oriented. The average geography graduate is therefore well versed in the use of computers, and as they are trained in understanding patterns and relationships over space.

1.9 Geography in Tamil Nadu

A number of institutions of higher learning in Tamil Nadu have been offering graduate and post graduate programmes in geography for several decades. Some of the Departments are recognized as research centers and these are engaged in undertaking national and international research projects besides conducting research programmes in geography. The departments are also engaged in organizing short term and long term training programmes and workshops to disseminate the latest geographic knowledge and technology for the benefit of students, researchers and teachers of geography.

Annual Geography Talent Tests for College / University Students and School Students of Tamil Nadu

The Indian Geographical Society is conducting talent test examination to final year UG and PG geography students across the State and present awards and cash prizes to a tune of Rs. 15,000 (top three M.Sc. students) and Rs. 10,000 (top three B.Sc students) in the names of the IGS Founder Prof N.Subrahmanyam and the former Head of the Department of Geography of University of Madras Prof. A.Ramesh, respectively.

The Association of Geography Teachers of India conducts Annual Geography Talent Tests to the school students. The talent test is conducted at two levels: Students of classes 7 and 8 take Junior Level test while the students of classes 9 and 10 take it at the Senior Level. Prizes and certificates are awarded to top ranking candidates.

Two geographical Associations are functioning in Tamil Nadu to disseminate geographic knowledge to the students and teachers of schools, colleges and universities through publishing journals, organizing workshops and conduct talent tests to the geography students.

1.10 Databases for Geography Teaching and Learning

Geographers are concerned about certain global and local issues like disasters, environmental problems, natural resources and other related aspects. Often these issues are discussed in the classrooms. Data relating to the issues are necessary for better understanding of the same and for seeking real world solutions. A number of organizations in India are engaged in disseminating such valuable information through special publications, especially to the student community. The schools, colleges, universities and research institutions can write to the following organizations and enroll themselves to receive the published materials like booklets, pamphlets, satellite images, manuals etc. They can also enroll for short term trainings / field visits / workshops arranged by these organizations.

The students can make use of the free software available from these organizations to visualize the earth's surfaces from space and map the existing and changing land cover details, traffic density, pollution levels etc., A number of spatial information, including satellite images can be downloaded freely for educational purposes such as classroom teaching, preparation of maps, for project work, field work and other activities.

GLOSSARY

1. **Absolute Location:** The exact position of an object or place stated in spatial coordinates of a grid system designed for the location purposes.
2. **Cartography:** The art, science and technology of making maps.
3. **Global Positioning System (GPS):** A method of using satellite observations for the determination of extremely accurate location information.
4. **Greenhouse Effect:** The heating of the earth's surface as shortwave solar energy passes through the atmosphere, which is transparent to it but opaque to reradiated long wave terrestrial energy. It also refers to increasing the opacity of the atmosphere through the addition of increased amounts of carbon dioxide, nitrous oxide, methane and chlorofluorocarbons.
5. **Greenwich Mean Time (GMT):** Local time at the prime meridian (Zero degree longitude), which passes through the observatory at Greenwich, England.
6. **Map Projection:** A method by which the curved surface of the Earth is shown on a flat surface map.
7. **Nation:** A culturally distinctive group of people occupying a particular region and bond together by a sense of unity arising from shared ethnicity, beliefs and customs.
8. **Natural Resource:** A physically occurring item that a population perceives to the necessary and useful to its maintenance and well-being.
9. **Ozone Layer:** A gas molecule consisting of three atoms of oxygen (O_3) formed when diatomic oxygen (O_2) is exposed to ultraviolet radiation.
10. **Prime Meridian:** An imaginary line passing through the Royal Observatory at Greenwich, England, serving by agreement as the zero degree line of longitude.

Evaluation

Choose the correct answers

1. The word 'geography' is coined from _____ language.
   a. Latin
   b. Spanish
   c. Greek
   d. Chinese

2. Four traditions of geography were introduced by_____.
   a. Hartshorne b.Gerard Mercator
   c. William D Pattison d.Humboldt
3. Which one of the following is not a theme of geography?
   a. Location b. Place
   c. Movement d. Technology
4. Systematic approach to study geography was developed by_____.
   a. Carl Ritter b. Humboldt
   c. Pattison d. Hartshorne
5. Anthropology deals with human _____.
   a. Migration b. Settlements
   c. Races d. Kingdoms
6. Which one is wrongly matched?
   a. Economic Geography- Industries
   b. Political Geography - Boundary of States
   c. Cultural Geography - Life Expectancy
   d. Populion Geography - Dependency ratio
7. Meteorology is a study of _____.
   a. Atmosphere b. Meteors
   c. Metals d. Asteriod

8. Astronomy is a science which deals with_____.
   a. Plants b. Animals
   c. Climate d. Celestial bodies
9. What is the GNSS system of India called as?
   a. IRNSS b. GPS
   c. GLONASS d. Beidou
10. Which one of the following countries first used the GPS for its military applications?
   a. Canada b. Germany
   c. India d. USA

Very short answers

11. Define Geography.
12. List the five themes of geography.
13. What are the three domains of geography?
14. Define cartography.
15. What is mathematical geography?

Short answers

16. Distinguish between systematic approach and regional approach to study geography.
17. What is Geographical data matrix?
18. Write a note on remote sensing.
19. Discuss Medical Geography.
20. Define Oceanography.

Detailed answers

21. Describe how the five themes are interrelated.
22. Describe how geography is related to natural sciences.
23. Explain any four geographic techniques.

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6. Robinson, J.L. (1976), A New Look at the Four Traditions of Geography, Journal of Geography, 75, pp. 520-530.
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Internet Resources

Open GIS Software

http://www.saga-gis.org/en/index.html; https://qgis.org/en/site/; https://grass.osgeo.org/

Free Satellite Data and Images

https://earthexplorer.usgs.gov/; https://bhuvan.nrsc.gov.in

Online Mapping

https://www.openstreetmap.org; https://maps.google.com/; https://www.google.com/intl/en_in/earth

Online Learning Resource

www.mhhe.com/getis10e/

ICT CORNER

Modern Tools of Geography

Explore and survey geography using modern tools.

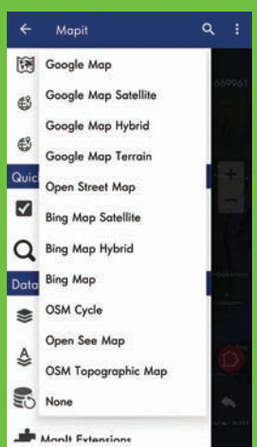
Steps

- Use the URL or QR code to download and install 'Mapit GIS' app in your smartphone. Open the app and go to settings tab on the top right corner of the page and set units of measurement of your choice.
- Select scale icon from the bottom and place the targets by pressing 'Balloon' icon from the bottom. Scale icon will provide you instant survey of distance using GPS.
- Long press the scale icon and it will transform into 'Area mode'. Follow the same step to drop the balloon and survey the area between any numbers of points.
- Touch the menu navigation button from the top left corner and change the map styles you want to survey.

Step 1

Step 2

Step 3



Step 4

Website URL:

https://play.google.com/store/apps/details?id=com.osedok.gisdatacollector&hl=en

*Pictures are indicative only.