TO THE POINT
NCERT PLUS

CHRONICLE
Nurturing Talent Since 1990

WORLD GEOGRAPHY

Useful for UPSC, State PSCs & Other Competitive Examinations

3

Index

A. Physical Geography

B. Economic Geography

C. Human Geography

D. World G.K.

01
CHAPTER

Our Universe

How large is the universe? What exactly is the observable universe? Will we ever be able to detect things that are outside it? If so, what are the ultimate limits of observability? Are there fundamental limits on how far we could travel through space? How far away does something have to be such that it is completely causally separate from us? How do these relate to each other? And how do they change with time?
In this chapter we are going to learn the facts and unknown about Universe, Solar System, and much more.

An Introduction to Our Universe

The origin of things has always been a central concern for humanity; the origin of the stones, the animals, the plants, the planets, the stars and we ourselves. Yet the most fundamental origin of them all would seem to be the origin of the universe as a whole – of everything that exists, without which there could be none of the creatures and things mentioned above, including ourselves. Thus, the vast empty space surrounding the planets and stars is called as the Universe.

- The Big Bang theory explains the origin of our universe. According to this theory, ***15 billion years ago***, cosmic matter was in a compressed state from which expansion started by a primordial explosion. The super-dense ball broke to form galaxies, which again broke to form stars and finally stars broke to form planets including the Earth.

Current Cosmogony: Big Bang Theory

- In order to understand the early events in the history of the universe, it is necessary to discuss the particles and forces that make up the universe. There are four fundamental forces which control the interactions in the universe. We are most conscious of **gravity** (apples fall) and the **electro-magnetic force** (static electricity and compass). However, the **strong nuclear force** (holds atomic nuclei together) and the **weak nuclear force** (radioactivity) is also essential to our lives.
- Current scientific theory says that all matter is composed of quarks, leptons, or bosons (gauge particles). Three quarks combine to form the particles of the atomic nucleus (protons and neutrons), while electrons are a type of lepton. Gauge particles carry or mediate the fundamental forces. For example, photons carry the electromagnetic force between atoms, while gravitons carry the gravitational force.
- For each particle there can be an antiparticle. Antiparticles or antimatter are mirror images of the ordinary matter that we know on earth. Antimatter has the same mass as matter, but it has the opposite value in some fundamental property. The antimatter electron is the positron. When a particle and its anti-particle meet, they annihilate each other with the release of energy.

History of the Universe

The following history of the universe, as presented by the Big Bang theory, comes from both experimental and theoretical work. The Big Bang theory assumes that the universe began at a fixed time in the past as a high-temperature, high-density state (a singularity).

Quarks	Leptons	Bosons (Gauge Particles)	
up	electron	Type	Force Mediated
down	neutrino	photon	electromagnetic
strange		gluons	strong nuclear
charm		W and Z particles	weak nuclear
bottom		gravitons	gravity
down			

Figure : Fundamental Particles

- Since that beginning, the universe has been expanding, allowing matter to cool to form stars and galaxies. Thus, the distance between the galaxies is increasing because the space is expanding.
- This is very hard to visualize because one does not experience in daily life anything that behaves like the expansion of the universe. Scientists believe that the universe began about 15 billion years ago as a singularity of infinite density and temperature.
- Initially the universe was so hot that the four fundamental forces were united as one force and all existed as high-energy radiation (photons) comparable to gamma rays.

02 CHAPTER

Geomorphology

After learning about how the Earth was born, now, it is our turn to venture into its evolution, its crust and other inner layers, how its crustal plates moved and are moving, etc. This chapter will deal with topics which are in relation to basic physical, chemical and mechanical processes of our Earth.

The science that analyses and describes the origin, evolution, form, classification, and spatial distribution of landforms is known as **Geomorphology.**

- ***Geomorphology*** - a term that arose in the Geological Survey in the USA in the 1880s, possibly coined by J. W. Powell and W. J. McGee. He regarded geomorphology as being that part of geology which enabled the geomorphologists to construct Earth's history by looking at the evidence for past erosion.
- In recent years there has been a tendency for geomorphologists to become more deeply involved with understanding the processes of erosion, weathering, transport and deposition, with measuring the rates at which such processes operate, and with quantitative analysis of the forms of the ground surface (morphometry) and of the materials of which they are composed.

Compositional Elements of the Earth

Elements	Percentage (%)
Iron	34.6
Oxygen	29.5
Silicon	15.2
Magnesium	127
Carbon	1.1
Aluminium	1.1
Nickel	2.4
Sodium	0.6
Sulphur	1.9

Earth

The planet Earth is full of spectacular natural features; there are lofty snowy peaks and deep ocean basins, numerous rivers and huge islands, hot treeless and rainless deserts, wet places with dense forests, polar areas with freezing temperature and also areas so hot that one can fry food, rivers that traverse the breadth of a continent and several fresh water lakes almost simulating a sea.

Yet this marvellous Earth is but a minuscule part of the astounding Universe.

