KERALA READER

SOCIAL SCIENCE - II

Standard X

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SOCIAL SCIENCE-II

STANDARD - X

Government of Kerala
Department of Education

2004

YT 134--1

Kerala Reader
SOCIAL SCIENCE - II (English Medium)
Standard X

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Research & Training (SCERT)
Poojappura, Thiruvananthapuram -12
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Type setting by:
SCERT Computer Lab.

Printed at:

PLEDGE

India is my country. All Indians are my brothers and sisters.

I love my country, and I am proud of its rich and varied heritage. I shall always strive to be worthy of it.

I shall give respect to my parents, teachers and all elders and treat everyone with courtesy.

I pledge my devotion to my country and my people, In their well-being and prosperity alone lies my happiness.

THE NATIONAL ANTHEM

Jana Gana Mana Adhinayaka Jaya He
Bharatha Bhagya Vidhata
Punjab Sindhu Gujarata Maratha
Dravida Utkala Banga
Vindhya Himachala Jamuna Ganga
Uchala Jaladhi Taranga
Tava Subha Name Jage
Tava Subha Ashisa Mage,
Gahe Tava Jaya Gatha
Jana Gana Mangala Dayaka Jaya He
Bharatha Bhagya Vidhata
Jaya He Jaya He Jaya He
Jaya Jaya Jaya Jaya He.

CONSTITUTION OF INDIA

Part IV A

FUNDAMENTAL DUTIES OF CITIZENS

ARTICLE 51 A

Fundamental Duties- It shall be the duty of every citizen of India:

(a) to abide by the Constitution and respect its ideals and Institutions, the National Flag and the National Anthem;

(b) to cherish and follow the noble ideals which inspired our national struggle for freedom;

(c) to uphold and protect the sovereignty, unity and integrity of India;

(d) to defend the country and render national service when called upon to do so;

(e) To promote harmony and the spirt of common brotherhood amongst all the people of india transcending religious, linguistic and regional or sectional diversities; to renounce practice derogatory to the dignity of women;

(f) to value and preserve the rich heritage of our composite culture;

(g) to protect and improve the natural environment including forests, lakes, rivers, wild life and to have compassion for living creatures;

(h) to develop the scientific temper, humanism and the spirit of inquiry and reform;

(i) to safeguard public property and to abjure violence;

(j) to strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievements.

Dear pupils,

The earth is subjected to changes from the very beginning, and this has been a continuous process.

People who are of different races travelled wide and settled in suitable areas on the earth. Physiography of the land determine the process of selection of areas of settlement. People still migrate to different parts of the world for education and employment opportunities.

Our country is a land of diversity, rich in natural resources. We have to use our natural resources most carefully and judiciously for the sake of us and for the future generation.

In order to fulfil the needs of the ever increasing population, a very good economic planning and international understanding is essential.

As each paise we spent is of great value, we have to spend it judiciously. Don't you have interest to know more about all these?

This book may help to you to acquire more knowledge by making the best use of technological advancement. Constructive criticism and creative suggestions for the improvement of textbook are most welcome.

With best wishes.

Dr.P.M.Jaleel
Director, SCERT
Vidyabhavan, Thiruvananthapuram

CONTENTS

1 MAN AND HIS WORLD

What we have learnt

- Chimpanzee, Gorilla and Modern man have evolved from a type of monkeys existed on the earth about ten million years ago.
- Australopithecus, Singenthropus, Pithecanthropus, Erectus, Sinanthropus, Neanderthal man, Cromagnon man are the different phases in the evolution of man.

Man is the youngest among the living beings on the earth. His life was modified in accordance with the topography, climate vegetation etc., of his region. These factors have brought in significant changes in the stature of man and as a result, human races with differing colour and body stature evolved. Later on they travelled and spread over different parts of the world. In the initial stages food and suitable climate were the driving forces for such travels.

But when he learned to cultivate, he stopped wandering and started a settled life. Thus settlements began. As time passed, the number and size of such settlements increased. The society developed and man's needs also diversified.

Man started migrating to different parts of the world for better economic, social and educational achievements as well as for political reasons. The developments in the field of science and technology have really expedited such migrations. This lesson is about different human races, their characteristics, migration and settlement.

How diverse mankind in this world!

The dark Africans with curly spring like hair, the Chinese and Koreans with their flat nose and narrow eyes, the European with their golden hair and white skin..... How astonishing!

You must have seen the photographs of the world leaders and athletes appearing on television and in newspapers. Is their physical appearance the same?

You might have learned about the evolution of man in the previous classes. When did modern man evolve? Which are the major human races of the world? Which parts of the world do they belong to? Let us find out answers to such questions.

Human beings belong to primates, the highest order of mammals. A developed brain, hands which move freely, flat nails and keen eyesight are the major characteristics of primates. The ability of man to stand erect, his locomotion, co-ordination of brain and hands, and the composition of blood are much similar to those of apes. But his ability to make and use different kinds of tools makes him different from other primates.

The apes, believed to be the predecessors of mankind evolved from a common ancestor who existed about 65 million years ago. They were herbivores, lived on trees. The last stage of evolution occurred about 5 lakh years ago. Scientists are of the opinion that homosapiens, the ancestors of man appeared in that period.

Although homosapiens have certain common traits based on the colour of skin, shape of head, nature of hair and body stature, they are broadly divided into different human races.

Discoveries of Charles Darwin

Charles Darwin, who made studies on the evolution of species, established similarities in the basic character and blood groups among different human races. That shows a common ancestor for different races.

Homosapiens can be broadly grouped into three racial groups on the basis of their external features.

Negroid Mongoloid Caucasoid

Let us examine the special features of these races.

Negroid

The characteristics of this race are clearly seen in the Negroes of Sudan. We call them 'Kappiris'. Black curly hair, black or dark brown complexion, brown iris, broad and flat nose, long head, thick lips and slightly protruded teeth are the characteristics of the Negroid race.

"Maseemba is the capital of Membera district. People of Maseemba speak Tumbukka language. This is also the place from where a large number of recruitment to the mines of South Africa are made..... Even though two rivers Rukkuru and Lunyangua

flow through this district, they dry up in summer. Water shortage is severe in the summer season. The aborigines of this place are of Vamtumbukka tribes. Tribes having strange names such as Angoni, Avemba, Akkamanga, Sukkooma, Safwa, Vangonde, Vappakka with their unique cultures are also there in Maseemba.

It is a wonderful sight to see them coming together as crowds to the markets. Bare headed rural women folk carrying their kids in pouches made of squirrel skin and men with axes and catapults, clinkgcoins bamboo pipes pretending to be multimillionaires may be standing under the trees and corners, chattering.....

Translated from Kappirikalude Nattil

S.K Pottekkat

What you have read is a picture of African villagers about 55 years ago, as described by the famous writer, S.K Pottekkat.

The Negroid-Australoid races are also known as Equatorians or Afro-Australians. How did they get such names? Think.

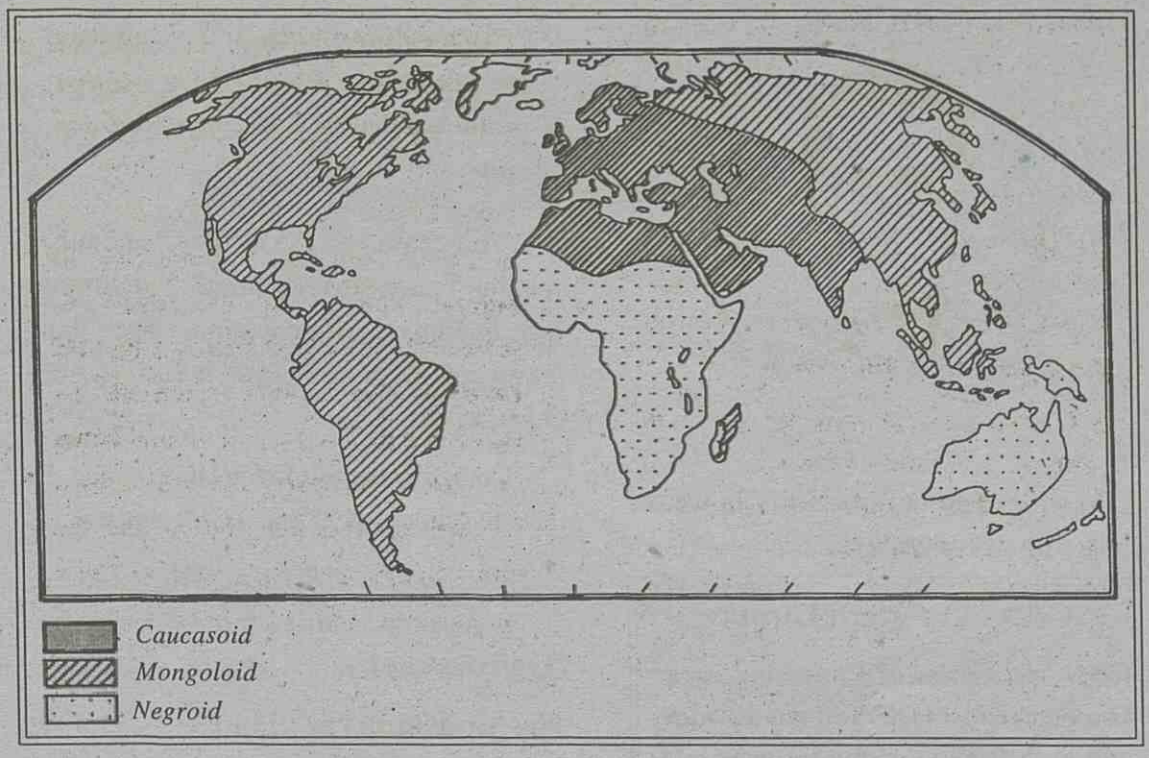
Find out from the map (figure1.1) the regions where Negroid race lives.

Bushmen of Kalahari

It is a subclass of the Negroid race. They are spread over the arid regions of South Africa such as Botswana, Namibia and Angola. These people were forced to engage in agricultural, domestic and other activities with the advent of Europeans. Today only a few people of this class are leading their traditional way of life. This hunting race catch their prey by shooting poisoned arrows. They dry the meat in the sun and store it, and drink the animal's blood. They even drink the juice of the grass and other undigested food in the prey's stomach by squeezing it. They break animal bones to drink the marrow. The hide is used for making bags and clothes and the bone pieces, for the points of their arrows.

Mongoloid

The important characteristic of the race is their epicanthic fold. Flat nose, and saffron or yellowish brown skin are the other characteristics. Body hair is comparatively less for this short statured people. The people of China, Korea, and Japan are of Mongoloid race. People of this race are also found in India. Locate the places where such people live. Find out their homelands from the map (figure 1.1) and make notes on it.



Distribution of human races
figure 1.1

Eskimoes

Eskimoes are one among the many subclasses of the mongoloid race. It is believed that Eskimos originated from Bering Strait about 5000 years ago. Then they spread over north east Canada and Greenland through Alaska. Fish, beaver, reindeer, seal etc. form the food items of eskimoes. There are fish below the frozen surface. They catch fish using hooks by making holes on the frozen ground.

Igloo

Eskimoes make their houses with ice blocks! They cut the ice into square blocks and arrange them in a circular shape around them. When it is completed, they would get trapped in the house. The floor of igloo will be much below the ground level and there will be an opening to reach the ground. Don't think that there is extreme cold in this ice house. The structure of the building, body heat of Eskimo, heat emitted from the lamps using animal fat etc. make the temperature inside the igloo higher than that of outside.

Caucasoid

Their complexion is pale red or white or the colour of olive oil. They have light brown or golden hair. Light blue or dark iris, long nose, thin lips, tall and well built body etc., are the physical traits of Caucasoid.

In which part of the world can we see people with such physical traits?

Celts of Western Europe

Celts are a class of Caucasoid race. Once spread over Western Europe and even frightened the Romans and the Greeks, today they shrunk into the Western regions of Scotland, Ireland, Wales and France.

These people use Celtic, Gaelic, Simric and Bretton languages. In the past they believed in the power of human head. They believed that offering of enemy's head in springs would enrich their power and that of the spring. We can see the vestiges of this culture in those who still use the practice of drinking water stored in the human skull as a treatment for epilepsy.

You can make use of books and other reading materials for gathering additional information on different human races, their living environments, life style and physical characteristics.

Complete the following table (table 1.1) including the characteristics of different human races.

If you come across a foreigner, can you identify his race?

The Vanishing racial purity

As time elapsed marital relations between different races led to the emergence of mixed racial groups. Today each major race has a number of sub races and mixed races. In short, there is no such thing as racial purity. All are alike.

From the maps you have learnt the source region of different human races.

- *Analysing the physical characteristics of the people of the USA can you say to which racial group they belong?*

Trait	Negroid	Mongoloid	Caucasoid
• Skin Colour	• Black or chocolate colour	• Saffron or yellow brown	• Pale red, white or colour of olive oil
• Nature of hair	•	•	•
• Shape of nose	•	•	•
• Nature of lips	•	•	•
•	•	•	•

Table 1.1

- *Which race was in power in South Africa till recently?*

Compare the answers of the above questions with the pieces of information on the map (figure 1.1). Could you notice any difference? What is your conclusion?

Different races during different periods of history left their native places and settled in different regions. This process is still going on and this is known as migration.

Different ways of Migration

Many people from Kerala are migrating to gulf countries, the USA, Britain and such other nations. The migration across the national boundaries is known as international migration. Migration within a country is known as internal migration.

People move daily from one place to another for the purposes of education, business, employment etc. This movement is called commutation. A person who performs commutation is known as a commuter. Commutation cannot be considered as migration.

- *Find suitable examples for the different types of migrations.*

International migration include two processes. The outward migration of people of one country to another country is known as emigration and the incoming of people to a country is known as immigration.

Several factors force people to leave their homelands. These factors are known as 'push factors'. There are some other factors that attract people to a region. These are known as 'pull factors'.

Many people from all over the world left their motherland and became refugees. Motherland became "foreign" to them.

What might be the reasons which prompted them to leave their motherland and to migrate to other places?

- Better employment opportunities
- Environmental hazards
- Resource availability
- Political instability
- Extension of national boundaries
- Facilities for higher education
- Epidemics
- Slavery
- Suitable climatic conditions
- Religious factors
-

The following are some of the migrations that occurred in the world.

- The migrations of the Europeans to the USA.
- The migrations of doctors, nurses and technocrats of Indian origin to the USA, Australia and Europe.
- The immigration to India from Sri lanka and Tibet.
- The recent migration from Chernobyl in Russia and Bhopal in India.
- Migrations of the Whites to South Africa.
- Migrations of Keralites to Gulf countries.
- Migrations of Ethiopeans to Sudan.
- Invasion of Europeans to India.
- Migrations of people from Central Travancore to Malabar.
-

Categorise and list out these migrations into forced migrations and voluntary migrations.

Forced Migrations	Voluntary migrations
• Migration of Ethiopeans to Sudan	• Migration of Keralites to Gulf countries
•	•

Table 1.2

Impact of migration

Travels of man in search of new world is as old as man himself. Migrations to different regions caused changes in the prevailed conditions of the regions concerned. Let us see the various impacts of such migrations. Complete the table (table 1.3) based on this.

- Influence on language and literature.
- Transfer of human resources.
- Exchange of new knowledge.
- Over exploitation and the resultant scarcity of resources.
- Difference in the population structure of a particular region.
- Cultural diffusion.
- Economic progress.
- Introduction of land use practices which are not conducive to the land.
- Changes and diversification in the field of agriculture.
- Environmental degradation and pollution.
- Progress in transport and communication.
- Scarcity of Land.
- High density of population.
-

Transhumance

The pastoral nomads who settled in the foothill zones are moving upslopes during summer to graze their animals. They remain there for the whole summer period and come down with the advent of winter. This movement of people with their cattle is known as transhumance. The Gujjar and Bakerwal tribes of Jammu and Kashmir are still practising transhumance.

When man learned to cultivate crops, he started a settled life. This put an end to his endless journey in search of food. He made shelter with the locally available materials near his farm. Thus formed the primitive form of settlements.

