

11th Geography Lesson 1 Notes in English

1. Fundamentals of Geography

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**’ was 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.
- Unfortunately, in the recent past it has been demoted to the back seat in most parts of the world, while certain other sciences hold prominent places in the society.
- 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.
- A society that lacks sufficient geographic knowledge cannot be expected to exhibit its strength of resource potentials and empowerment to make decisions in real-world context.
- Therefore, the knowledge of geography is very much vital for the care and concern of the earth, growth and development of every country and for minimising the issues related to human activity.
- In this context, **the National Geographic Society**, USA defines geographic literacy as being equipped to understand the complexity of the world, how our decisions affect others (and vice versa), and the interconnectedness of this rich, diverse, and not-so-large world.
- This unit introduces the student to the foundations over which the subject had developed in the past, the content it offers now and the changes that it had undergone.
- It also opens the door to **the world of physical geography** and the practical skills to be acquired to understand geography which are explained in the units following this.

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 and provides sustainable solutions to human and environmental issues of the earth.

Evolution of Geography

- Geography had evolved over **a long period of time**.
- Some of the **earliest geographical** studies go back about **four thousand years ago** through explorations.
- The early explorers travelled and tried to map the new places.
- The evidences of such explorations come from the **archaeological discovery** of a **Babylonian clay tablet map** that dates back to **600 BCE**.
- During this time, **Phoenician, Chinese and Egyptian civilisations** were in the beginning to explore places outside their homelands.
- It was the **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).

- The earlier geographers were descriptive geographers concerned with answering questions like **'what is where'** on the earth and the question like **'why it is there'** came later.
- 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.
- They discover the linkages and movements between places and are able to infer the spatial processes that are working in these areas.
- 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.

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.
- The discipline was in an **embryonic stage**.
- 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**.
- 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 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.

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.



Ratzel

- **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.

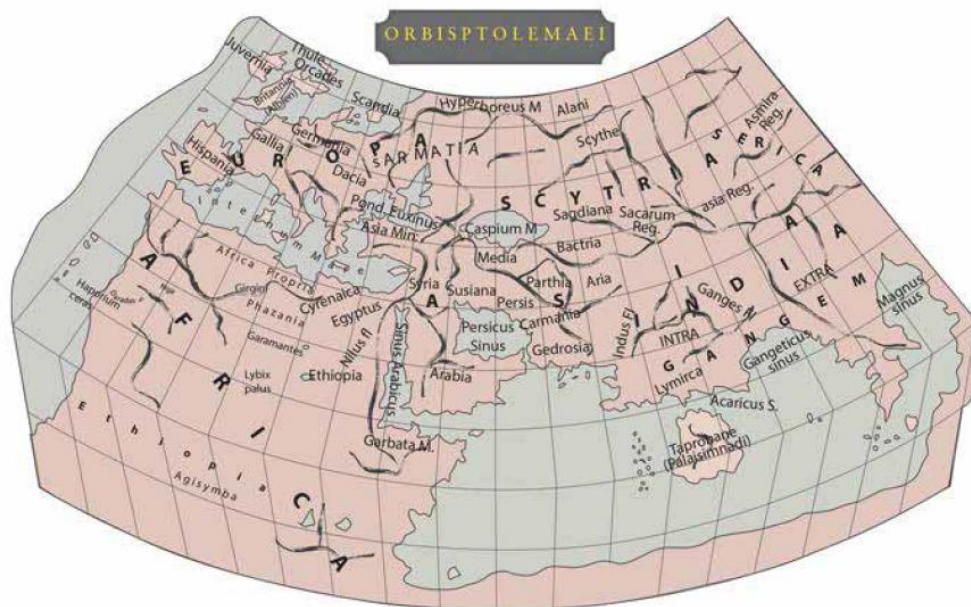


La Blache

- 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 high temperatures** and **poor soils**.

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.
- This **quantitative revolution** was referred to as a revolution because it marked a new beginning in the way the subject matter of geography was to be studied.
- 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**.



Ptolemy's World Map

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** (area distributions and spatial patterns).
- Example: 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).
- Like the major traditions identified in geography, the significant themes of the subject are also identified.



VASCO DA GAMA

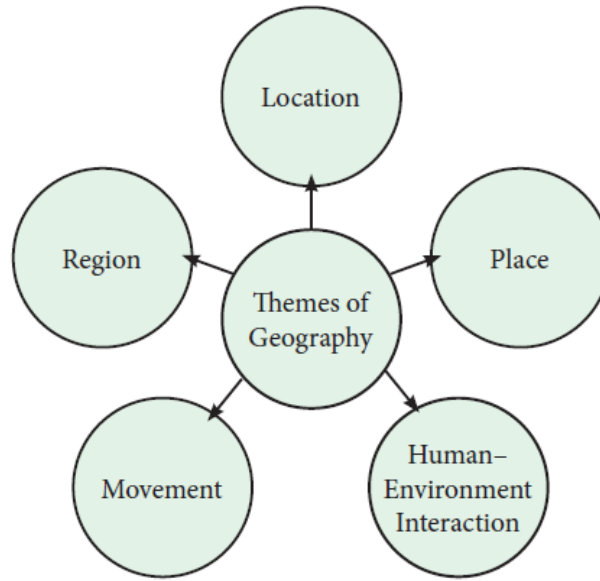
- The Association of American Geographers put forward the 'Five themes of Geography' and it has been widely accepted by geographers worldwide .
- The themes are **location, place, human – environment interaction, movement and regions.**



Christopher Columbus's voyages to America

Location

- **Every point on 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** 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.