Age & Dimensions of Earth

- **Age:** 4.6 billion years (4.6×10^9)
- **Diameter:** 12,756.32 kilometres
- **Equatorial Diameter:** 12,756.8 km
- **Polar Diameter:** 12,713.8 km

The Interior of the Earth

The **Earth's radius is 6,370 km**. To reach the centre of the Earth and make observations or collect samples of the materials is almost impossible. Under such conditions, most of our knowledge about the interior of the Earth is largely based on analogies and inferences. Yet, a part of the information is obtained through direct observations and analysis of materials.

Direct Sources

- The readily available solid Earth material is surface rock we get from mining areas. Besides mining, scientists world over are working on two major projects such as "Deep Ocean Drilling Project" and "Integrated Ocean Drilling Project". The deepest drill at Kola, in Arctic Ocean, has so far reached a depth of 12 km.
- These drilling projects have provided large volume of information through the analysis of materials collected at different depths. Volcanic eruption forms another source of obtaining direct information. As and when the magma comes out to the surface of the Earth during volcanic eruptions, it becomes available for laboratory analysis.

Indirect Sources

- Analysis of properties of rocks and magma indirectly provides information about the interior. Through mining we know that temperature and pressure increases with the increasing depth. It is also known that the density of the material also increases with depth. Scientists have estimated the values of temperature, pressure and the density of materials at different depths. Despite of much highest temperature the **inner core remains** in solid position.

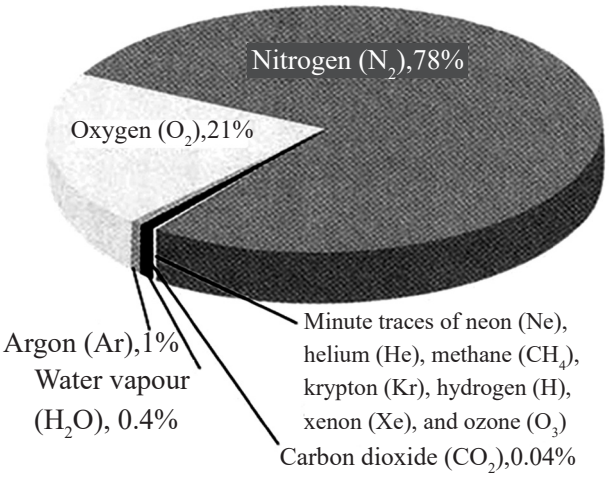
03 CHAPTER Climatology

Our Earth is divided into a number of climatic regions. Do you know why seasons occur? Why it is so different according to different regions? What are its influencing factors? We will learn everything about such changes in this chapter.

An atmosphere is a layer or a set of layers of gases surrounding a planet or other material body that is held in place by the gravity of that body. An atmosphere is more likely to be retained if the gravity it subject is high and the temperature of the atmosphere is low.

Composition of Atmosphere

- A unit mass of dry air is made up of **78.084 per cent nitrogen (N_2), 20.946 per cent oxygen (O_2)**, **0.934 per cent argon (A)**, **0.036 per cent carbon dioxide (CO_2),** and smaller proportions of rare gases such as neon, helium, methane and hydrogen.
- Atmosphere extends to approximately 480 km above the earth surface.
- Its density decreases rapidly with altitude. In fact, 97 per cent of the air is concentrated in the first 25 km or so.
- At sea level, atmospheric pressure is about **1034 gm/cm2**, but as proceed from lower to higher elevation, the atmospheric pressure tends to decline.
- Water vapour is also variable in the atmosphere, which decreases with altitude. It may account for **4 per cent of the air by the volume** in **warm and wet tropics** while even may be less than 1 per cent in dry and cold areas of deserts and polar-regions.
- Thus, water vapour also *decreases* from equator towards poles.
- Nitrogen, oxygen and Argon are called **constant gases**.
- While carbon dioxide, methane, ozone, water vapour and particulates among other are called **variable gases**. As they represent a tiny portion of the atmosphere.
- CO2 is the *fourth* most abundant gas, shows **seasonal variation**, decreases slightly during summer as plant leaf out while in winter it increases as plants go dormant and photosynthesis decreases.
- ***Greenhouse effect*** is caused when CO2 absorbed long wave radiation in lower atmosphere, which reradiate some of that heat back to the surface.
- *Methane (CH4)* is greenhouse gas contributing about *18% of global warming* and has been on rise since last decades. It is ***20 times*** more potent than CO2 as greenhouse gas.
- Ozone (O3) is *both harmful and beneficial* to life on earth. Much of ozone found in **stratosphere** *at height of 15-50 km* from earth surface. However, ozone absorbs UV light from sun. It is also found in lower layer of atmosphere (troposphere) where it act as an eye and respiratory irritant.
- Water vapour is good absorber of terrestrial radiation. Thus, considered as a greenhouse gas.
- *Sky* ***appears to be blue*** because of refraction, reflection and scattering of sunlight from water vapour or *water droplets*.