Merits of migrations	Demerits of migrations
• Cultural diffusion	• Evolution of slums
•	• Scarcity of infrastructure
•	•

Table 1.3

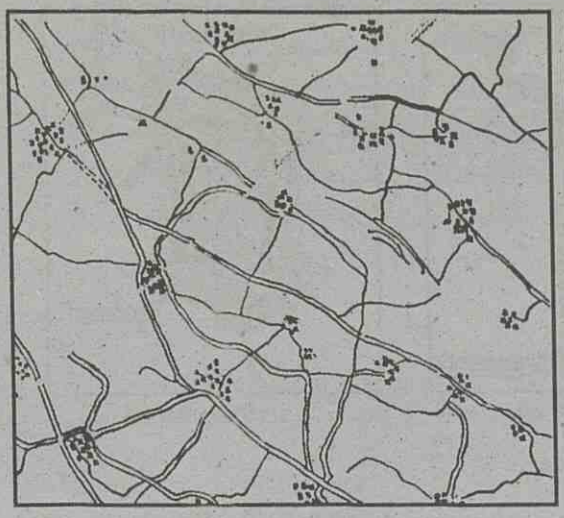


figure 1.2

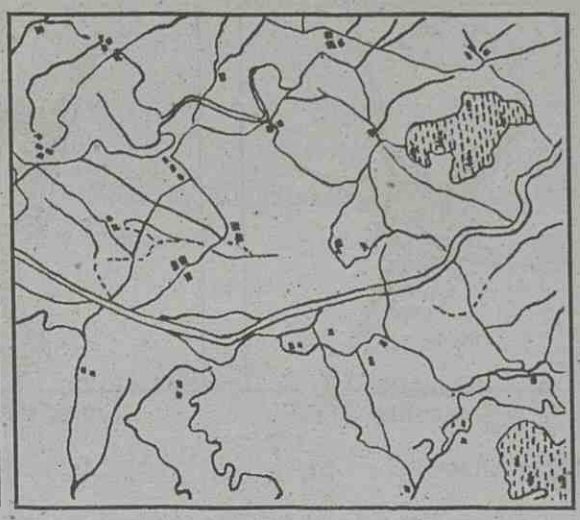


figure 1.3

Men who had been living in total agreement with the laws of the nature, slowly tamed nature to suit his needs. As years passed, the magnitude of manipulations of this sort became manifold.

Find answers to the following questions based on the figures (fig 1.2, 1.3) provided.

- *How is the distribution of settlements of the area depicted in fig 1.2?*
- *How is the distribution of settlement of the area depicted in fig 1.3?*

Let us examine the factors considered for the selection of sites for settlements.

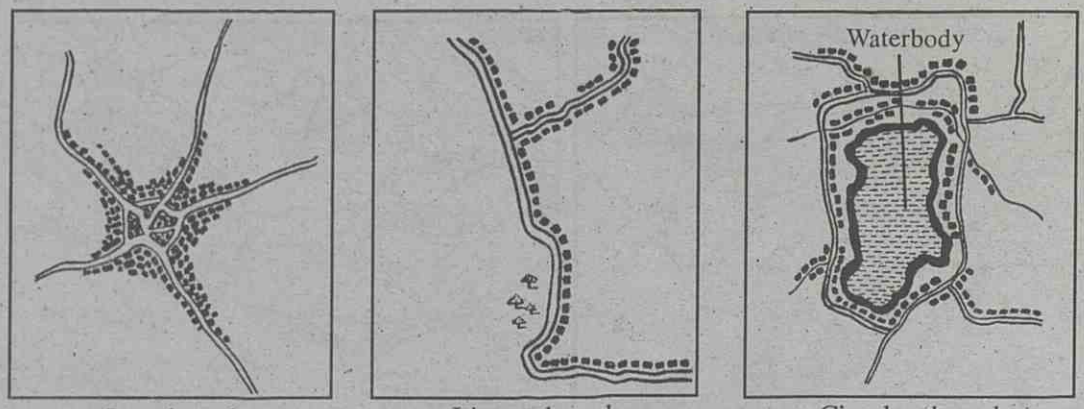
Man gave considerable importance to the factors like climate, soil, availability of water, inundation, defence etc., while selecting the sites for their settlements. These factors are called siting factors of settlements.

- *Make notes on the significance of the above mentioned siting factors in the development of settlements.*
- *The ancient civilizations emerged on the river basins. What could be the reason?*

Settlements where the houses are very close to each other are known as 'compact settlements' whereas settlements where the houses are far apart are known as 'dispersed settlements'.

Patterns of settlements

You have learned about the siting factors which helped the development of settlements. Man started building houses at the junctions of the then existing foot tracks. Subsequently, houses spread on both sides of the path due to the scarcity of land at the junctions. The shores of lakes and other water bodies were also preferred for the development of settlements. The roads, rivers, water bodies etc., have influenced much the shape of the settlements developed in each region.



Star shaped Linear shaped Circular shaped

Settlements figure 1.4

Observe the sketches of the settlements given above (figure 1.4) and make notes on them. What all details can be included?

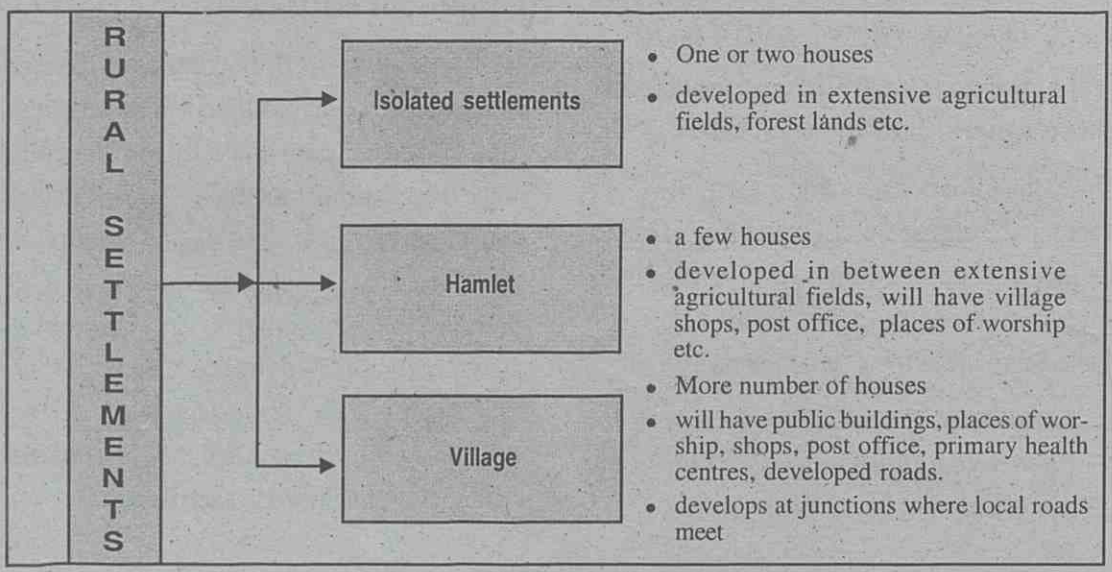
- Shape
- The factors that influenced the distribution of settlements
- Reason for the particular shape to the settlements.
-

Rural settlements

The settlements of the people engaged in fishing, agriculture etc are called rural settlements. Apart from the farm lands, rural settlements develop in traditional fishing centres and mines.

Endless paddy fields, the houses just like spots in between, limited transport and communication facilities! Even today we can see such small villages isolated from urban crowds, in some parts of north India, Karnataka, Tamil Nadu, and Andhra Pradesh. Such villages are very rare in Kerala.

The following chart shows classification of rural settlements based on size.



The people of isolated settlements and hamlets depend on the neighbouring villages for different services. Can you say where the village people will go for higher education facilities, specilised medical treatment, employment in service sector and the like?

Urban Settlements

What are the peculiarities of urban settlements?

- High density of population
- Modern communication facilities
- More employment opportunities in service sectors
-
-

The area receiving the service of a port is its influential area. This is termed 'hinterland'.

An urban area extend its services to its surroundings and depends on the surrounding land for its existence. This area is known as 'urban field'.

Classification of Urban Centres

Based on the prominence of service provided by urban areas, they can be classified into Administrative towns, Cultural towns, Industrial towns, Resort towns etc. Try to find out examples for each type of the town mentioned above.

Classification of Urban Centres based on size

- **City**

City is a place which gives more importance to service sector and has a population of more than one lakh.

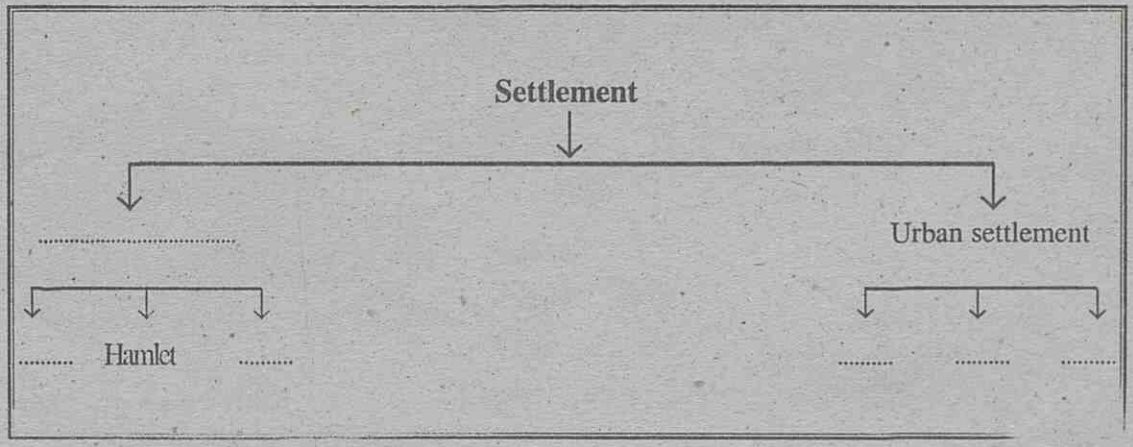
- **Metropolitan city**

As per Indian census, a city having a population of more than 10 lakhs, can be considered a metropolitan city. Eg: Mumbai, Chennai.

- **Megalopolis**

A complex of many large cities can be called a megalopolis.

Based on the knowledge you have acquired about settlements, complete the flow chart given below and add it to the wall magazine.



SUMMARY

- Human beings belong to primates, the highest order of mammals.
- Based on external appearance mankind can be classified into Negroid, Mongoloid, and Caucasoid.
- Movement of people from one place to another and settling there is known as migration.
- The permanent dwelling places of man are known as settlements.
- The shapes of settlements are greatly controlled by geographical conditions.
- Settlements can be divided into rural settlements and urban settlements.

QUESTIONS

1. Explain the characteristics of different human races?
2. You might have heard of the people of your area migrating to other areas. What could be the reasons for this?
3. What are the consequences of migration?
4. Compare rural settlements and urban settlements.
5. Write a note on the classification of towns.

****

2 OCEANS AND MOVEMENTS IN THE OCEAN WATER

What we have learnt

- About 71 percent of the surface of the earth is covered by water.
- Hydrosphere is that realm of the earth that holds all the water resources.
- The bottom of the ocean comprises of continental shelf, continental slope, abyssal plains, submarine trenches and submarine ridges.

You know that the oceans cover about 71% of the earth's surface. A major portion of the surface of the earth appears blue when observed from space. The influence being exerted by oceans in our life and our physical environment is immense. It is in the oceans that the first forms of life originated. As land, oceans also abound with a variety of minerals, plants and animals. The ocean is as dynamic as the earth's atmosphere. Although we know much about the oceans, many more details are yet to be discovered. The days are not far off when humanity will have to depend more on the oceans to meet its various needs.

The oceans are indispensable for the survival of humanity. Let us try to learn more about the oceans.

- **Oceans play a vital role in controlling climate.**

Coastal areas experience lower temperature than the interior regions. In what other ways do oceans affect climatic change.

- Onshore winds blowing over the oceans carry moisture and give rainfall.
-

- **Oceans provide fish**

Fish is one of the most widely consumed items of food. In countries like Japan, Maldives and India fishing industry plays a significant role in earning foreign currency. Millions of people the world over depend on fishing and fish processing industries to earn a living. The development of fishing harbours has accelerated the growth of fishing related occupations. The coastline of India, stretching over 6100 kms, offers unlimited scope for the development of fishing industry.

You have grasped information about important fishing centres of the world, the factors that have helped these centres to flourish and the countries in which these centres are situated.

In addition to fish, highly nutritious algae are also being used as food resources. The drug manufacturing industry has been using certain varieties of sea plants in the production of medicines.

The Algae

Sea plants, just like the plants on land, are used for various purposes. Algae are among the most useful marine plants. Some varieties of algae are edible. These marine plants are also used for the manufacture of cattle feed and organic fertilisers. Chemical substances such as sodium, potash, iodine and bromine are also extracted from algae.

Storehouse of Minerals

Almost all the minerals found on land have been discovered in the sea. Sea water contains minerals like sodium chloride, bromine and magnesium. Although mineral substances such as petroleum and natural gas, manganese, sulphur, titanium and monazite are known to be present in the sea, only petroleum and natural gas are extensively mined. Mining of other minerals from the sea has not been done so far because it is expensive 20 times more than mining them from land.

The salt pans of India

On the eastern and western coasts of India common salt is manufactured by solar evaporation of sea water. Sea water is collected in flat, enclosed fields and kept exposed to the sun. As the amount of water drains gradually through solar evaporation common salt gets separated from this brine. Places where common salt is produced in this way are called salt pans. There are vast salt pans in the Kachchh region of Gujarat and the Rameswaram area of Tamil Nadu.

Gold Mine in the Sea

Out of the total value of the minerals obtained from the sea, petroleum and natural gas together account for the highest percentage. The energy crisis in recent times has highlighted the urgency of increasing the production of petroleum from the seabed. Petroleum occurring in the continental shelf and the continental slope is pumped out from wells sometimes as deep as 2000 metres. These off-shore wells are located at an average distance of 150 km from the sea coast. Statistical data show that by the end of this century petroleum production from off-shore wells will rise to 40 per cent of the total production of petroleum.

Bombay High, which is about 176km northwest of Mumbai, is a good example of off -shore oil fields. Crude petroleum mined from Bombay High is pumped to land based refineries.

Source of Energy

Energy can be produced by making use of sea waves, tides and ocean currents. Tides that reach an average wave height of 5 metres or more are ideal for wave energy production. In the Bay of Fundy near Nova Scotia, the tidal range sometimes comes to about 15 metres.

The first commercially viable tidal energy power plant was set up in France. This electricity generating facility, (Rance Barrage Tidal Scheme) which was built in 1967, exists at the Rance River, near St Malo. Here, electricity is produced by using the flow of water during the rise and fall of tides.

- **Fresh water from sea water**

The conversion of sea water into fresh water is done by employing mainly two purification processes.

Sea water Distillation : In this process sea water is turned into water vapour by using solar energy. The vapourised water is condensed and fresh water is obtained. In Saudi Arabia, Kuwait, Greece, Pakistan, Australia, India and Chile and in the states of Texas and California (USA),this process is used to produce fresh water from salt water.

Electrodialysis : In this process fresh water is produced by using an electric field to separate salt ions from sea water. This device is used in the desalination plant at Kavarathi in the Lakshadweep.

The distillation process is widely used to produce fresh water from sea water as it is comparatively less expensive.

Ocean Transport and Trade

The oceans have been serving as a means of transport and trade for centuries. They are especially suitable for transport of cargoes in bulk. Items such as heavy machinery, food grains, petroleum products and mineral ores are carried to all parts of the world by sea. No less is the utility of the oceans as highways for travel. Commercial traffic through the oceans is of vital importance for all nations. Sea routes linking the port cities on the east coast of North America and those in Western Europe are equally important and useful for trade and travel.

Over and above the functions mentioned above, oceans play a significant role in various fields like defence and the diffusion of cultures.

Although the oceans are extremely useful to mankind, human activity is paving the way for the pollution of the seas. This pollution has been found to upset the equilibrium of the oceanic environment.

What can be the causes of marine pollution?