Themes of Geography

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 Redhills, Fort St. George, Mint, and George Town are examples to this theme.
- **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.

Human-Environment Interaction

- **The theme** describes how people interact with **the environment** and how the environment responds.
- These are 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 or desert regions)
- **Modification**: How humans modify the environment (Example: Construction of Underground Metro rail, Agriculture in Israel).

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.

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** (Chota-Nagpur plateau) etc.

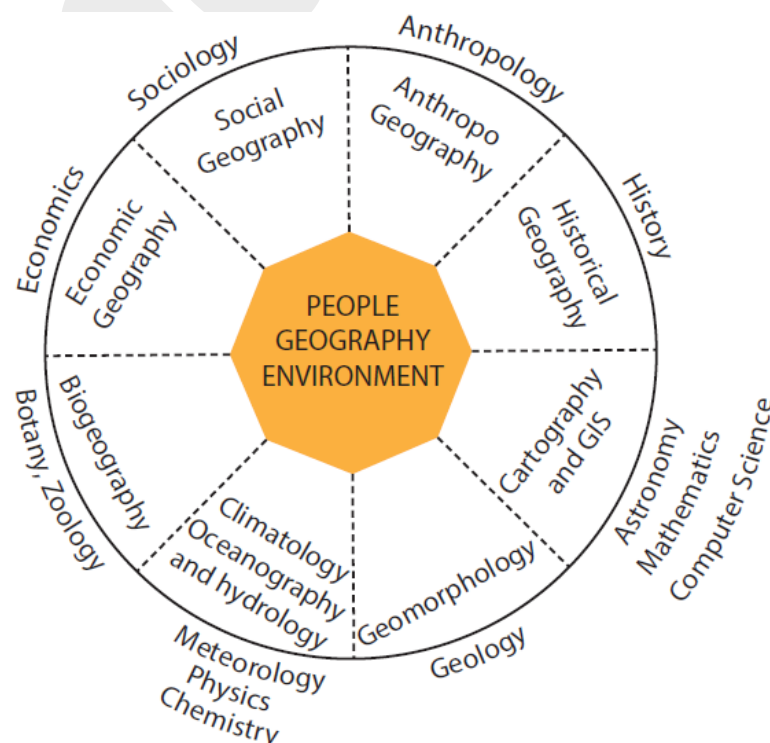
Geography's Relation with Physical and Social Science Disciplines

- 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 gives clear idea about the relationship of geography with other disciplines.

Relations with Physical Sciences

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

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**.

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.
- They study how **the physical and chemical** contents are disturbed by human activities and vice versa.

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

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**.

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**.

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**.

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.

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**

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.
 - 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.

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, Per capita income or there could also be multifactor 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.**



- Born on 14 September 1769 **Alexander Von Humboldt** was a **Prussian polymath**, geographer, naturalist, explorer.