Principal Gases comprising Dry Air in the Lower Atmosphere

Constituent	Per cent by Volume	Constituent	Per cent by Volume
Nitrogen (N2)	78.008	Ozone (O2)	0.00006
Oxygen (O2)	20.94	Hydrogen (H2)	0.00005
Argon (Ar)	0.93	Krypton (Kr)	Trace
Carbon dioxide (CO2)	0.03	Xenon (X2)	Trace
Neon (Ne)	0.0018	Methane (Me)	Trace
Helium (He)	0.00015		

04
CHAPTER

Oceanography

The Earth is called the 'Blue Planet'. Oceans, rivers, lakes, ice in glaciers, underground water and the water vapor in atmosphere, all comprise the hydrosphere. And, in this chapter we are going to learn about Oceanography: such as oceanic reliefs, distribution of temperature and salinity; movements of ocean water-waves, tides and currents and several other things.

The hydrosphere is the total mass of water on the surface of Earth. About 97 per cent of the water is in the ocean; 3 per cent is in streams, lakes, ground-water, and glaciers. Approximately 70.8 per cent of the Earth is covered with water and 29.2 per cent is land area. Thus, it is for the good reason the Earth has been called ***'the water planet'.***

The total length of the Earth's coastlines is more than 500,000 km that is equivalent of 12 times around the globe. A high percentage of the world's population lives in coastal zones. Of the ten most populated cities on the Earth, eight are situated on deltas, estuaries, or the coast.

There are four principal oceans in the world which are separated largely on the basis of their geographical locations. These are the Pacific Ocean, the Indian Ocean, the Atlantic Ocean and the Arctic Ocean. All the other seas, inland seas or the arms of the oceans, are counted within these four main oceans.

Major Oceans

1. The Pacific Ocean

- It is the **largest and deepest** covering one third of the globe. **It divides the Old and New Worlds.** Its average depth is 4200 m. Its basin contains high and abrupt ridges, deep trenches, volcanic mountains and other features.
- The deepest hollows are in the **Philippine Trench** about 10,380 m. and the **Marina Trench** about 10,800.m. Some of these ridges project above sea level and form islands most of which are either volcanic or coral.
- The highest volcanic islands form Hawaii. Tahiti and Samoa, the Pacific Ocean has a string of volcanoes along the coastal margins of the continents. The narrow Bering Strait separates North America from Asia.
- The Pacific Ocean belts are in shrinking phase and resemble roughly the triangular shape with its apex in north at Bering Strait.

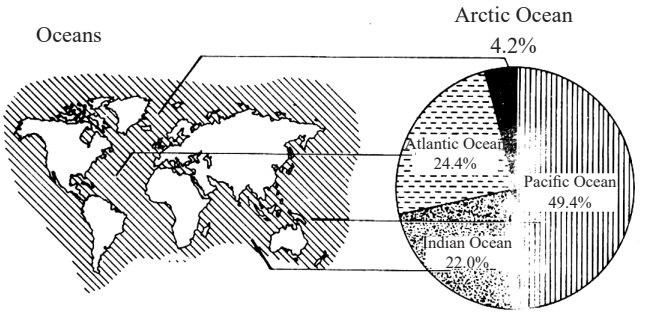


Figure: The Oceans and their Percentage Share of the Planet's total Ocean Area

Distribution of Water Mass

Water Mass	Rank	Name	Area (sq.km.)
Ocean (88.94%)	1 2 3	Pacific Ocean Atlantic Ocean Indian Ocean	165, 246, 200 84, 441, 500 73, 442, 700
Inter-Continental Seas (8.20%)	1 2 3 4	Arctic Sea Malaya Sea Central American Sea Mediterranean Sea	14, 090, 100 8, 143, 100 4, 319, 500 2, 965, 900
Smaller Enclosed Sea (0.64%)	1 2 3 4	Hudson Boy Red Sea Baltic Sea Persian Gulf	1,232, 300 437, 900 422, 300 238, 800
Fringing Seas (2.22%)	1 2 3 4 5 6	Bering Sea Okhotsk Sea East China Sea Japan Sea Andaman Sea North Sea	2,268,200 1,527, 600 1,249,200 1,007,700 797,600 575,300
	7 8 9 10	Laurentian Sea English Channel & Irish Sea Californian Sea Bass sea	237,800 178,500 162,200 74,800

2. The Atlantic Ocean

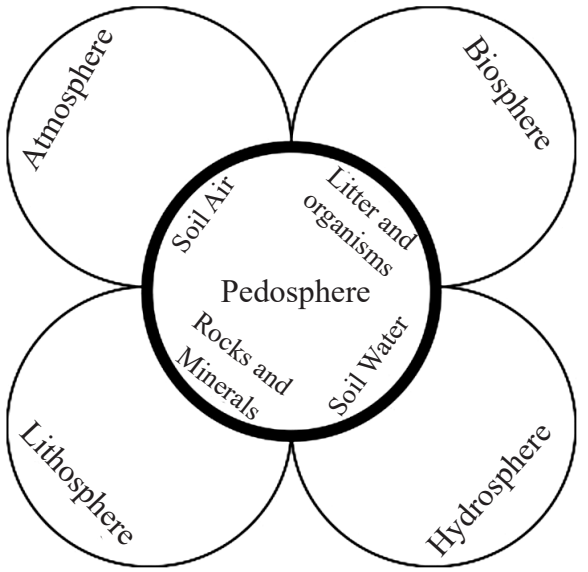
- small and shallower has *'S' shaped curve,* is similar to that of the coastline bordering it. This ocean also has many ridges. There are also many remarkable canyons and gorges.