- Oil spillages
- Disposal of radio active materials.
-
-

World Oceans

Observe the globe and list the name of the oceans

-
-

Don't you see that the oceans are connected to one another. The interconnected body of water on the earth's surface, comprising all the oceans, is called the world ocean. Find out from the globe the names of the continents by which each ocean is flanked and write the names in the table.

Oceans	*Continents*
Pacific Ocean	

Table 2.1

In table 2.2, some characteristics of the oceans are given

Oceans	Area	Average Depth	Deepest Trench	Seas	Bays/Gulfs
Pacific Ocean	165.2 lakh km^2	4270m	Challanger Deep (11033 m)	• Bering Sea • Yellow Sea •	• California •
Atlantic Ocean	82.4 lakh km^2	3700m	Puerto Rico Trench (8618 m)	• Mediterranean • Caribbean •	• Hudson • Mexico •
Indian Ocean	73.4 lakh km^2	3960m	Wharton Trench (7725 m)	• Arabian Sea •	• Persian • Bay of Bengal •

Table 2.2

We can understand more facts about the oceans by analysing the table.

- Which is the deepest ocean?
- Which ocean is Hudson Bay a part of ?
-
-

Bay and Gulf

Bay is a wide segment of an ocean extending into land. Gulf is a narrow portion of an ocean extending into land.

Some other features of the oceans are given below.

The Pacific Ocean is dotted with a large number of islands. There are about 20000 islands in this ocean.

A salient feature of the Atlantic Ocean is the Mid-Atlantic Ridge, a submarine mountain range that lies in a north-south direction for about 14000km across the ocean floor.

Most of the islands in the Pacific and the Atlantic ocean are of volcanic origin.

The number of islands in Indian Ocean is comparatively small. Madagascar and Sri Lanka are examples of continental islands. The Sunda archipelago is about 5000km long. This chain of islands, stretching from Myanmar to Australia, includes the Andaman - Nicobar islands. Coral islands are also found in the Indian Ocean. Coral reefs are formed by accretion of lime secretions and dead remains of the small organisms called polyps. Coral islands have been formed on coral reefs. The Maldives and the Lakshadweep in the Indian Ocean are examples of coral islands. Coral polyps thrive mostly in the tropical and equatorial seas.

Ocean Temperature and Salinity

The average surface temperature of the ocean water ranges between 2°C and 33°C. What can be the reasons for the temperature variations?

- Latitude
- Salinity
-

Find answers to the following questions after analysing the data given in table 2.3.

Latitude	Average Temperature
0° - 10°	26.72°C
10° - 20°	25.60°C
20° - 30°	23.16°C
30° - 40°	17.98°C
40° - 50°	10.33°C
50° - 60°	4.56°C
60° - 70°	2.12°C

Table 2.3

- What changes do you notice in the temperature of sea water according to latitudinal differences?
- In which latitudinal zone is the highest average ocean temperature recorded?
- In which latitudinal zone is the lowest average ocean temperature recorded?

Imaginary lines drawn on maps connecting all parts of the oceans that experience equal temperature are called isonomals. Salinity of the oceans is the amount of salt present in sea water. Salinity is usually expressed as the number of grams of dissolved salts in 1000

grams of sea water. The average salinity of sea water is 35 per 1000 grams. This is expressed as $35^{o}/_{oo}$. It means that 35 grams of salts are dissolved in 1000 grams of water. It is equal to 3.5%.

Salts other than common salt, present in sea water in very small amounts are:

- *Magnesium chloride*
- *Magnesium sulphate*
- *Calcium sulphate*
- *Potassium sulphate*
- *Calcium carbonate*
- *Magnesium bromide*

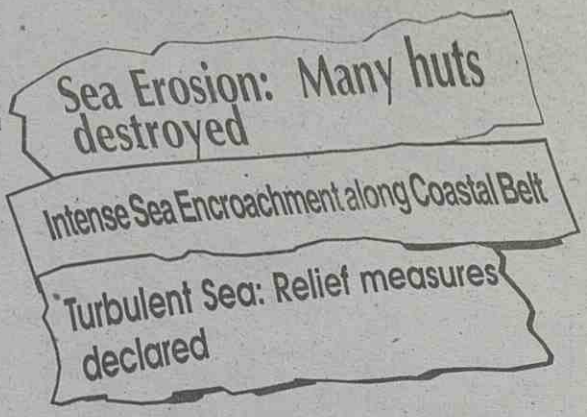
Salinity is not the same in all parts of the oceans. The reasons:

- Evaporation increases as temperature increases. When evaporation increases salinity increases.
- Salinity is low in ocean regions that receive heavy rainfall.
- Water in river mouths has comparatively low salinity.
- Water reaching the oceans from melting ice causes salinity to come down.
- In areas where cold and warm currents meet salinity is comparatively low.

Salinity of Sea Water: High and Low

In the Red Sea, where rate of evaporation is high, average salinity is between 37 and 41 parts per thousand. On the other hand, the average salinity in the Baltic Sea, which is fed by water from melted ice, is between $3^{o}/_{oo}$ and $15^{o}/_{oo}$ only.

Movements of Ocean Water



Have you not noticed the newspaper headlines given here? They highlight the destruction and devastation being caused by violent waves and the resulting sea erosions. You must have read items of news such as these in the newspapers. In which season of the year do reports about sea erosions occur in the Kerala media? It is the powerful waves crashing against the shores that cause the devastations.

What are sea waves? Aren't you desirous of knowing more about them? Waves are the movements in sea water in the form of alternate rise and fall of the sea surface. A wave includes a ridge of water between two depressions.

What is the cause of waves?

Waves are produced mainly by winds. As powerful winds blow along the surface of the sea frictions make the surface water move. Depending upon the power of the wind the moving water takes the shape of waves. The wave motions are pushed forward by the wind. The more powerful the wind is, the bigger the waves will be. Waves generated by very strong winds or storms cause destructive marine erosion.

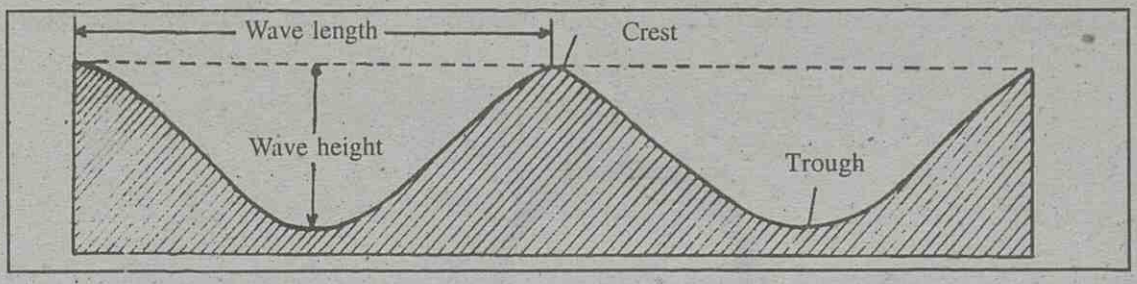


figure 2.1

Complete table 2.4 with the help of figure 2.1.

Description	Term
• The topmost part of a wave	
• The lower part between two crests.	
• Distance between two consecutive crests.	
• Vertical distance between a trough and a crest.	

Table 2.4

Try to collect more information about the coastal areas in Kerala where sea erosion and landslides are being caused by the violent sea. Based on the information you have gathered, prepare an edition of the school magazine. Take care to include relevant pictures, media reports and other illustrations.

Tsunamis

Tsunami is a Japanese word meaning harbour waves. They are powerful sea surface waves generated due to submarine disturbances caused by earthquakes and volcanic eruptions. Tsunamis lead to heavy loss of life and property in coastal areas. The most active tsunami belt in the world is the Japan-Taiwan ocean region.

Tides

"It was the most heartbreaking moment during the entire swim. I knew the fierce flood tide was going to start from 8pm. and the moon was already up in the sky.....

Soon the "flood" started, a stiff breeze broke out and the choppy sea was transformed into a raging, foaming hell. It was now indescribable agony to face the powerful tide and the ten-foot waves and spray. From this time I kept on through sheer will power".

Mihir Sen

The extract you have just read is from an account of Mihir Sen's experiences during his swim across the Palk Strait, which separates Sri Lanka from India.

Won't you like to know about the natural phenomena of high tides and low tides? Tides are the periodic rise and fall of sea level. Tides comprise high tides and low tides. Two tides usually happen daily in almost every part of the ocean.

Causes of tides:

- The gravitational attraction exerted on the earth by the sun and the moon.
- Rotation of the earth.

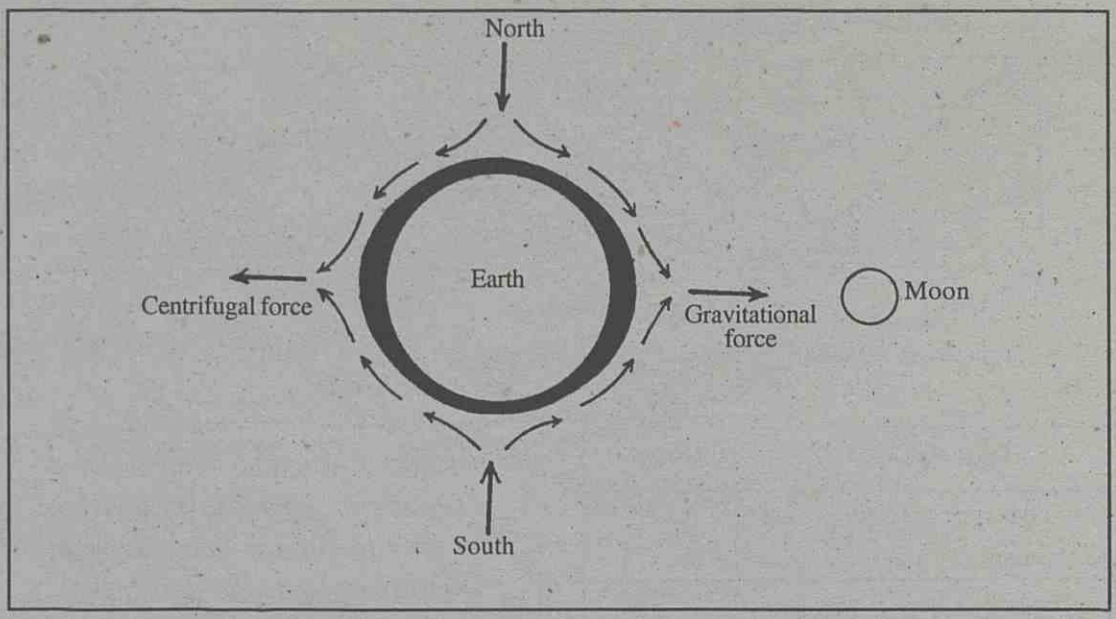


figure 2.2
Tides and Moon

Tides and the moon

Figure 2.2 explains the most important cause of tides.

What have you understood from figure 2.2?

- High tide occurs in those parts of the ocean which face the moon.
- Low tide occurs in those parts which are at an angular distance of 90°.
-

Tides and the Sun

The sun as well as the moon plays a part in producing tides.

The distance between the earth and the sun is about 400 times the distance between the earth and the moon. Therefore, the sun's gravitational pull exerted on the earth is less than that the moon exerts on the earth. However, the sun's attraction plays a role in the production of tides.

Spring Tide and Neap Tide

You have already learned about the phases of the moon during its movement around the earth.

The tides at full moon and new moon rise higher than the tides on other days. The exceptionally powerful tides at full moon and new moon are called spring tides.

When the moon is in the first and last quarters the tide does not rise as high as the usual tides. Theses tides are called neap tides.

What are the causes of spring and neap tides?

-
-

Figure 2.3 illustrates spring tide and neap tide. Study the figure and complete table 2.5.

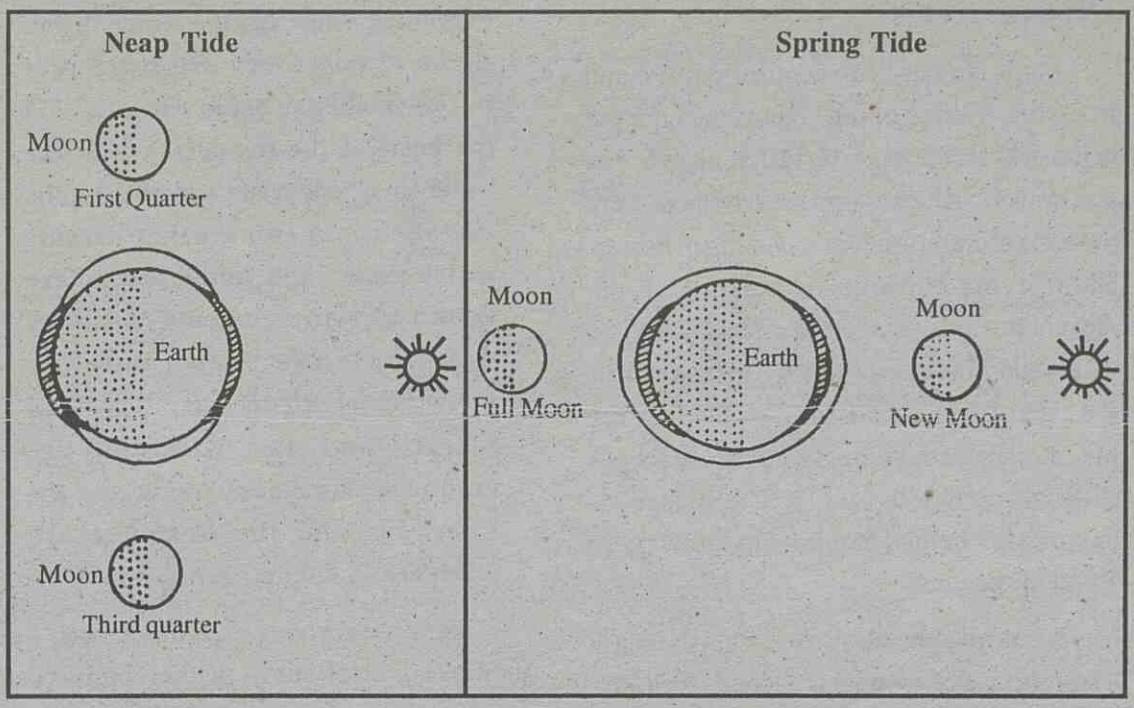


figure 2.3

Formation of Spring and Neap Tides

Let us see what the effects of tides are:

- Tides facilitate the movements of ships at ports and river mouths.
-
-

Learn more about the phenomena of waves, high tides and low tides by direct observation during study tours to sea coasts and also by gathering information from people living in coastal areas.

Day	Type of Tide	Relative position of Sun, Moon and Earth	Nature of Tide
New Moon	Spring Tide	The sun, the moon and the earth are almost in line with each other and the moon lies between the sun and the earth	Rises higher than tides on other days
Full Moon			
First Quarter			
Second Quarter			

Table : 2.5

Ocean currents

Mankind has been acquiring more and more knowledge of the oceans through the centuries. Rafts made by fastening together tree trunks and logs of timber and canoes were the earliest crafts used for travelling in the sea. Then came the age of sailing ships. Adventurous sailors like Columbus, Vasco Da Gama and Magellan used sailing ships in their voyages of exploration. People of India, even in very ancient days, made daring sea travels to distant parts of the world. The voyages of exploration helped mankind to know more about the oceans.

It is no exaggeration to say that the sea is a storehouse of wonders. Ocean explorers the world over have been trying hard to unreveal the mysteries of the sea. Navigators like Christopher Columbus had observed that the oceans transported various floating objects from far and wide.

Waves cannot carry floating objects in this way from far off parts of the oceans. Studies made centuries ago had revealed that flows or currents in the oceans were behind such movements. The flows in the oceans are known as ocean currents.

The continuous flow of ocean water from one direction to another in fairly defined direction is called an ocean current.

Why do currents occur in the oceans?

- Temperature differences in the ocean water
- Density differences
- Salinity
- Coriolis effect
- Global winds

Prevailing winds and the direction and shape of coastlines are important factors modifying ocean currents. On the basis of the temperature of the water involved, ocean currents can be classified into two types. Currents which have high temperature are known as warm currents and those which have low temperature are known as cold currents. The Gulf Stream and the Kuroshio are examples of warm currents and the Labrador and the Benguela are examples of cold currents.