Alexander Von Humboldt

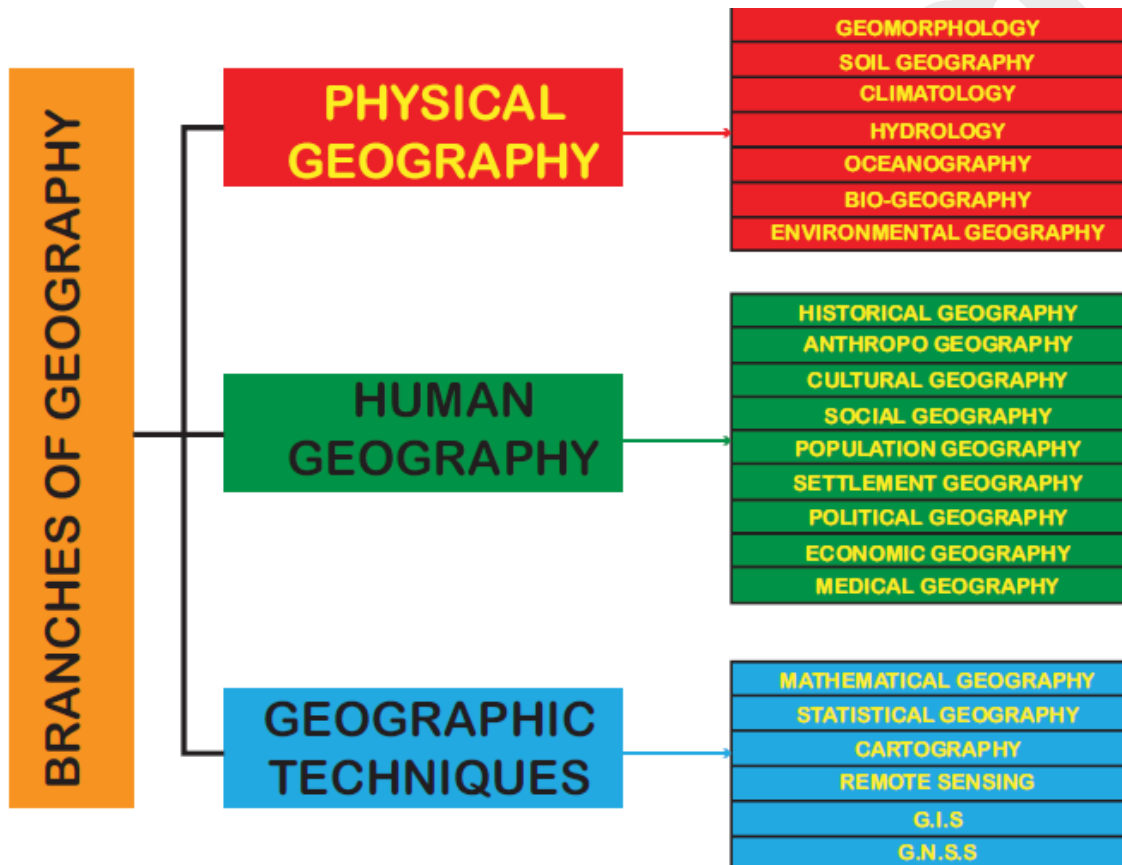
- Humboldt's quantitative work on **botanical geography** laid the foundation for the field of **biogeography**.
- **Humboldt** resurrected the use of the word **cosmos** from the **ancient Greek** and assigned it to his multi-volume treatise, **Kosmos**.
- He was the first person to describe the phenomenon 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.

Geographical Data Matrix:

- **The matrix** is 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.

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**
 - Physical Geography
 - Human Geography and
 - Geographic Techniques.



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:
 - 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**.
 - 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.

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

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.
- **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**.
- **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**.
- **Historical Geography** tries to **pictorise 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.

- **Anthropo Geography** deals with the **distribution of human communities** on the earth in relation to their geographical environment.
- **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.
- **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.
- **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.
- **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 and other related areas.
- **Medical Geography** mainly deals with study of geographical aspects of origin, diffusion and distribution of various communicable diseases and health care planning.

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**.
- **Mathematical Geography** deals with the study of earth's size and shape, motions of the earth, concept of time and the time zones.
- **Statistical Geography** is concerned with the practice of collecting, analysing and presenting data that has a geographic or areal dimension, such as census data.
- **Cartography** is the study of making maps of various scales using authentic information.
- **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** touses.
- **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**.

- **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**.
- Geography is undergoing frequent changes to tackle the **challenges of the dynamic world**.
- The subject is more flexible and accommodates many principles of related subjects.
- At the same time, it lends **concepts** and **knowledge** to many related disciplines.
- Owing to these changes, the subject is attaining more refinement, accuracy, precision, depth and scientific rationale.

Geographical Tools and Skills

- Every day the **news media report** several geographically significant events of nearby 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.

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**.

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 and urban 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.

Geospatial Analysis:

- A **geospatial analyst designs databases, analyses 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.,

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.

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.

Weather Forecasting / Now casting:

- 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 now **cast the weather conditions** and provide live cyclone movement tracts, otherwise known as **weather now casting**.
- 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.

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**.

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.
- **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.

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.

MORE TO KNOW:

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**.

'Apartheid'

- The study of **'apartheid'** (a system of institutionalised racial segregation as existed in South Africa) is an example of **anthropo-geographic study**.

Tamil Rulers and Geographic Knowledge

- **History reveals** to us that how the Great rulers like **Raja Raja Chola** or **Rajendra Chola** had trade relations with other countries of the world, especially **South Asian** countries by understanding the relief, seasons, ocean current movements etc.,
- **The sailors** would have been experts in every aspect of **geography** to move their **troops, sail overseas and trade** with all known **nations of that time**.
- They also utilised the **ocean currents to transport** teak and other valuable timbers from **Indonesia, Myanmar, and other countries to South India**.

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**.

How does ground penetrating RADAR locate the archaeological site?

- 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**.

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**.

Awards to Geography Teachers and Scientists

- **The Indian Geographical Society** has instituted Awards in the names of **renowned Geographers Prof.B.M. Thirunaranan, Prof. A.R. Irawathy and Prof.V.L.S.PrakasaRao** to the leading geographers who work in the areas of geomorphology, remote sensing and regional planning respectively.