06
CHAPTER

Soil

Soil has been called "the skin of the Earth." Soils are the product of complex mixture of weathered and eroded rock material as well as organic residue. It is a dynamic body of natural materials that is capable of supporting a vegetative cover. Thus, in this chapter we are going to learn details about soil formation, classification, its taxonomy and several other things.

Soil is defined as upper layer of the Earth composed of loose surface material. It is a mixture of many substances including endless variety of minerals, remnants of plants and animals, water and air. It is the end product of continuing interaction between the parent material, local climate, plant and animal organisms and elevation of land. Since each of the elements varies over space, soils also differ from place to place.



Soil is an important segment of our ecosystem, as it serves an anchorage for plants and source of nutrients. Thus, soil is the seat, the medium and fundamental raw material for plant growth. Through its relative fertility, it affects man's economic activities and shapes the destiny of our country. When the soil is lost, property and culture are also lost. Therefore, it is a valuable national and fundamental Earth resource of the country.

The **pedosphere** interfaces with the lithosphere, the hydrosphere, the atmosphere, and the biosphere. The term pedolith, used commonly to refer to the soil, translates to ground stone. Soil consists of a solid phase of minerals and organic matter (the soil matrix), as well as a porous phase that holds gases (the soil atmosphere) and water (the soil solution). Accordingly, soils are often treated as a three-state system of solids, liquids, and gases.

Soil is the mixture of rock debris and organic materials which develop on the Earth's surface. The major factors affecting the formation of soil are relief, parent material, climate, vegetation and other life-forms and time. Besides these, human activities also influence it to a large extent. Components of the soil are mineral particles, humus, water and air. The actual amount of each of these depends upon the type of soil. Some soils are deficient in one or more of these, while there are some others that have varied combinations.

- **Parent Material:** The parent material includes both hard, resistant rocks such as granite and also the less resistant rocks such as **recent volcanic lavas and ashes** and most of the sedimentary rocks like limestone and sandstone.
- **Humus:** Humus is the end-product of the **breakdown of dead organic material**. It is structure less, dark-brown or black jelly found beneath the soil surface. The humus of ordinary soil is black, and is thus responsible for making the soil darker than the subsoil. It plays an important role in maintaining the fertility of the soil.

Major Soil Types

Soil may be divided (i) Zonal, (ii) Intrazonal & (iii) Azonal categories. Let us get acquainted with them briefly:

(i) Zonal Soil: The soil whose characteristics are dominated by the influence of climate and vegetation is known as zonal soil. These soils occur on gently undulating land where drainage is free and where the parent material is of neither extreme texture nor chemical composition.

(ii) Intrazonal: The soil which has been influenced in its development less by climate and vegetation than by other local factors, such as effective drainage, excessive evaporation or parent material (such as limestone) , terrain or age is known intrazonal soil.

07
CHAPTER

Global Climates

Earth's climate is influenced by interactions involving the Sun, ocean, atmosphere, clouds, ice, land, and life. Heat from the Sun keeps the Earth's average temperature at 16°C, which allows for biological life and maintains the planet's life-sustaining. Ocean currents and winds also redistribute heat and moisture across globe forming climate zones.

The interaction of solar radiation with the atmosphere and the gravitational forces, together with the distribution of land and sea masses, produces an almost infinite variety of climates.

Climate holds an important place in our own life. Our life and various economic activities (agriculture, industries, commerce, etc.) are affected by climate. Climate has also an important place in physical geography.

Factors affecting Climate

Factors influencing world climatic regions are given below:

- Air mass influence
- Distribution of land and sea
- Altitude
- Latitude and solar influx
- Pattern of prevailing winds
- Ocean currents
- Location of global high and low pressure zones
- Relief barrier

However, certain zones and belts of approximately uniform climates can be distinguished.

Classification of Climate

On the basis of very regional similarities and differences of climatic elements, attempts have been made to classify climate for easy understanding, description and analysis. The Greek philosophers were the first to present classification of climates. The temperature of the Earth was the main basis of their classification. They had divided the Earth into Torrid, Temperate and Frigid zones.

1. **Tropical or Torrid Zone:** This zone lies between the Tropic of Cancer and the Tropic of Capricorn. In this zone the sunrays are almost vertical throughout the year. The temperature always remains high. There is no winter season in this zone.
2. **Temperate Zone:** There are two zones lying between the Tropic of Cancer - the Arctic Circle and the Tropic of Capricorn - the Antarctic Circle.
3. **Frigid Zone:** This zone lies between Arctic Circle and North Pole and the Antarctic Circle and the South Pole. The sunrays in these two zones in the Northern and Southern Hemisphere fall in slanting form throughout the year. Therefore these zones experience very low temperature and high degree of coldness. Therefore, these latitudinal zones are known as Frigid Zone.