There are currents in all the oceans. Let us make a brief study of the chief ocean currents of the Pacific, the Atlantic and the Indian Oceans with the help of the maps.

Ocean Currents of the Pacific Ocean

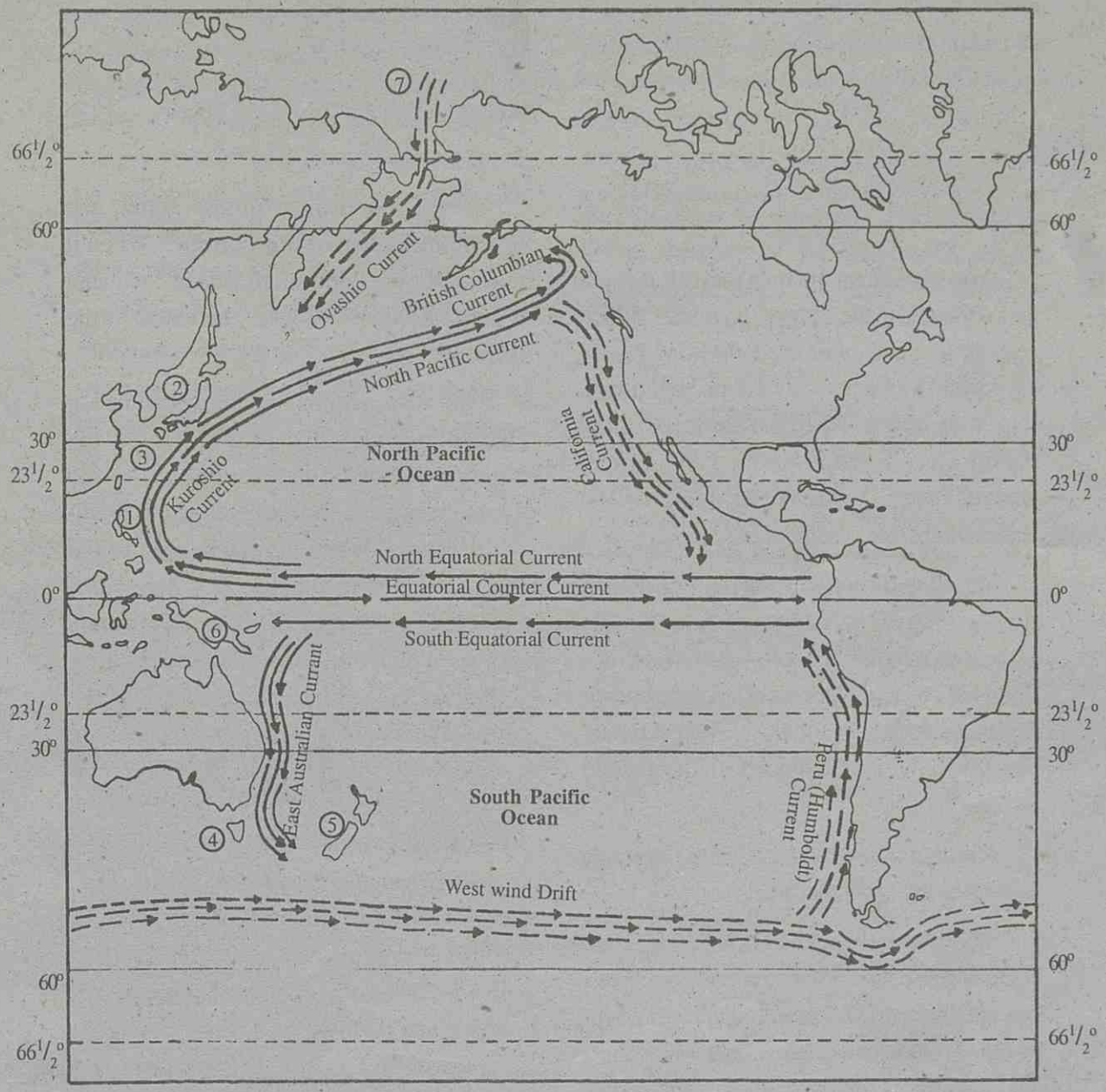
Figure 2.4 shows the important ocean currents of the Pacific Ocean. Mark the direction of global winds by drawing arrows on this map.

Study carefully the map in figure 2.4. Don't you see a current marked on either side of the equator. Find out the names of these two currents.

It can be seen that these currents flow in a westerly direction. Can you find out the reason why these currents flow from east to west? Which global winds blow in this region? Do these winds influence the direction of these currents?

Study the course of the currents you have just observed on the map.

You will see that the North Equatorial Current enters the sea near the Philippine Islands. Here the onward movement of this



Currents of the Pacific Ocean

figure 2.4

current is obstructed by land. So it turns in a northerly direction and advances in that direction. It is seen to be flowing along a group of islands. What is the name of this group of islands? Note that this current flows northwards and pass the island of Taiwan. Find out by what name the current is known here.

You can see on the map that this current gets deflected to the right of its course. Which permanent winds cause the deflection? Notice the onward movement of the deflected current. It is advancing towards the northeast of the Pacific Ocean. Find out the name of this current here. What is the name of the continental coast it approaches?

The map shows you that this current, on approaching the west coast of the continent bifurcates. One branch turns north and flows along the coast of Canada. The other branch deviates southwards and flows along the west coast of the USA. Find out the names of the two currents.

Find out from the map where the south flowing branch eventually reaches.

Study the map and locate the Bering Strait. You can see that an ocean current flows south through the Bering Strait and enters the Pacific Ocean. From which ocean does it flow? Find out the name of the current and notice what current it merges with.

It can be seen on the map that the South Equatorial Current flows in the same direction as that of the North Equatorial Current. The arrow you have drawn show which global winds are present in this region. Name these winds. Compare the wind direction with the direction of the current that flows here. What inference do you make from the comparison?

It is clear from the map that the South Equatorical Current, on reaching the sea near the big island of New Guinea, turns south and flows along the coast of Australia. What can be the reason for this deflection? By what name is this current known?

Don't you want to know about the remaining course of this current? When it reaches the sea lying south-east of Tasmania it gets deflected. What is the cause of the deflection?

The map (figure 2.4) shows an ocean current flowing from west to east across the South Pacific Ocean. It advances in the direction of the southern end of the South American continent. As can be seen on the map, the current, on reaching the south-western coast of the continent, changes its course. Which coast does it flow along after getting deflected? Find out the name of the current and the current it meets.

Peru Current

The Peru Current is one of the most prominent ocean currents of the Pacific Ocean. The German Scientist Humboldt made an extensive study of this. It brings plenty of nutrients, which attract fish and birds preying on the fish. When the current is pushed into the coastal waters, vast numbers of fish and other marine creatures reach the offshore areas of Peru to feed on the nutrients. It is the Peru current that sustains the sea off the Peruvian Coast as one of the prosperous fishing banks of the world. Millions of birds have settled in this area. They have made it their

habitat. They lay eggs on the rocky coasts and multiply. The droppings of the birds - known as guano - is used as a manure.

Don't you see a current flowing between the two Equatorial currents in the Pacific Ocean. Find out its name and the direction of its movement.

It can be seen that ocean currents that originate in the equatorial seas and flow pole ward are, as a general rule, warm currents and currents which originate in the polar seas and flow equatorward are cold currents.

Fill up the table (2.6) given below.

Prepare a map showing the ocean currents of the Pacific Ocean and include it in the wall magazine of your school. Take care to mark warm currents and cold currents in different colours.

Currents of the Atlantic Ocean

Look at figure 2.5. The important ocean currents of the Atlantic Ocean are shown on it. Mark the global winds on the map by drawing appropriate arrows.

Fill up the table 2.7. Gather the necessary information about the currents of the Atlantic Ocean from figure 2.5. An atlas will be helpful in doing the activity.

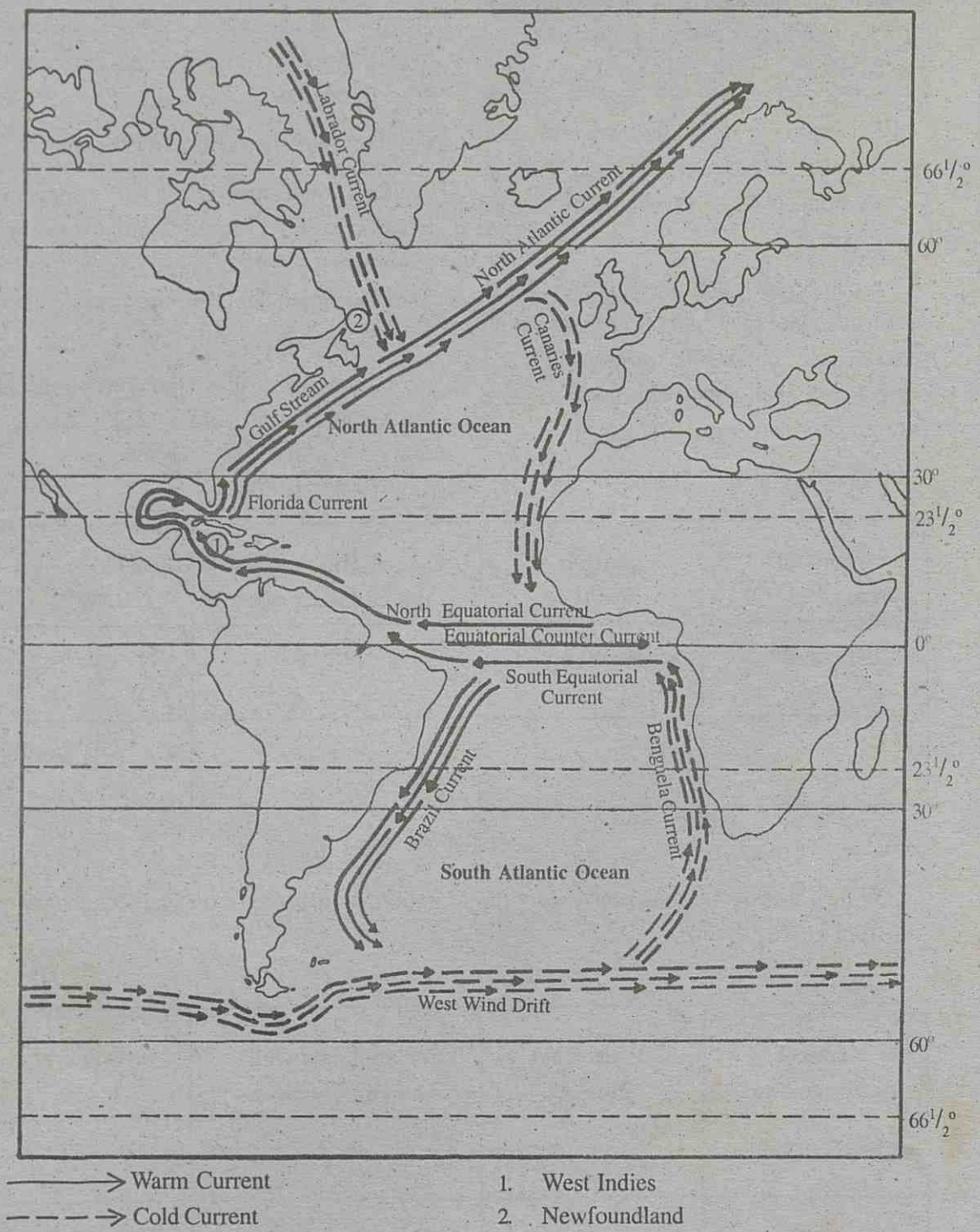
Name of Ocean current	Warm/cold current	Coast/Islands which the current passes	Direction of Flow
• Noth Equatorial Current	• Warm current	• Philippine Islands	• From East to West
•	•	•	•

Table 2.6

Write a note on the ocean currents of the Atlantic Ocean, based on the facts collected from figure 2.5 and table 2.7.

Name of Ocean current	Warm/cold current	Coast/Islands which the current passes	Direction of Flow
• Noth Equatorial Current	• Warm current	• West Indies	• From East to West
•	•	•	•

Table 2.7



Currents of the Atlantic Ocean

figure 2.5

Tragedy in the Atlantic

The Titanic was a big luxury liner built in Britain. Its builders had claimed that she would not suffer damages under any circumstances. Sad to say, the Titanic met with a terrible disaster on her maiden voyage itself. The ship was on her way from England to New York City. The disaster occurred in the sea near the island of New Foundland. That part of the Atlantic Ocean has been notorious for gigantic icebergs carried by the cold Labrador Current. The Titanic struck a huge iceberg that had been floating about on the night of 14th April 1912. The collision tore a long gash in the ship's hull. Water rushed into the Titanic and she sank in about $2^1/_2$ hours.

The Sargasso Sea

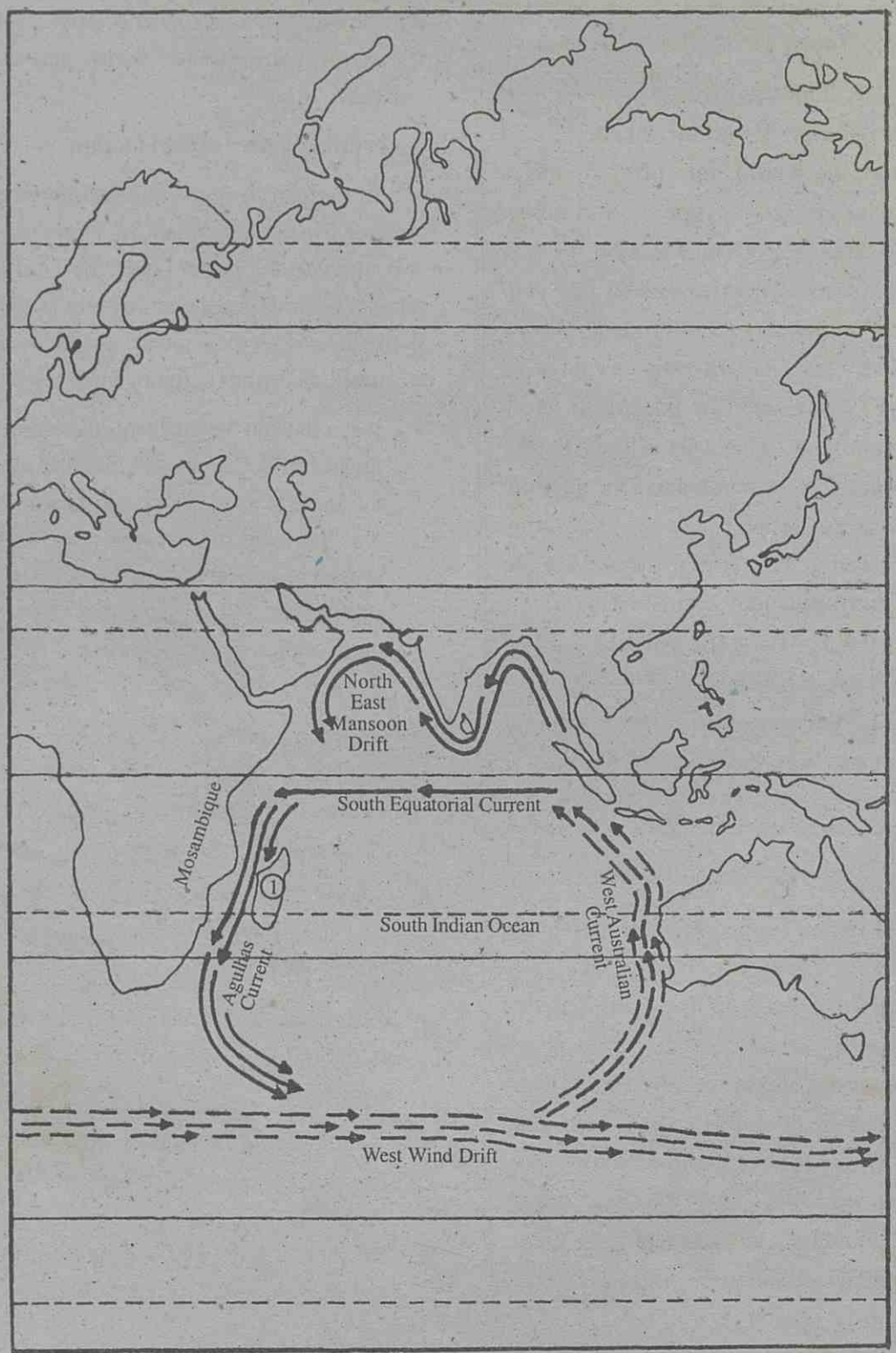
The region in the centre of the North Atlantic Ocean encircled by the North Equatorial, the Gulf stream and the Canaries ocean currents is devoid of currents and is generally calm. This region is called the Sargasso Sea. The name, first used by Portuguese sailors, derived from the word "Sargassum", the name of a sea plant found in abundance in this part of the ocean.

Make an illustrative chart showing the currents of the Atlantic Ocean and include it in the wall magazine. Use different colours to distinguish between warm and cold currents.

Currents of the Indian Ocean

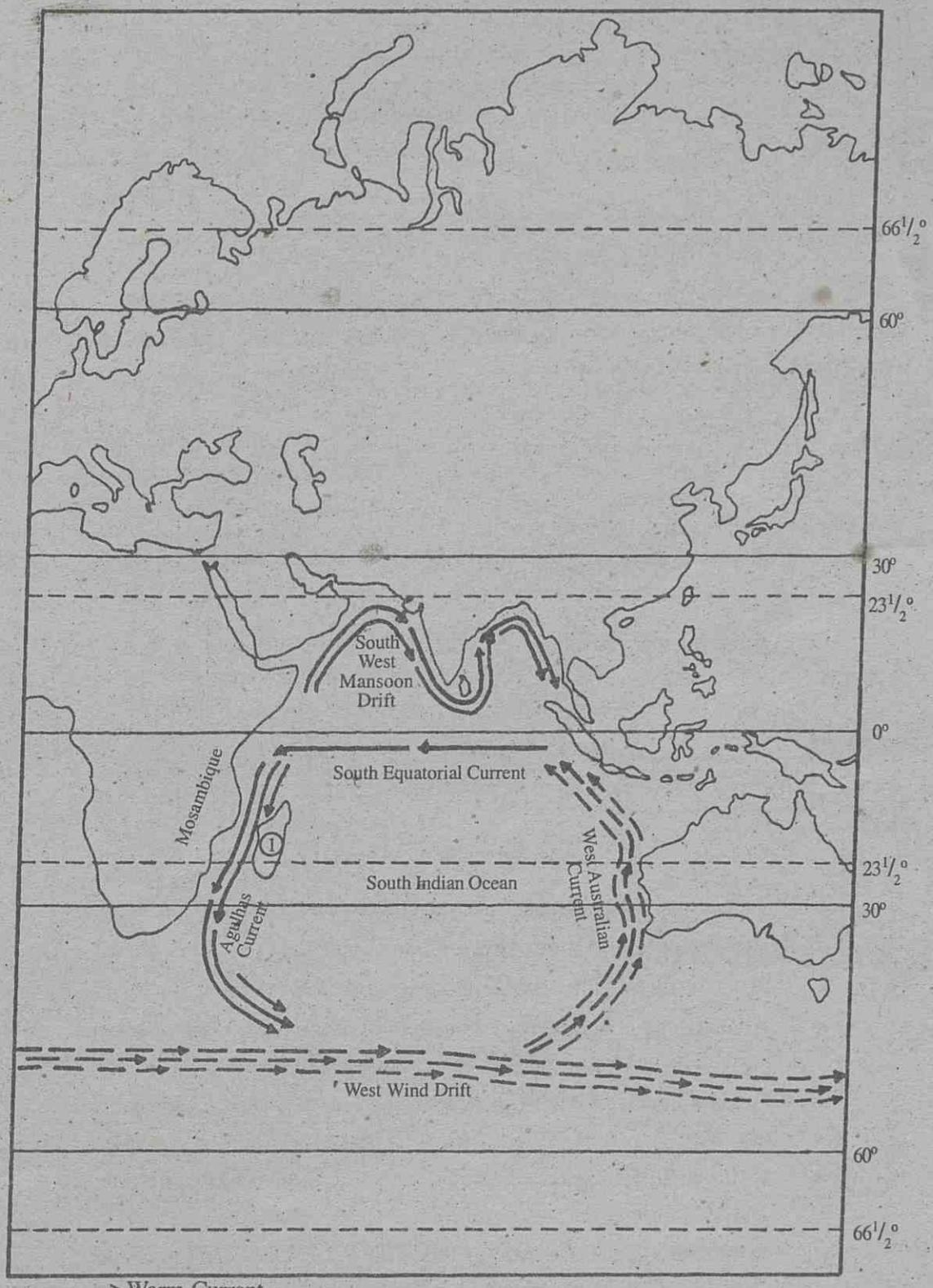
The ocean currents of the Indian ocean are shown in figures 2.6 and 2.7. Draw arrows and indicate the direction of the summer monsoon winds and the global winds on the figure 2.7. Mark the winter monsoon winds and the global winds in figure 2.6.

- It can be seen that in the northern part of the Indian Ocean currents circulate along the coasts from west to east in the summer season and from east to west in the winter season. Can you give the reason for the seasonal reversal of the currents? By what name is the current called in each of the two seasons?
- Find out the name and direction of the ocean current that flows just south of the equator in the Indian ocean. Which global winds influence this current?
- Which continent deflects the South Equatorial Current as it enters the western part of the ocean?
- By what name is the current flowing along the south-east coast of this continent known?
- After reaching the southern tip of Africa, it gets deflected and flows into the West Wind Drift. Find out the name and direction of flow of the ocean current that advances along the west coast of Australia.
-
-



Currents of the Indian Ocean

figure 2.6



Currents of the Indian Ocean

figure 2.7

Name of Ocean current	Warm/cold current	Coast/Islands which the current passes	Direction of Flow
• Southwest Monsoon Current	• Warm	• Coasts along the Arabian Sea and the Bay of Bengal	• From West to East
•	•	•	•

Table 2.8

Based on the facts already learned, fill up table 2.8 by writing the characteristics of the ocean currents of the Indian ocean.

Give a brief description of the currents of the Indian Ocean on the basis of the facts you have studied.

Draw a chart showing the currents of the Indian Ocean and include it in the wall magazine.

Let us examine the main effects of ocean currents.

- Affect the climate of neighbouring coasts. Eg: The North Atlantic current brings down the intense cold winter conditions experienced in Western Europe and thereby maintains a moderate climate. This current is, therefore, described as the 'Blanket of Europe'.
- Cause mists and fogs in some parts of the ocean.
- Help the healthy growth of fish and other marine creatures.

SUMMARY

- Oceans are connected together and it can be called as the World Ocean.
- The surface temperature of the sea water is not the same everywhere.
- Waves result from the undulating movements of sea water.
- Tides are the phenomena of rise and fall of the sea surface due to the gravitational effects produced by the moon and the sun.
- Ocean current is the uninterrupted movement of sea water in a fairly defined direction.
- On the basis of temperature, ocean currents are classified into warm currents and cold currents.
- In the Pacific Ocean the two equatorical currents, Kuroshio, North Pacific, British Columbia, East Australian and Equatorial Counter Currents are warm currents and Oyashio, California, Peru and West Wind Drift are cold currents.

- The two Equatorical currents, Gulf Stream, Florida, North Atlantic, Brazil and Equatorial Counter Current are warm currents and Labrador, Canaries, Benguela and West Wind Drift are cold currents of the Atlantic Ocean.
- In the Indian Ocean the two Monsoon Drifts, South Equatorial Current and Agulhas Current are warm currents and West Australian current and West Wind Drift are cold currents.

QUESTIONS

1. What are the factors that affect the amount of salinity in sea water?
2. "It is said that the sea is a depository of mineral wealth". Why?
3. The moon exerts more influence in producing tides than the sun. Why?
4. Why are spring tides much stronger than usual tides?
5. The names of some ocean currents are given below.

   Canaries Current, Agulhas Current, Peru Current, Kuroshio Current, West Australian Current, Brazil Current.

   Write the names of these currents in the appropriate columns of the table given below.

Pacific Ocean	*Atlantic Ocean*	*Indian Ocean*

6. Explain citing spefic examples, how global winds affect the movement, direction and deflection of ocean currents.
7. Ocean currents north of the equator in the Indian Ocean are different from the currents of the other oceans in the Northern Hemisphere. Explain.
8. Suggest effective ways to prevent ocean pollution.
9. Write a description of the currents of the Atlantic Ocean.

****

3 FORMATION OF CONTINENTS AND OCEANS

What we have learnt

- There are seven continents on the surface of the earth and oceans occupy the space in between them.
- The crust of the earth can be bifurcated into sial and sima
- Some rocky portions of the continents are more than 3500 million years old.
- Portions of the sea floor older than 180 million years have not been discovered so far.
- The crust and the upper portion of the mantle together constitute the lithosphere of the earth.
- The rocks of the asthenosphere occurring just below the lithosphere are in partially molten condition.
- Earthquakes and volcanoes are found concentrated along certain linear zones of the earth's surface..

Can you believe that the various continents were connected to each other once upon a time! There was also an extensive ocean that surrounded that 'supercontinent'. In course of time that continent broke up and the fragments drifted to different directions. Man could not witness these events that took place several million years ago, because man was not originated at that time. You may now ask the question: How then did we come to know about these? Time has preserved records of these events in the rocks. When man's intelligence was combined with his enthusiasm, he could bring to light several secrets of the past. Let us have a brief discussion of these developments.

The origin of the concept of drifting continents

With the beginning of the 17th century, outlines of most of the continents had been made. The similarity between the east coast of South America and the west coast of Africa attracted the attention of early explorers and scientists.

Many people including the English philosopher Sir Francis Bacon, Flemish cartographer Abraham Ortelius and French scientist Françoise-Placet the 17th century, pointed out similarity between the continental outlines on both sides of the Atlantic. This indicated that the continents of the western hemisphere were once united with Europe and Africa during some period in the long history of the Earth. In 1878, a scientist named Antonio Snider Pelligrini supported this view with substantive evidence. He observed similarities between the fossil plants of the coal deposits that formed during the Carboniferous Period in Europe and North America. However, these suggestions could not gain much recognition in the scientific world.

Ever since the beginning of the 20th century, several evidences have been obtained for the existence of a supercontinent in the southern hemisphere. In 1885, the Austrian geologist Edward Suess proposed the name Gondwanaland for that ancient supercontinent. It covered the present Indian Peninsula, the Islands of Sri Lanka and Madagascar, and the continents of Africa, South America and Antarctica. The similarity of the deposits left behind by ice sheets that covered extensive regions of these land masses between 380 to 250 million years ago (corresponding to the end of the Carboniferous Period and the beginning of the Permian period) as well as the similarity of the fossils of animals and plants that lived prior to that period in these areas, were the major evidences that indicated the existence of the gondwanaland.

Suess believed that, in addition to the gondwanaland yet another continent also existed in the southern hemisphere. It consisted of the

present day Australia and the Patagonia. He gave the name 'Antactics' to that continent. He also believed that, there probably existed two more continents in the northern hemisphere, during that time.

Suess also held the views that by the process of large scale faulting, extensive segments of landmass were detached from the ancestral continents and they subsequently floundered. These formed ocean floors and the remaining masses formed the present continents. However, where it was found that the density of the rocks of the ocean floor is more than that of the continents, the hypothesis of Sucess became unacceptable to the scientific world.

Continental Drift Theory

The German meteorologist Alfred Wegener (1860-1930) proposed the concept of "Continental Drift" and gave it a scientific base. It attracted the attention of the world of science. The similarity between the opposing coastlines of the continents of South America and Africa attracted his special attention. He was also impressed by the remarkable fit between the bulge of Brazil and the sea of Western Africa.

(i) Alfred Wegener formulated the hypothesis based on the following evidences. The similarity of the fossils collected from the continents on both sides of the Atlantic.

(ii). The evidences left by the ice age (glaciation) in the continents during the Permian Period and the subsequent Carboniferous Period, and

(iii) the pattern of global distribution of fold mountain chains.

In 1912, he presented the Continental Drift Theory before the scientific world in a meeting of the Frankfurt Geological Association, supported by numerous scientific evidences. Later in 1915, with additional evidences, he published his new theory in German language. He formulated his theory by incorporating the concept of gondwanaland of Suess. With the publication of an English translation of Wegener's work in 1924, the theory of continental drift became more popular in the scientific world.

Wegener held the view that the sialic portion of the crust which comprises the continental block, slides over the underlying sima. According to the continental drift theory, until the end of the Triassic Period, there was only a single huge landmass and an ocean that encircled it. 'Pangaea' was the name given by Wegener to that continent. For the ocean that surrounded Pangaea, he gave the name 'Panthalassa'.

About 200 million years ago Pangaea broke into two large continents and began to drift away from each other. Observe the(figure 3.1) and try to answer the questions given below.

- What was the name of the newly formed continent that existed in the northern hemisphere during that time?
- What was the name of the continent that existed in the southern hemisphere?

- What was the name given to the sea that lay in between the two continents?

According to the theory of Wegener, those two huge continents drifted away from each other. As a result of further breaking and subsequent lateral movement (drifting) of the continental masses, the seven continents assumed their present position.

From figure 3.1, study the displacements that have affected the continents and prepare a note. Draw the outline of a world map using a tracing table. Cut the continents out of that map and try to reassemble the continents and thus make an attempt to reconstruct the primordial supercontinent- Pangaea.

Wegener could not provide an adequate answer to the question of the nature of the force that was necessary to break the continents and drifting of the continental fragments. Wegener held the view that the gravitational pull of the sun and the moon that causes the phenomenon of tides on earth resulted in the drifting of continents towards the equator. The centrifugal force developing from the rotation of the earth resulted in the westward drift of the continents. However, a majority of the scientists of the time pointed out that these forces were not enough to cause the lateral drifting of continents. Moreover, Wegener could not provide an adequate explanation for the drifting of the continents. Later, in 1928, the well-known British geologist Arthur Holmes (1890-1965) suggested that perhaps the convection currents that develop in the mantle may be the driving force of drifting of continents.

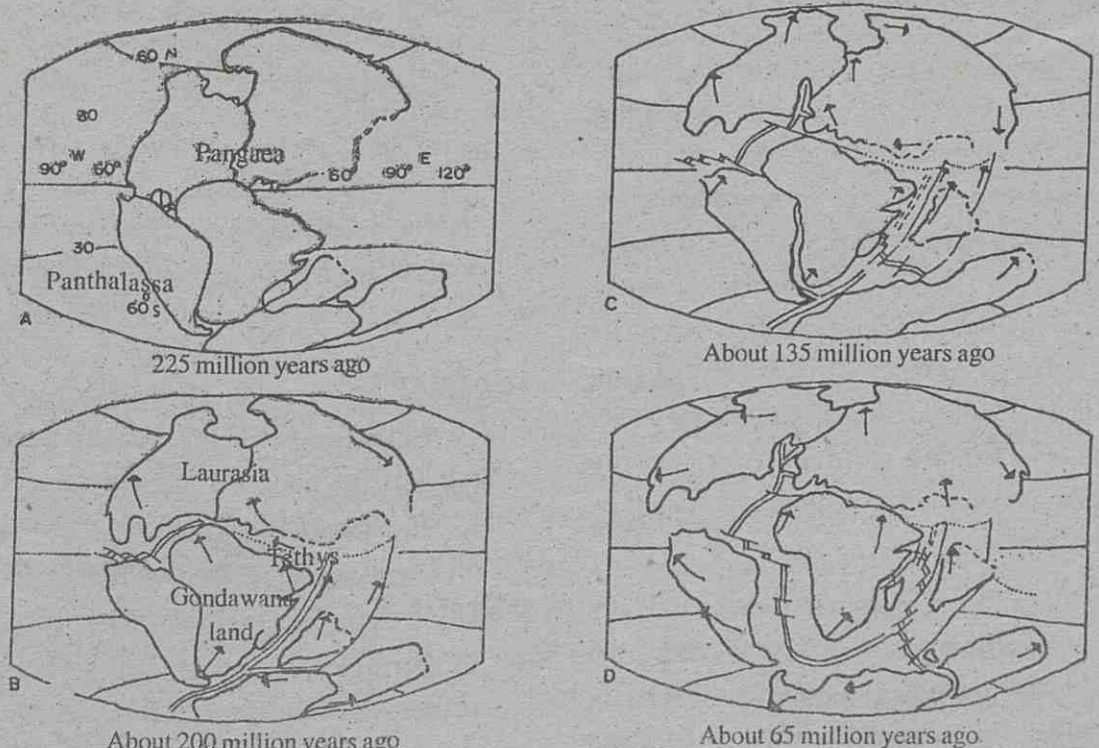


Figure 3.1

Our Wandering Continents

In 1934, Alexander du Toit, a Professor of Geology at Johannesburg University of South Africa gave a stronger foundation for the continental drift theory with the publication of his well-known book entitled ' Our Wandering Continents', supported by numerous evidences gathered from the southern continents. du Toit concluded that at first there were two continents -namely the gondwanaland and the Laurasia. He also supported the suggestion made by Arthur Holmes that convection currents originating inside the mantle could be the probable cause of the drifting of continents.