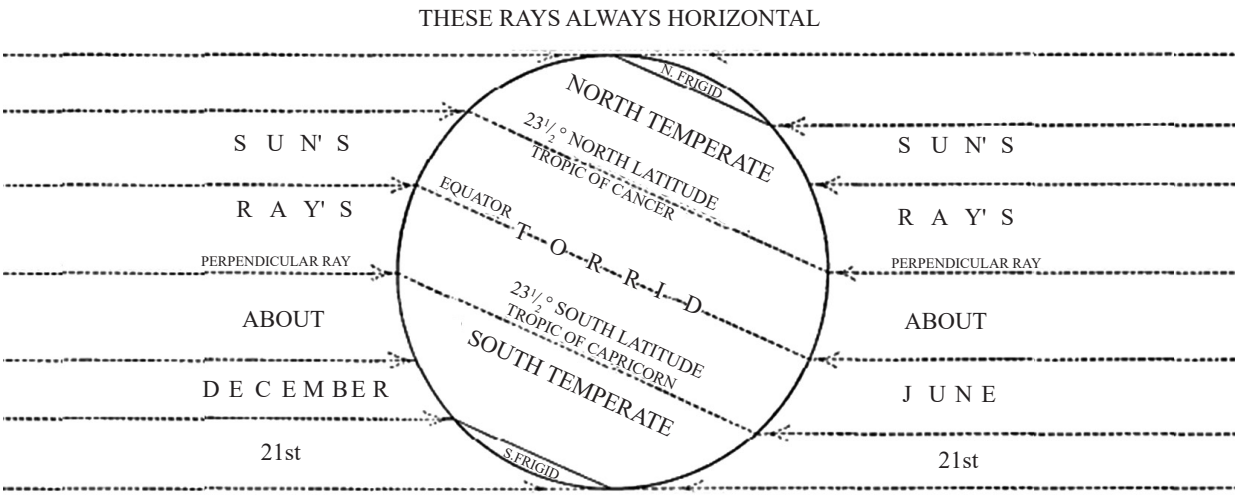


Figure: Heat Zones Classfications

08
CHAPTER

Economic Geography

Economic geography can help us understand why people and firms choose to locate where they do, whether these are good choices from a broader efficiency/resource allocation viewpoint, and what the implications of these choices are for the distribution of income and wealth. It even represents a traditional sub-field of the discipline of geography. Thus, in this chapter we shall learn about the location, distribution and spatial organization of economic activities across the world.

An Introduction to Economic Geography

World Economic Geography deals with the analysis of the ***spatial distribution*** of the transportation and consumption of resources, goods and services, and their effect on landscape. Anything that satisfies peoples' needs is known as a resource. Resource may be natural, like mineral-ores, water, soil, natural vegetation, climate or man-made – labour, skills, finance, capital, technology and working environment.

Scope and Nature of Economic Geography

- According to **Ellsworth Huntington,** Economic Geography is the study of all those kinds of materials, resources, activities, institutions, customs, capacities, abilities that contributes to some work to earn a livelihood.
- In the words of **Hartshorn and Alexander,** "Economic Geography is the study of the spatial variation on the earth's surface of activities related to producing, exchanging and consuming goods and services. Whenever possible the goal is to develop generalizations and theories to account for these spatial variations."

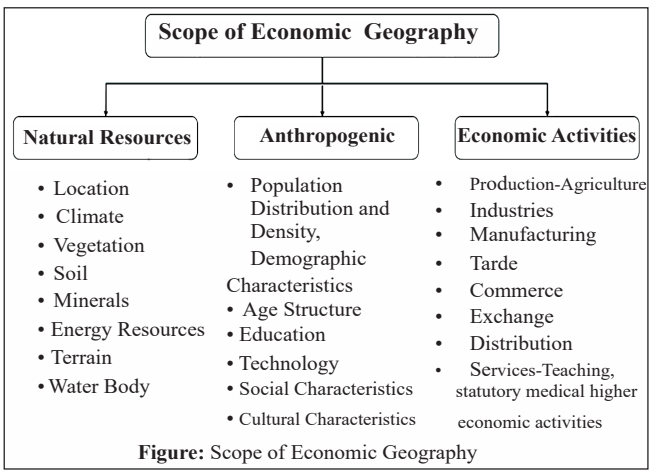


Figure: Scope of Economic Geography

- Therefore, studying the manner of exploitation of the Earth's resources and the limits set by the physical environment is a proper scope of Economic Geography.
- Economic Geography also aims at resolving resource-related problems by better and efficient utilization of limited resources through rational, systematic, scientific, and long-term planning.
- **Humboldt,** a famous 19th century German Geographer, remarked that the diversified riches of the Earth are a vast source of human enjoyment.

Development of Economic Geography

The focus of economic geography has shifted over the last five decades, from description – gathering facts about production in various locations of the world – to interpretation, from environmental determinism to economic determinism. Both of these shifts can be attributed to the incorporation of Neo-classical Economics into economic geography.