The Theory of Plate Tectonics

The Theory of Plate Tectonics, which was formulated in 1968, can be considered to be an integration or unification of earlier tectonic theories, such as those of continental drift, sea -floor spreading and polar wandering. Try to learn more about those theories from your teacher. Many scientists including Tuzo Wilson, Jack .E.Oliver, Bryan L.Isacks, William Morgan and several others made valuable contributions to the development of Plate Tectonics Theory in its present form.

The Theory of Plate Tectonics elucidates that Earth's outermost layer named the lithosphere has a thickness about 50 km to 100 km (including the crust and the upper mantle). Lithosphere consists of numerous large and small plates. These plates slide very slowly over the Earth's mantle, called asthenosphere, in response to some forces that originate at the interior of the Earth. Among these plates seven are very extensive. From the figure. (3.2) try to find out their names and prepare a list.

Major lithospheric plates are several thousands of square kilometres in areal extent. Why they are called 'plates' will become apparent when one compares their areas with their thickness.

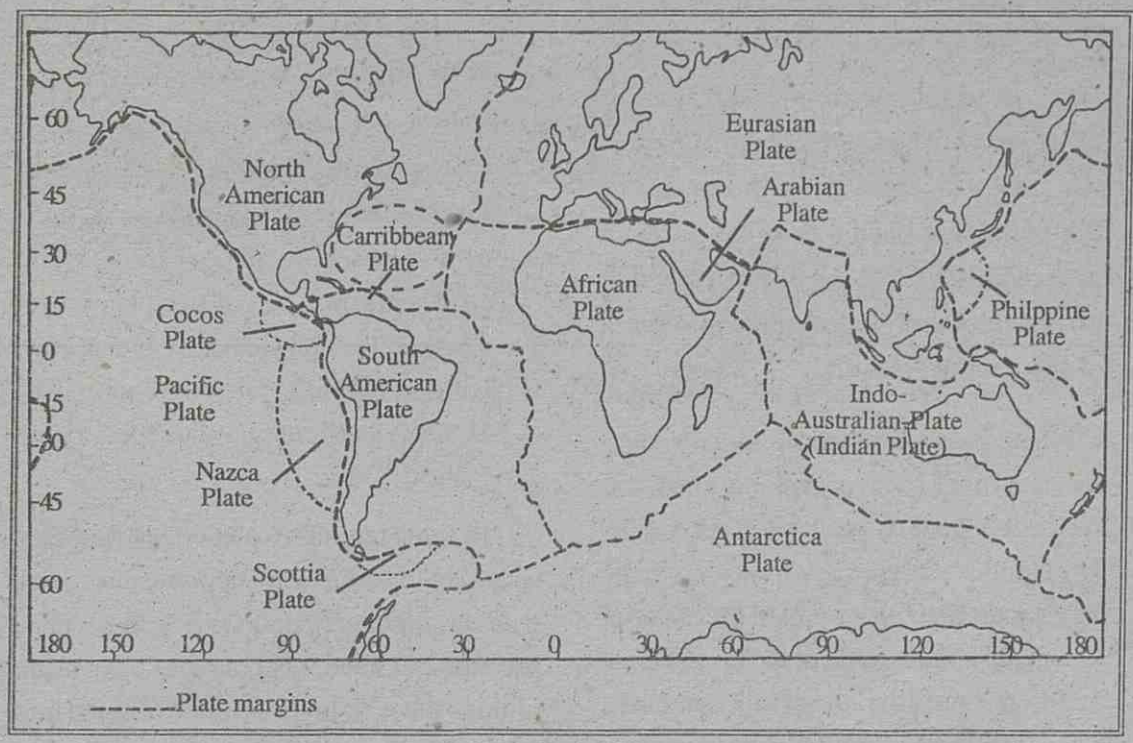
Lithospheric plates with relatively lesser areal extent include Cocos Plate, Nazca Plate, Caribbean Plate, Arabian Plate etc;

Although most of the plates comprise both continental and oceanic crusts, the Pacific plate is overlain only by oceanic crust.

The most extensive plate of the lithosphere is the Pacific plate. Its maximum width is about 14,000 km.

According to plate tectonics theory, lithospheric plates move very slowly in different directions. The margins of the lithospheric plates are zones which deserve our special attention. It has been noted that three types of plate margins can be recognised on the basis of the relative motions of plates with respect to adjacent plates. However, it should be noted that all the three types of margins need not be present in all plates.

1. Plate margins where two adjacent plates move away from each other- Divergent Margins.



Lithospheric Plates.
figure 3.2

2. Plate margins where two plates meet each other - Convergent Margins.
3. Plate margins along which the plates slide past each other- Shear Margins.

As two adjoining plates slowly move away from each other, very long fissures develop in the lithosphere between them. Molten rock (magma) from the underlying mantle comes up through these fractures and cools down later. It consolidates and joins with the trailing edges of the plates and forms the youngest portions of the sea floor. The process of seafloor spreading takes place in this manner. Such plate margins passing through continents result in the formation of rift valleys. Most of the divergent plate margins pass through the crestal portions of the submarine mountain chains (midoceanic ridges). It has been estimated that the two plates on both sides of the midoceanic ridge of the Atlantic Ocean (The Mid-Atlantic Ridge) continually move apart at the rate of about 2.5 cm. per year. Earthquakes, faulting, and lava flows are very frequent along such plate margins.

In regions where divergent plate margins pass through the continents, large rift valleys develop. In course of time new sea floor forms within them and subsequently results in the drifting away of the sides of the rift valleys towards the opposite sides. The Krafla Rift Valley of Iceland and the rift valley zone of East Africa extending from Syria to Mozambique and further up to the Red Sea are formed in this manner. The Continent of Africa is gradually undergoing drifting as a result of the intrusion of magma from the mantle and the formation of new sea floor within the branching rift valley zone of that continent.

Gulf of California

The Gulf of California today occupies the region formed by the drifting that took place at about 30 million years ago of Baja California from the North American Plate along the northern extension of a divergent plate margin of the Pacific Ocean.

Where two plates come together and meef each other (convergent margins), the leading edge of one of the plates dives or sinks below the other and goes down into the mantle where it melts and forms part of the material of that mantle. Such zones of the Earth's crust where the margin of the lithospheric plates sinks into the mantle are called subduction zones.

There are three types of convergent plate margins.

1. ***Margins on both sides of which have sea floor:***
   The region of Mariana Trench in the Western Pacific Ocean is a zone where oceanic part of two lithospheric plates meet together. This is a plate margin where the Pacific plate is descending under the smaller Philippine plate.
2. ***Margin where seafloor of one plate meets the continental portion of adjacent plate:***
   Andes Mountain is an example for a convergent plate margin where there is seafloor on one side and continent on the other. In this zone the Pacific plate sinks below the South American plate .Many of the world's large destructive earthquakes occur along this type of plate margins.
3. ***Convergent margins where continents occur on both sides of the plate margin:***
   The Himalayan Mountains is an example of a convergent plate margin where continental portions of two plates meet together. The collision of the Indian Plate with the Eurasian Plate has produced the Himalayan Mountains and the Tibetan Plateau.

In some regions two lithospheric plates slide past one another in opposite directions, without converging or diverging. Such plate margins are called shear margins. As a result of this, these regions have developed into zones of faulting or shearing . The San Andreas Fault Zone of California is an example of such a plate margin. Shear margins are zones of tectonic activity characterized by frequent earthquakes. Some regions of the Earth are localities where three lithospheric plate margins meet together. Such plate margins are called 'triple junctions'.

The process of plate tectonics is making the Pacific Ocean smaller, the Atlantic Ocean larger and the Himalaya Mountains taller.

The pattern of distribution of continents and oceans we see today has evolved through the tectonic processes of repeated breaking, drifting and recombining of continental blocks. These processes have been taking place in the lithosphere without any interruption ever since the origin of the Earth. These process will most probably continue as long as our Earth exists.

SUMMARY

- It was the German meteorologist Alfred Wegener who gave a theoretical basis for the concept of continental drift.
- According to the Theory of continental drift there was only a single large continent on the surface of the Earth until the end of the Triassic Period.
- At about 200 million years ago, Pangaea broke up and formed into two continents named Gondwanaland and Laurasia.
- During the course of time earlier continents further fragmented and their portions drifted away from each other.
- Wegener failed in providing a scientifically sound explanation regarding the force that was necessary for drifting of continents.
- The Theory of Plate Tectonics has been formulated in 1968.
- The lithosphere of the Earth is made up of a number of large and small plates.
- Lithospheric plates slowly slide over the underlying asthenosphere.
- On the basis of relative motions of adjacent plates three types of plate margins have been recognised.
- Divergent plate margins in continents give rise to rift valleys.
- Convergent plate margins are of three types.
- Shear margins are those where adjacent plates move past each other in horizontal directions.
- Triple junctions are regions where three plates come into contact.

QUESTIONS

1. Write a note on the Continental Drift Theory of Alfred Wegener.
2. What was the explanation offered by Wegener regarding the force required for the drifting of continents?
3. Explain the Theory of Plate Tectonics.
4. Which are the seven major lithospheric plates?
5. Mark the locations of minor plates on a world map.
6. Name the lithospheric plate which consists solely of oceanic region.
7. What are the three types of plate margins?
8. Describe the tectonic processes that take place along the plate margins and their effects.
9. Elucidate with reference to Plate Tectonic Theory how the Himalaya Mountains were formed.
10. What is meant by 'triple junction'?
11. Name the type of plate margin with which subduction zones are associated?
12. What are the different kinds of convergent plate margins?
13. 'Continental regions are older than the sea floor'. Explain.
14. What is the basic difference between the Continental Drift Theory and the Plate Tectonics Theory?

****

4 MODERN TECHNIQUES IN GEOGRAPHY

What we have learnt

- The data generation with the artificial satellites are helpful in meterological studies.
- Topographic maps depict physical and cultural details of the surface of the earth.
- Computer performs different tasks with the softwares.

Ever since the origin of the earth, it has been subjected to changes. In his endeavor to study the earth, Man has crossed mountains, oceans and valleys. Such explorations helped him in getting information about new regions. However, there are a number of places on earth that are still inaccessible and hence devoid of any information. With the development of the Remote Sensing technology, collection of information about regions difficult to reach, has become possible. Geographers, now-a-days rely upon Geographical Information System (GIS) to store and analyse data about the earth's surface collected using remote sensing and other means. Let us now try to understand the latest techniques in the study of the earth, namely Remote Sensing and the Geographical Information System.

Remote Sensing

The method of analyzing the details about the objects or processes without touching them by using a distantly placed sensor is called remote sensing.

The term remote sensing was first used by the American Navy in 1960.

Terrestrial Photography

Taking pictures of the earth's surface from the ground or from higher elevations is called terrestrial photography. During picnics we take photographs of natural scenes using cameras. This is an example of terrestrial photography.

The surface used to place the camera or sensor for collecting remote sensing data is called platform. Depending upon the type of platform we can classify remote sensing technology into two, namely Aerial Remote Sensing and Satellite Remote Sensing.

Eyes in the sky...

Aerial photography is the process of taking photographs of the earth's surface with the help of cameras fitted in aircrafts. It started in 1858 when the French photographer Gaspad Felix Tornashan during his balloon flight took pictures of the earth's surface. The French army had used balloons to take pictures of the Paris city in 1859. Such pictures are called aerial photographs.

What is overlap in aerial photographs?

Take a look at figure 4.1 given.

The figure represents three aerial photographs A, B, and C taken from an aircraft from an altitude above ground level. figure A shows majority of regions shown in figure B. Similarly, majority of the regions of B are visible in C. Thus, every aerial photographs contain about 60 percent of the area shown in the previous photograph. This is termed as the overlap in aerial photos. Two such adjacent photographs having overlap is termed as a stereo pair (fig. 4.2).

When a stereo pair is kept under an instrument called stereoscope and viewed by adjusting the distance between the lenses, we get a three dimensional view of the region. This is called 'stereoscopic vision'. For example, view the figure 4.2 using a stereoscope. It is to be noted that only photos with overlap can give three dimensional views.

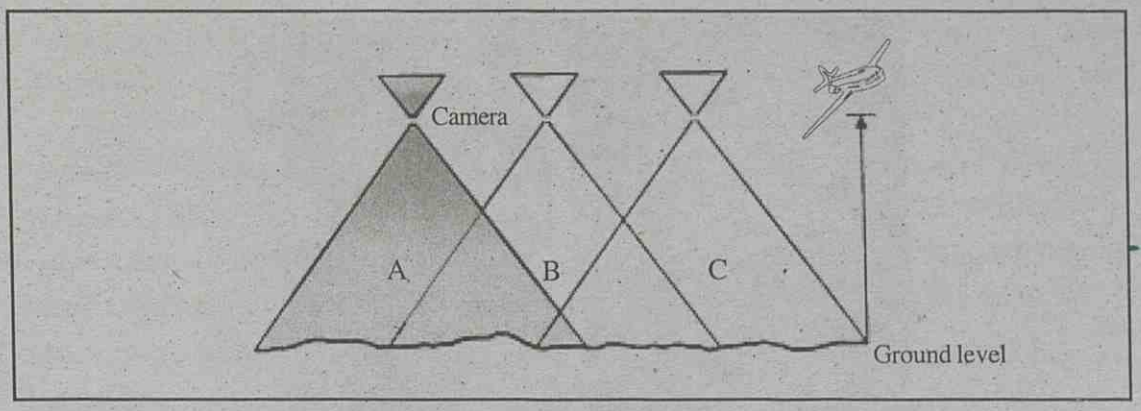


figure 4.1

Aerial photos were widely used during the second world war for a bird's eye view of large regions as well as for identifying heights and depths of the ground.

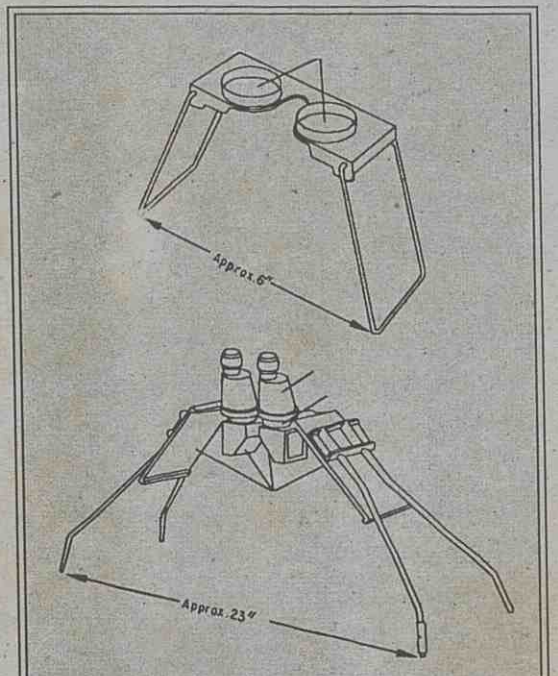
Aerial photography is ideal for making pictures of the earth's surface with clarity. Aerial photos find wide application in the preparation of topographic maps.