During the last three decades, economic geography has shifted its focus to:

- The nature and causes of development and underdevelopment, emphasizing the inter-relationships between the less and more developed worlds and putting the mode of production at the centre;
- The link between economic systems and geography, particularly in interpretations of capitalism's spatial impacts and role in the development of the world economy;
- The impact of technological advancements and the development of new industrial areas;
- The use of discursive, qualitative, and realist explanations that acknowledge that each economic agglomeration and development is entrenched locally in its own socio-institutional environment;
- The economic dimensions of class, race, and gender, emphasizing and at times criticizing how economic institutions rely on discrimination based on these three groups;

09
CHAPTER

Minerals & Mining

Unlike agriculture or forestry, which can be grown over and over again, mining is a robber industry. The discovery of minerals is reflected in many stages in terms of Copper Age, Bronze Age, and Iron Age in the history of human development. The use of minerals since ancient times was mainly for making tools, utensils and weapon. However, with beginning of Industrial Revolution, the importance and demand for minerals increased continuously.

Minerals

A mineral is a naturally occurring inorganic element or compound having an orderly internal structure and characteristic chemical composition, crystal form, and physical properties.

Identification of Minerals (Physical Characteristics)

Generally, the identification of minerals is done through the following properties:

(a) Colour: All minerals have their own characteristic colour, differing in shade, intensity and rate of oxidation when exposed to air. ***For example***, because of impurities quartz may be white, green, red, yellow, etc.

(b) Lustre: Due to different nature of reflecting surfaces, minerals differ in their brightness. ***For example***, mica is glossy, whereas galena (lead ore) is metallic in appearance.

(c) Cleavage: Tendency to break in given directions. ***For example***, mica splits into thin layers, flint breaks as glass fracture.

(d) Hardness: Relative resistance being scratched as of different chemical constituents and their mode of formation. ***For example***, diamond is hardest of all minerals, talc is softest, etc.

(e) Density or Specific Gravity: All minerals have their own density or specific gravity, ***For example,*** quartz has low density of only 2.65 while lead has specific gravity of 7.6.

(f) Other Properties: These include transparent, translucent or opaque, malleability (flexibility when being forged/shaped), alloy-ability (being alloy with other metals to form new compound), elasticity (spring effect), magnetic attraction and more.

Mode of Occurrence of Minerals

The extraction of minerals out of ground is a complex process. It involves technological know-how, understanding nature of the ore, mode of occurrence of various minerals ores. Metallic minerals may occur in *native or almost pure form* in veins, or may be mixed with other materials in which case the material as a whole is called an **Ore.**

1. **Veins and Lodes**
   - Minerals *may occur* in cracks, crevices, faults or joints in rocks.
   - The smaller varieties of such occurrence are called Veins, and the larger, Lodes.
   - They are mostly associated with ***igneous and metamorphic rocks*** or sedimentary occurring in close proximity to igneous intrusions.
   - Many of the major metals such as tin, copper, silver, lead and zinc are found in veins and lodes.
   - This process inevitably requires a complex arrangement of **shaft and galleries.**
2. **Beds and Seams**
   - A number of minerals occur in beds or layers having been formed as a direct result of deposition, accumulation and concentration in horizontal strata of the earth's crust.
   - Coal and some grades of iron ore formed in this manner and concentrated over a long period under great heat and pressure.
   - Sedimentary or bedded ores, if they lie close to the surface, are frequently worked by open cast methods. Where deposits lie on the escarpment or valley side, **adits or tunnels** driven into the hill side may be the most economical method of extraction.
3. **Weathering Products**
   - Bauxite, an ***ore of aluminium*** is formed by deep-weathering of variety of rocks under tropical conditions with a seasonal rainfall regime.
   - It is similar in appearance to the red lateritic deposits (which however, are iron concentration) found in many tropical soils and is formed by concentration of aluminium as a result of leaching by groundwater.

10 CHAPTER

Energy Resources

Energy Resources in world are diverse and play an important role in the development and economy of country, along with the standard of living of its citizens. Different types of power generated across the world are thermal power, nuclear power, hydro power, wind power and solar power, etc. In this chapter we will discuss about energy and energy-mix scenario spatially.

Energy can be defined as the capacity to produce an effect to do some work. Energy is one of the most important building blocks for human life on earth and economic development of the country. The demand for energy resources are increasing day by day in the development of industries, transportation and agricultural activities. The S.I unit of energy is Joule or KJ or Watt/h.

- Energy consumption of a nation is usually considered as an index of its development. Almost all the developmental activities are directly or indirectly dependent upon energy.
- Agriculture, industry, mining, transportation, lighting, cooling and heating in buildings require energy.
- With the increasing population the world the demand of energy is also increasing.
- Fossil fuels like coal, oil and natural gas which are the main sources of the commercial energy are depleting fast and are going to be exhausted in coming years.

Types of Energy Resources

On the basis of sources, energy is classified into two categories - renewable energy resources and non-renewable energy resources.

1. **Renewable Energy Resources:** These energy resources are also known as non-conventional energy resources, which can be regenerated continuously. It can be used again and again in an endless manner because these resources are available in large amount.

   The major sources of this energy are:
   - Solar energy from the sun,
   - Geothermal energy from heat inside the earth,
   - Wind energy,
   - Biomass from plants, and
   - Hydropower from flowing water.
2. **Non-renewable Resources:** These energy resources are also known as conventional (traditional) energy resources. It cannot be replenished when these sources are exhausted because these resources are present in limited amount and take a long period of time to resynthesize.

   The most common of non-renewable are:
   - Petroleum
   - Hydrocarbon gas liquids
   - Natural Gas
   - Coal
   - Nuclear energy

The coal, natural gas and petroleum formed over thousands of years ago from the buried remains of ancient sea plants and animals. Therefore, they are known as fossil fuels.

1. Conventional Energy Sources

Conventional energy sources are:

A. Fossil fuel energy
B. Hydraulic energy
C. Nuclear energy

A. Fossil Fuel Energy

Fossil fuels are found under the earth and are formed by the decomposition, of organic matter (by heat & pressure) buried under the soil for millions of years. Fossil fuels can be found in solid, liquid or gaseous state. It includes- Coal, Petroleum and Natural gas.

(i) Coal

- Since the advent of industrialization coal has been most common source of energy. In the last three decades, the world switched over from coal to oil as a Major source of energy because it is simpler and cleaner to obtain useful energy from oil.
- Coal is a complex mixture of compounds of carbon, hydrogen and oxygen. Small amounts of nitrogen and Sulphur compounds are also present in coal.
- It is low in calorific value and its transportation is expensive. Coal is pollutant and when burnt it produces CO_2 and CO. Extensive use of coal as a source of energy is likely to disturb the ecological balance of CO_2.

11 CHAPTER

Forest Resources

You must have read in your Social Sciences text book about the early humans who were basically wanderers in the forest. They used to derive food, clothing and shelter from the forest. Later on, human being started settled life by clearing forest. But, life was still highly dependent on forests in a symbiotic manner. After Industrial Revolution in 18th century, humans began to exploit forest in a ruthless manner without considering its negative impact on the earth and its environment.

The forest is a living system composed of many species of flora, fauna, and micro-organisms interacting together and environment in which they occur. Forest has been regarded as a type of ecosystem, which is an important component of life support system. These plants, animals and micro-organisms in a forest ecosystem provide forest products desired by economic development.

- The forest ecosystem service is of great benefit to humanity, particularly for improvement of our living environment, and providing recreational and aesthetic experience.
- Thus, for all of these reasons, the forest should also be managed as a system if all the functions and products are expected.

Forest Cover

- Forests, which once covered about 60 per cent of the earth's surface, have been greatly reduced because of agriculture, settlements and industry as well as being felled for timber.
- As of now about 31 per cent of Global land surface areas (nearly 4 billion hectares) are cover with forest.
- According to data from **U.N. Food and Agriculture Organisation**, deforestation was highest in 1990s, responsible for losing an average of 16 million hectares of forest.
- On the other side, Forest was also expanded in some places because of plantation and native tree processes, bringing the net loss to 8.3 million hectares per year.

Types of Forest

- There are broadly three major types of forests – **tropical, temperate, and boreal forests**.
- They are classified according to latitude. Also, these major types are divided farther into more specific categories.

1. Tropical Forests

- The tropical rainforests are found between latitudes 23.5° N and 23.5° S. The temperatures in these forests range between 68° and 77° F throughout the year.
- They don't experience winter and normally receive 100 inches of rain annually.
- Decomposition happens at an incredibly fast rate as of high temperatures and moist air. High levels of rainfall normally result in leaching of nutrients from the soil.
- These forests are dominated by broad-leafed trees, which grow between 82 and 115 feet tall and include vegetation like vines, ferns, mosses, orchids, and palms.
- The sun hardly reaches the lower levels of the forest trees are in thick canopy. So, most animals that inhabit tropical rainforests are adapted to living in the trees.

Different categories of tropical forests include:

- **Evergreen:** Evergreen forests receive rain year-round and have no dry season
- **Seasonal:** They have evergreen vegetation and short dry season

2. Temperate Forests

Temperate forests are further divided into two sub-categories:

(i) Temperate Deciduous Forests

- Temperate deciduous forests receive between 30 and 60 inches of rain annually where soils are very fertile.
- Temperate deciduous forests found in China, Japan, Western Europe and parts of Russia, as well as in the Eastern United States and Canada. They experience **four distinct seasons**_and precipitation falls all year long.
- Trees like maple, as well as ferns and mosses, are common.
- Most of the animals that inhabit include hawks, red fox, cardinals, and woodpecker.

12
CHAPTER

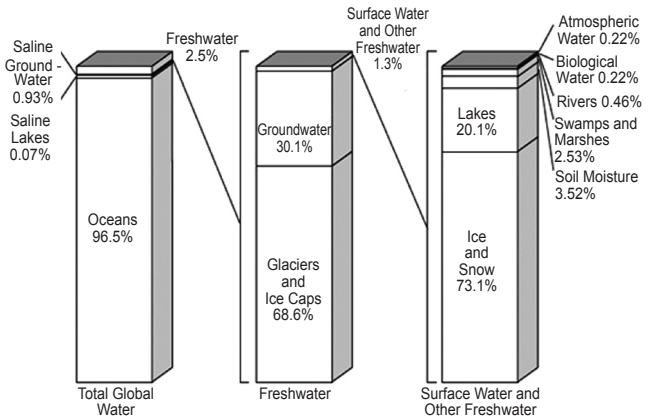
Water Resources

Water resources are under major stress around the world. Rivers, lakes, and underground aquifers supply fresh water for irrigation, drinking, and sanitation, while the oceans provide habitat for a large share of the planet's food supply. Thus, in this chapter we shall study how expansion of agriculture, damming, diversion, over-use, and pollution threaten these irreplaceable resources in many parts of the globe.