The responsibility of aerial survey in India has been given to the Indian Air Force, the Indian Aerospace company with its headquarters at Kolkata and the Hyderabad based National Remote Sensing Agency (NRSA).

However, the following drawbacks are there for the aerial survey technique.

- Shaking of the aircraft is a serious hinderance to the taking of quality photographs.
- Considerable open space is required for the take-off and landing of aircraft.
- Frequent landings for refuelling is costly.
- It is quite impossible to view extensive regions from a height of 5-10 km.

The present development in remote sensing is due to the invention of artificial satellites. Pictures obtained from the Landsat satellite launched by America in 1972 has revolutionized remote sensing. For repeated earth observations nothing else can match satellite remote sensing.



Stereoscope is the instrument used to obtain three dimensional view of the regions depicted on aerial photographs

Aerial Photographs
figure 4.2

Satellite remote sensing and satellite imageries

Collection of information about the earths's surface with the help of sensors fitted in artificial satellites is called satellite remote sensing. Sensors detect various surface features of the earth and transmit data about them in a digital form to ground based stations. With the help of computers these data are interpreted and converted into pictures. These are termed as satellite imageries.

Geostationary satellites and Sun synchronous satellites

Artificial satellites which orbit the earth at an altitude of about 36,000 km are called geo stationary satellites. As they orbit along with the earth, they remain fixed facing a particular region on earth. Hence, they can be utilized for gathering permanent information about a region. Generally, these satellites are used for climatic observations and telecommunications. The INSAT series of satellites

launched by India are geostationary in nature.

Satellites that orbit the poles at a height of about 800 to 950 km are called Sun synchronous satellites. As they travel along orbits much lower than that of the geostationary satellites, they can be used for collecting information about the earth's surface with greater clarity. Sun synchronous satellites pass over the same place at the same time at regular intervals and hence it is possible to collect information about that place on different days.

With the help of remote sensing technique we can even detect and record features that cannot be discerned by human eyes. Electromagnetic radiation falling on objects is reflected back and is recorded by the sensors fitted in satellites. The quantity of electromagnetic radiation that is reflected/ scattered by an object is called its spectral signature. Spectral signatures vary for different objects depending upon their physical characters. These spectral signatures are recorded by sensors fitted to satellites. These can be converted into satellite pictures with the help of computers. Analysis of satellite pictures/imageries help us in understanding about the various objects and features on the earth's surface.

The size of the smallest object on the earth's surface that a satellite sensor can distinguish is called the sensor's spatial resolution. Satellite imageries of early days, could only distinguish objects having a minimum size of 72.5×72.5m. However, satellites launched later gave imageries in which even objects of 5×5m size could be distinguished. Recently launched satellites are giving imageries that can distinguish objects on the ground having a size of 1×1 m.

Won't you try to understand more about the various artificial satellites and their repetivity? For this, you can seek your teacher's help.

The vast potential of remote sensing is utilized in all fields today. Important among them are:

- For estimating crop area and pest attack in a region as well as for assessing periodic growth of crops and the spread of pests.
- Detection of forest fires and taking control measures by monitoring their spreading.
- Identification of drought and flood affected areas.
- In the fields of mineral, petroleum and ground water explorations.
- For oceanographic studies.
-

Global positioning System (GPS) helps us to find the geographic coordinates of a place, and its height and time on the basis of signals from about 24 satellites orbiting the earth.

With the help of study materials and enquiries, prepare a note about the achievements of India in the field of remote sensing technology. Let us see what can be included in it.

- The sun synchronous satellites launched by India.
- Research institutions in India working in the field of remote sensing.
-

With the advent of remote sensing technology we started getting manifold information about the earth's features. Computers have become an indispensable tool for the analysis and interpretation of these information. Today, computers are very much helpful for geographical studies. Look at Ramu's experience.

Ramu, a native of Palakkad went to Canada for his higher studies. He secured an admission in the St. Mary's University and preferred to stay in a rented house outside the campus than in the hostel. He contacted a real estate office upon the advice of the college authorities. Ramu told about his requirements to the lady staff of the office.

- *It should be a place near the college at a walkable distance.*
- *The monthly rent should be below 100 dollars.*
- *There should be library, playground and hospital nearby.*
- *The place should be neat and clean.*
- *There should be hotel facility nearby.*

The lady, after hearing Ramu carefully, clicked the computer mouse several times. After that she turned the computer monitor towards Ramu. The monitor showed a map with different places indicated by red spots. She brought the cursor to each of these spots and clicked while telling Ramu that the places in red are the ones fitting his description. Then even the smallest details about these places appeared on the computer screen. Ramu got surprised. He became curious and had a series of questions.....

- *What is the technique?*
- *How is it made possible?*
-

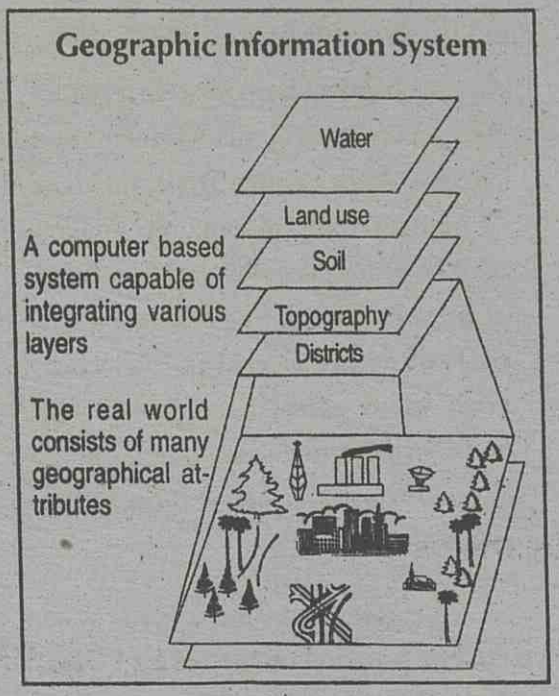
Don't you want to know how the lady replied to Ramu's questions?

It is with the help of the Geographical Information System (GIS) that this became possible.

What is Geographical Information System?

Geographical Information System is the method of storing, retrieving and transforming geographical data in computers and their analysis, finding answers to queries and displaying them in the form of pictures, graphs, and charts. It is very much helpful to understand the spatial relation between objects and phenomena. As it involves analyses based on geography, this technology is called the Geographical Information System (GIS).

In short, the Geographical Information System is the technique of collection of earth related information, their storage for use and analysis.



As you know, topographic maps contain different ground related information. We can prepare different thematic maps based on rivers, roads, houses, cultivatiable areas and forests from topographic maps. Each map thus prepared is called a layer. Each layer is incorporated into a computer using the vectorisation method. Attributes of different locations are stored in computer using a Database Management System (DBMS). The different layers are analysed together using the overlaying technique for finding solutions to specific problems.

Why Geographic Information System?

- For delineating the required information from a large geo-referenced data base.
- To select theme wise (e.g. relating to soil, water etc.) or region wise details.
- To find and analyse spatial relations of geographical phenomena.
- To show the peculiarities or events in a region on a locational basis.
- In order to update information in a fast and cheap manner.
- Te create visual models of future processes and phenomena using present day information.
- For creating maps, graphs and tables for specific uses.

What are the analytical capabilities of the Geographical Information System?

Imagine that the Government wants to construct a road connecting the boundaries of a reserved forest by widening a footpath by five metres on either side. Using the buffering technique of the Geographical Information System the extent of forest land lost due to the road construction can be estimated quickly and at a cheaper rate. Won't you try to find out similar situations where the Geographical Information System can be made use of?

Let us now find out how the Geographical Information System helps the revenue authorities to estimate land tax of a region on the basis of its geographic characteristics.

For this, theme based maps of the regional showing soil type, slope, vegetation, and regional characteristics (rural, urban, industrial etc) are utilized. These maps stored within a computer are analyzed with the help of a Geographical Information System software by the overlay analysis method to estimate land holdings of similar nature to fix the land tax. Thus goes the vast potential of the Geographical Information System.

Look at Ramu's another experience.

One day there was a fire in the house of Abu, Ramu's friend. Abu ran outside the house with his mobile phone. He

had only dialed the number of the fire force when a voice asked from the other end of the telephone.

- Oh, you're Abu ?
- When did the fire occur in your house?
-

Such questions were asked by them through the telephone. Within minutes the fire force reached Abu's house and doused the fire within no time.

Abu was thinking as to how the fire force reached his house exactly without informing them the location.

As the computer network of the fire department has a citizen data base prepared with the help of the Geographic Information System, just when the number was dialed, the location and the easiest route to reach were displayed on the Fire Force's computer. It is by that route that they reached Abu's house.

Geographic Information System has got diverse applications in various fields

- In the formulation of forest management policies
- For planning troop deployment for defence purposes
- In designing roads and highways
- In collection of information by the local self government institutions for planning and execution of various projects.
- For distribution of milk, medicine and other essential items.
-

You can also find out the other applications of the Geographic Information System.

GIS for catching thieves also

Crime Information System created using the Geographical Information System by the Police Department is of immense help in catching thieves. This helps to collect information about crimes, finding out criminals on the basis of nature of crimes, encircling areas where escaped criminals could be traced and to display photographs of criminals at local level through the visual media.

The geo-referenced information system created for a region on the basis of GIS is helpful in the following respects.

- To find out the name, latitude and longitude of a particular place in the region.
- In order to find out places that suit our various requirements.
- For finding out the spatial relations between various geographic factors.
- To find out past changes in that region and prepare future models.

The applications of Geographic Information System in map preparation

- Reproduction of existing maps in a faster and cheaper manner.
- To prepare thematic maps from the existing maps to meet the needs of users.
- In the preparation of maps without the help of a skilled cartographer.
- For displaying the same information in different picture formats.

- To reproduce maps by incorporating additional information.
- For the construction of three dimensional models.

Did you understand the characteristics and advantages of GIS. Can't you see the influence of its use in the various fields of life. GIS is extremely useful in geographic studies, transport planning, resource distribution and natural disaster studies.

SUMMARY

- Remote sensing is the method of analyzing the information about distant objects or phenomena without touching them by the use of a sensing device.
- Remote sensing technology can be classified into aerial remote sensing and satellite remote sensing.
- Taking pictures of ground with the help of cameras fitted on aircrafts is called aerial photography.
- The method of collecting information about the earth's surface with the help of sensors fitted in artificial satellites is called satellite remote sensing.
- The size of the smallest object that a sensor can distinguish is called its spatial resolution.
- The technique of collection, storage and analysis of earth related information is called the Geographic Information System.
- Geographic Information System holds great potential in different fields including geographic studies.

QUESTIONS

1. Evaluate the salient features of remote sensing and based on it analyse the significance of remote sensing in practical applications.
2. Mention the merits and demerits of terrestrial photography and aerial photography by comparing between them.
3. Explore the possibilities of aerial photography and prepare a note on it.
4. What is the significance of overlap in aerial photographs?

5. How does the analytical capabilities of Geographic Information System influences its application in various fields?
6. Explain buffer analysis and overlay analysis.
7. Evaluate the salient features of Geographic Information System.
8. Mention the analytical capabilities of Geographic Information System.
9. Analyse the cartographic potentialities of Geographic Information System.
10. Find out the different ways by which remote sensing and Geographic Information System help Geographic studies and prepare a note on it.

****

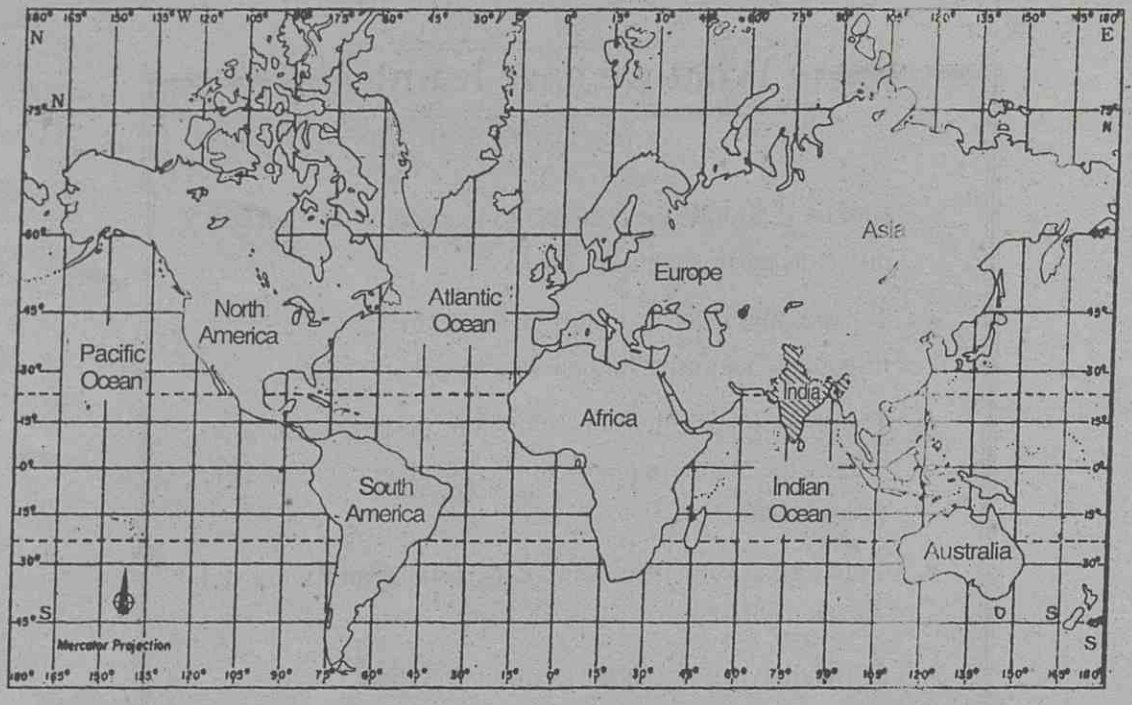
5 INDIA - PHYSICAL GEOGRAPHY

What we have learnt

- Based on altitude the regions of India can be divided into different physiographic divisions.
- Topography, water, soil, climate, vegetation etc are the most important factors that influence habitation in a place.
- The physiographic divisions of India are the great Himalayan ranges, the Northern plains, the Peninsular plateau and the coastal plains.
- Indian rivers can be classified as Himalayan Rivers and Peninsular Rivers.
- Different types of soils are distributed in India.
- India can be divided into different regions based on the amount of rainfall.

There are many factors that influence the culture and development of a place. They are the latitudinal and longitudinal position of that place, topography, climate, soil and vegetation. India is a land of diverse topography, soils, climate and vegetation. Let us enquire into the cultural diversity of India and the physical features that support it.

Find out the position of India on the world map (Fig. 5.1)



World Map

figure 5.1

India, which lies between 8°4' N and 37°6' N latitude and 68°7' E and 97°25' E longitude, has a total geographic area of 32,87,782 km^2. This is only 2.42 % of the total geographic area of the world.