97 per cent of water on the Earth is salt water, leaving only 3 per cent as fresh water of which slightly over two thirds is frozen in glaciers and polar ice caps. The remaining unfrozen fresh water is mainly found as groundwater, with only a small fraction present above ground or in the air.

- In fact, a very small proportion of *freshwater* is effectively available for human use. Fresh water availability varies over space and time. Most of the fresh water *(68.6 per cent)* is stored in glaciers and polar ice caps, about another *30 per cent* is stored in the groundwater.
- While the remaining and most accessible water resources available for human consumption and ecosystem are contained in lakes and rivers which accounts to only *0.27 per cent* of the fresh water and close to *0.007 per cent* of the total amount of the water in the world.
- Although Earth holds 1, 386 million km^3 of water but there is very little availability for human consumption i.e. 0.007 per cent.
- Brazil is the country estimated to have the largest supply of fresh water in the world, followed by Russia and Canada.

Distribution of Earth's Water



Sources of Fresh Water

1. **Surface Water**
   - Surface water is water in a rivers, lakes or fresh water wetlands.
   - Surface water is naturally replenished by precipitation and naturally lost through discharge to the oceans, evaporation, and sub-surface seepage.
2. **Under River Flow**
   - Throughout the course of the river, the total volume of water transported downstream will often be a combination of the visible free water flow together with a substantial contribution flowing through sub-surface rocks and gravels that underlie the river and its floodplain called the **hyporheic zone**.
   - For many rivers in large valleys, this unseen component of flow may greatly exceed the visible flow. This is especially significant in karst areas where pot-holes and underground rivers are common.
3. **Ground Water**
   - Sub-surface water, or groundwater, is fresh water located in the pore space of soil and rocks. It is also water that is flowing within aquifers below the water table.
   - Sometimes it is useful to make a distinction between sub-surface water that is closely associated with surface water and deep sub-surface water in an aquifer (sometimes called **"fossil water").**
4. **Desalination**
   - Desalination is an artificial process by which saline water is converted to fresh water. The most common desalination processes are distillation and reverse osmosis.

13 CHAPTER Transport, Trade & Communication

We use several commodities on a daily basis. But, the question arises that how these commodities are supplied to us for consumption? From the fields and factory, the finished products are brought to the market place from where consumers purchase it. It is the transportation which is in play in the background which makes items available to us. This chapter will give an idea on various modes of transport, trade and communication simultaneously their importance for the development of a nation.

Transport and communication infrastructure is a key driver for any developing economy. The state of development of transport and communication is a good indicator of the robustness the economic activities in the country. A well-developed communication system assists in inter-regional and local exchange of goods and commodities. It also promotes contact among cultures of different regions and in the longer run promotes exchange of thoughts and ideas in the society. Both transport and communication are interdependent on each other as communication system also supports the growth of transport infrastructure.

Transport

Transport is a service or facility for movement of person and goods from one place to other using humans, animals and different kinds of vehicles.

- Assured and speedy transportation with efficiency promote cooperation and unity among scattered peoples.
- A driving force of the global economy resides in the *capacity of transport systems* to ship large quantities of freight and to accommodate vast numbers of passengers.
- There would be no transportation without geography and there would be no geography without transportation. The goal of transportation is thus to transform the geographical attributes of freight, people or information, from an origin to a destination, conferring them an added value in the process.
- Political factors can also influence transportability such as laws, regulations, borders and tariffs. When transportability is high, activities are less constrained by distance.

Importance of Transport

Transport represents one of the most important human activities worldwide. It is an indispensable component of the economy and plays a major role in spatial relations between locations. Transport creates valuable links between regions and economic activities, between people and the rest of the world.

Transport is a multidimensional activity whose importance includes:

(a) Social

- Transport modes facilitate access to healthcare, welfare, and cultural or artistic events, thus performing a social service. They shape social interactions by favouring or inhibiting the mobility of people. Transportation, thus, supports and may even shape social structures.

(b) Historical

- Transport modes have played several different historical roles in the *rise of civilizations* (Egypt, Rome and China), in the development of societies (creation of social structures) and also in national defence (Roman Empire, American road network).

(c) Political

- Governments play a critical role in transport as sources of investment and as regulators. The political role of transportation is undeniable as governments often subsidize the mobility of their populations (highways, public transit, etc.).
- While most transport demand relates to economic imperatives, many communication corridors have been constructed for political reasons such as national accessibility or job creation. Transport thus has an impact on nation building and national unity, but it is also a political tool.

(d) Environmental

- Despite the manifest advantages of transport, its *environmental consequences* are also significant. They include air and water quality, noise level and public health. All decisions relating to transport need to be evaluated taking into account the corresponding environmental costs. Transport is a dominant factor in contemporary environmental issues.