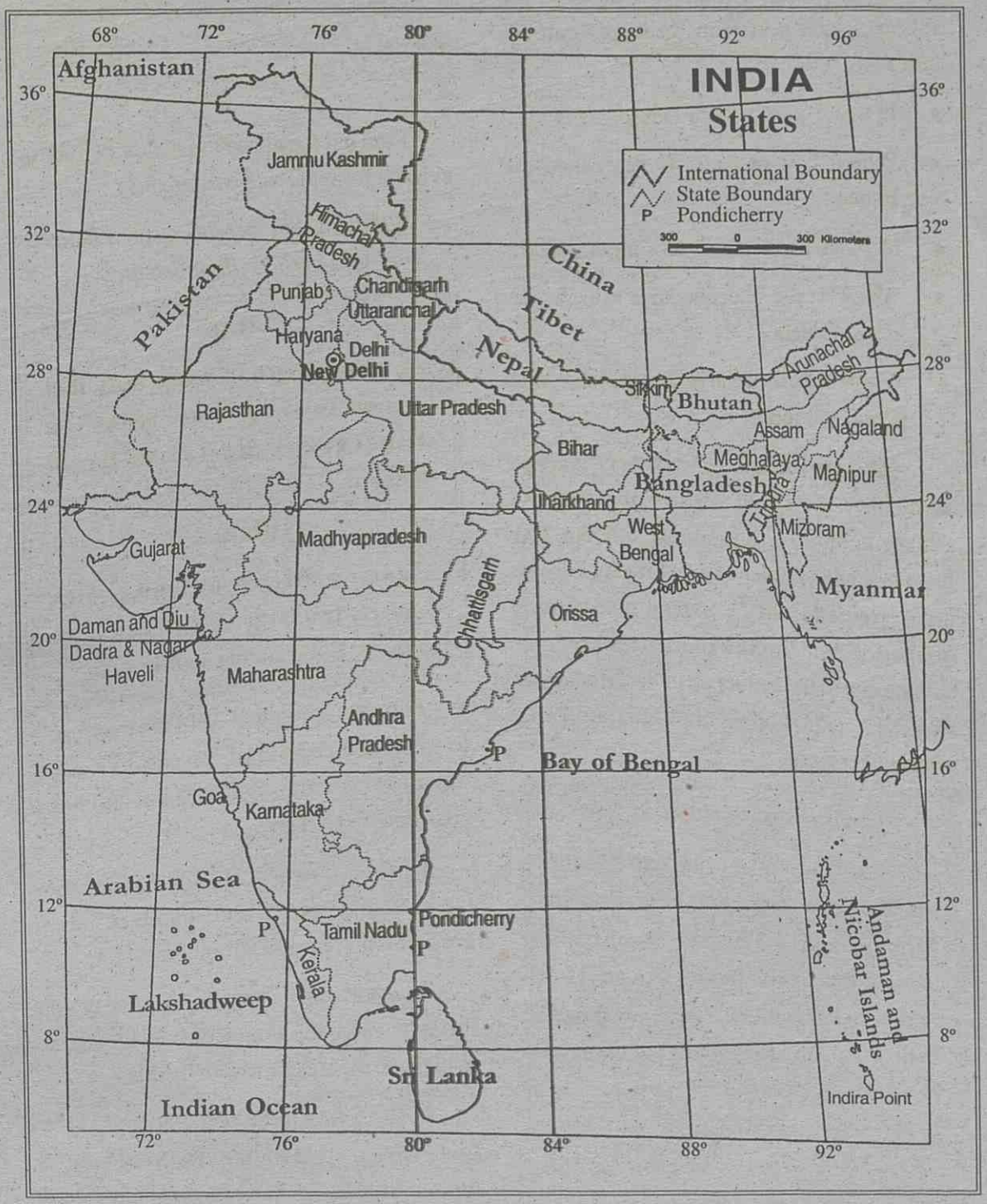


figure 5.2

Try to find out the answers to the following questions from the map (figure 5.1 and 5.2).

- In which part of Asia is India located?
- Which part of India is nearest to the Equator?
- In which hemisphere does India situate?
- Which are the other countries in the Indian sub-continent?
- Which are the ocean bodies that surround peninsular India?

Although India is a part of Asia, it keeps an identity of its own. Its size, topography, climate, culture, etc. are entirely different. The huge mountain ranges of the Himalayas in the north protect it from the extreme cold climate of interior Asia. India experiences a unique climate due to the influence of the Himalayas and the ocean bodies that surround the peninsular region.

Indian Peninsula

This is a land unit jutting out into the sea on the southern end of the Indian subcontinent. This land unit is surrounded by the Indian Ocean. The sea which lies in the west is known as the Arabian Sea and that in the east as the Bay of Bengal

- *Area wise, what is the place of India among the countries of the world?*

Find out from a world map, the countries that are larger than India

- Russia
-
-

Find out the group of islands belonging to India from the map (figure 5.2)

- *Which are the neighbouring countries of India in the Indian Ocean?*

Strait

A narrow stretch of water body that connects two large water bodies is a strait. Eg: Palk Strait in the Bay of Bengal.

Isthmus

A narrow stretch of land, which connects two large landmasses, is an isthmus. Eg: Panama Isthmus.

India has a length of 3214 km from north to south and 2933 km from east to west. It has a land frontier of 15200 km and has a coastline of 6083 km.

Draw an outline map of India and show the different states, their capitals, union territories and their head quarters.

Find out from the map (fig 5.2) the region through which the Tropic of Cancer passes. Which are the states crossed by this line?

82°30' E longitude is considered as the Indian Standard Meridian. The local time of this longitude is taken as the Indian Standard Time (IST). This is 5½ hours ahead of the Greenwich Mean Time.

Physiography

India is a land of diversities. Great mountains, rivers, wide plateaus and plains, lengthy coastlines etc., constitute the topography of our country. It has a monsoon climate with local and seasonal climatic diversities. We shall look at the topography, rivers and climate of our country.

Physiographically, India can be classified into four divisions.

- The Northern mountain region
- The Great plains of the north
- The Peninsular plateau
- The Coastal plains and Islands

Find out the different physiographic divisions from the map (figure: 5.3)

The Northern mountain region

This is the great wall like physiographic unit, which stretches from Kashmir in the north west to the Indian border in the east. This region is formed by the Karakoram, Ladakh, Zaskar and the Himalayan range of mountains and the eastern highlands. These mountain ranges are subdivided into three divisions namely, Trans Himalayas, Himalayas and the Eastern Highlands.

The Trans Himalayas comprises the Karakoram, Ladakh and Zaskar ranges that originate from the Pamir Knot. The highest peak in India, 'Mount K_2' (Mt. Godwin Austin, 8611m) is in the Karakoram Range. The Trans Himalayas, in which there are several gorges and mountain passes, has an average height of above 6000m.

The roof of the world

The Pamir plateau with the Pamir Knot in the central Asian country of Tajikisthan, is known as the roof of the world. Mountain ranges such as the Hindukush, Sulaiman, Tienshan, Kunlun and Karakoram run to different directions from the Pamir Knot. The Kailas range in Tibet is an extension of the Karakoram Range.

The Himalayas, a part of the Northern mountain region, which trend in NW-SE direction for a length of about 2400km is an arc shaped mountain range. This mountain region with an area of about 5 lakh km^2 is the highest region in the world. The width of this mountain range, is about 400 km in Kashmir, and it shrinks to 150 km in Arunachal Pradesh. There are three parallel mountain ranges in this physical division, which is composed of many deep valleys and extensive plateaus. Find out these ranges from the map (figure 5.4) and learn their importance from the table given below (Table: 5.1).

The Himalayas, still growing!

Himalaya means the abode of snow. It is the youngest fold mountain system of the world. These mountain ranges are formed due to the intensive folding of the floor of an ancient sea called Tethys. The fossils of different marine organisms, found at various locations on the mountain ranges support the fact that the region was covered by sea in the past.

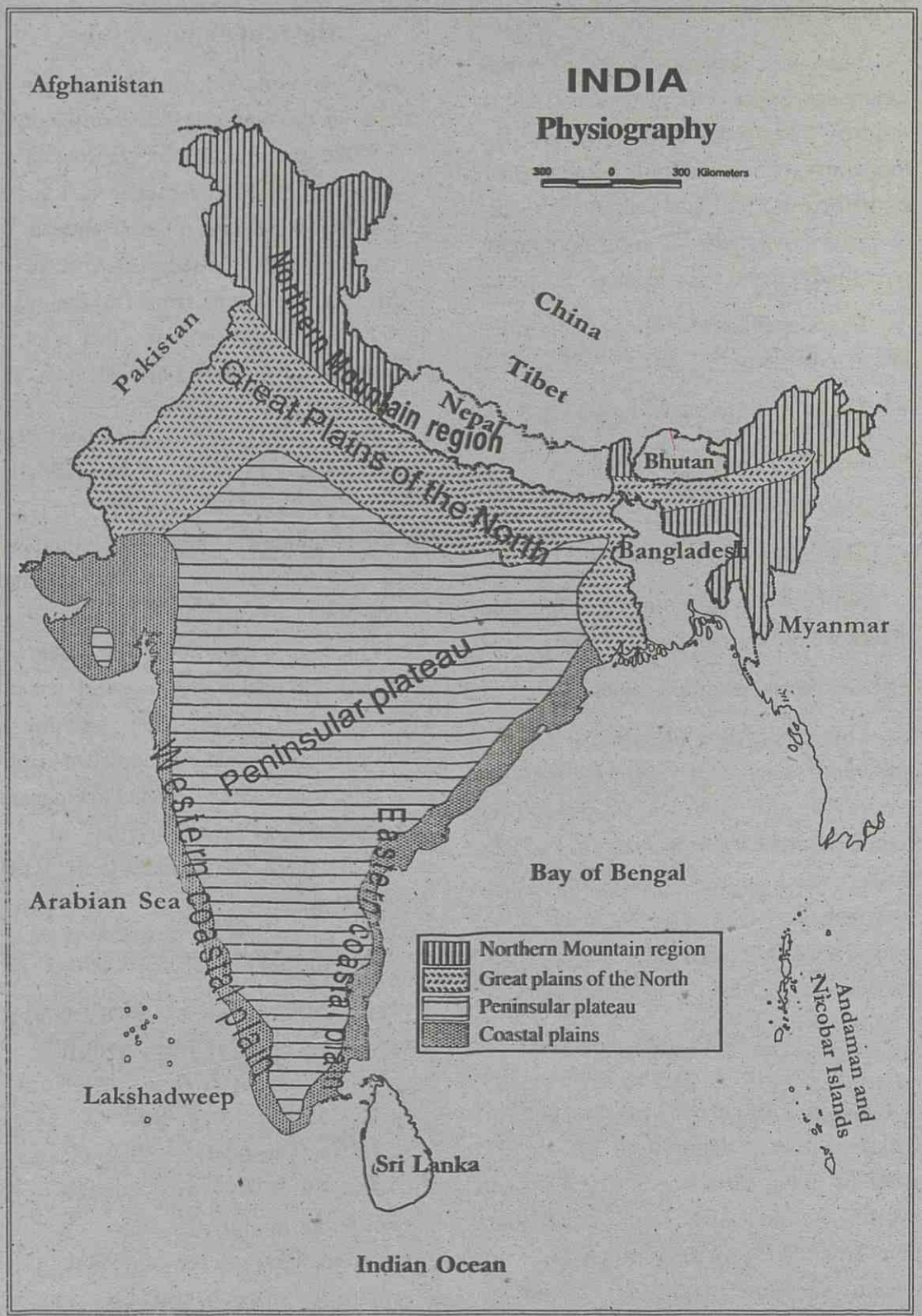


figure 5.3

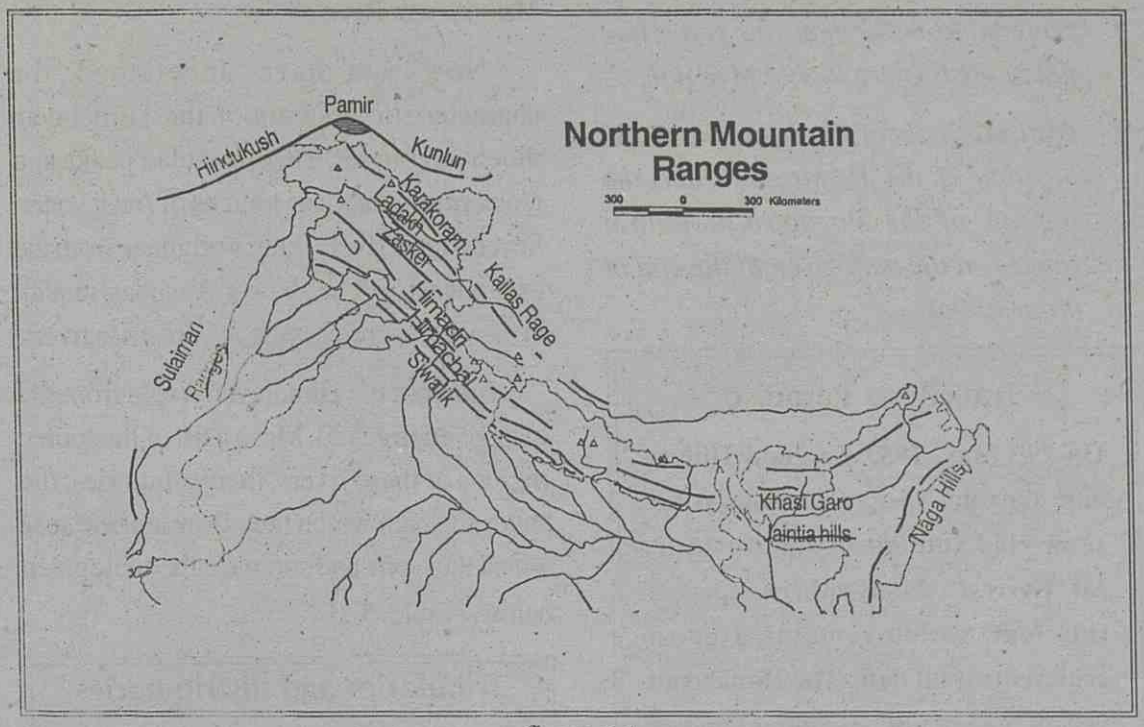


figure 5.4

The height of the mountain ranges gradually decrease as they approach the eastern parts of the Northern mountainous regions. This region with an average height of 500m to 3000m above MSL is known as the Eastern highlands (Purvachal). The thickly forested Khasi-Jaintia hills in this region are the world's rainiest (wettest) spots.

Greater/Inner Himalayas	Lesser/Middle Himalayas	Outer/Lower Himalayas
• The highest mountain range of the Himalayas. • Under perpetual snow, these ranges have an average height of about 6000m. • Mountain peaks with a height of more than 8000m are situated in this mountain range. (Eg: Kanchenjunga-8595m, Nangaparbat-8126m) • The source of Ganges and Yamuna	• Situated to the south of the Himadri • Average height is above 3000m • Many health resorts are situated on the southern slope of the mountain range, eg: Shimla, Darjeeling.	• This is the outer most range, situated on the south of the lesser Himalayas. • These discontinuous ranges join the lesser Himalayas in the extreme east. • Its average height is about 1200m • There are several elongated and flat valleys running parallel to the mountain ranges. They are called "duns". (Eg: Dehradun)

Table 5.1

- *Find out from the map, the states that fall in the Eastern highland region.*
- *With the help of an atlas, mark the location of the Pamir Knot and the regions of the Northern mountain ranges on the map given at the end of the textbook.*

Traveller's Paradise

On 29th May, 1953 Edmund Hillary and Tenzing Norgay conquered the snow clad summit of the world ie, Mt. Everest. Many others repeated this feat, which remains a great achievement till date. The Himalayan valleys attract not only mountaineers but also many tourists of the world. The valleys of Kulu, Manali, Shimla, Darjeeling, Naini Tal and Mussoorie valleys are some of examples.

- *Prepare a report, based on the descriptions and maps, about the Northern mountain region. You can enrich your knowledge with more reading materials and references.*

Himalayan Rivers

Now you have understood the characteristic features of the Himalayan mountain ranges. The snow clad peaks and glaciers are excellent sources of fresh water. Several great river systems originate from the melt waters of these glaciers. Abundant rainfall in the valleys enriches the flow of these rivers.

Find out the Himalayan rivers from the map given (fig: 5.5). Make a list of the source regions of these rivers, their tributaries, the states through which they flow and the seas which they join, and complete the table given below, (Table: 5.2)

Tributaries and distributaries

Tributaries are those small and big streams that join a river. Upon reaching a plain the rivers branch out and join the sea. These branches are called distributaries.

River Indus

Originating at a height of about 5180m from the Manasarowar in Tibet, River Indus flows northwest through Tibet and enters Jammu and Kashmir. Flowing through the deep valleys of Ladakh, Baltistan and Gilgit, River

Himalayan rivers	Sources	Tributaries	State through which they flow	Sea which they join
• Indus	•	•	•	•
• Ganga	• Gangotri, Alakapuri Glaciers	•	•	•
• Brahmaputra	•	•	•	•

Table 5.2

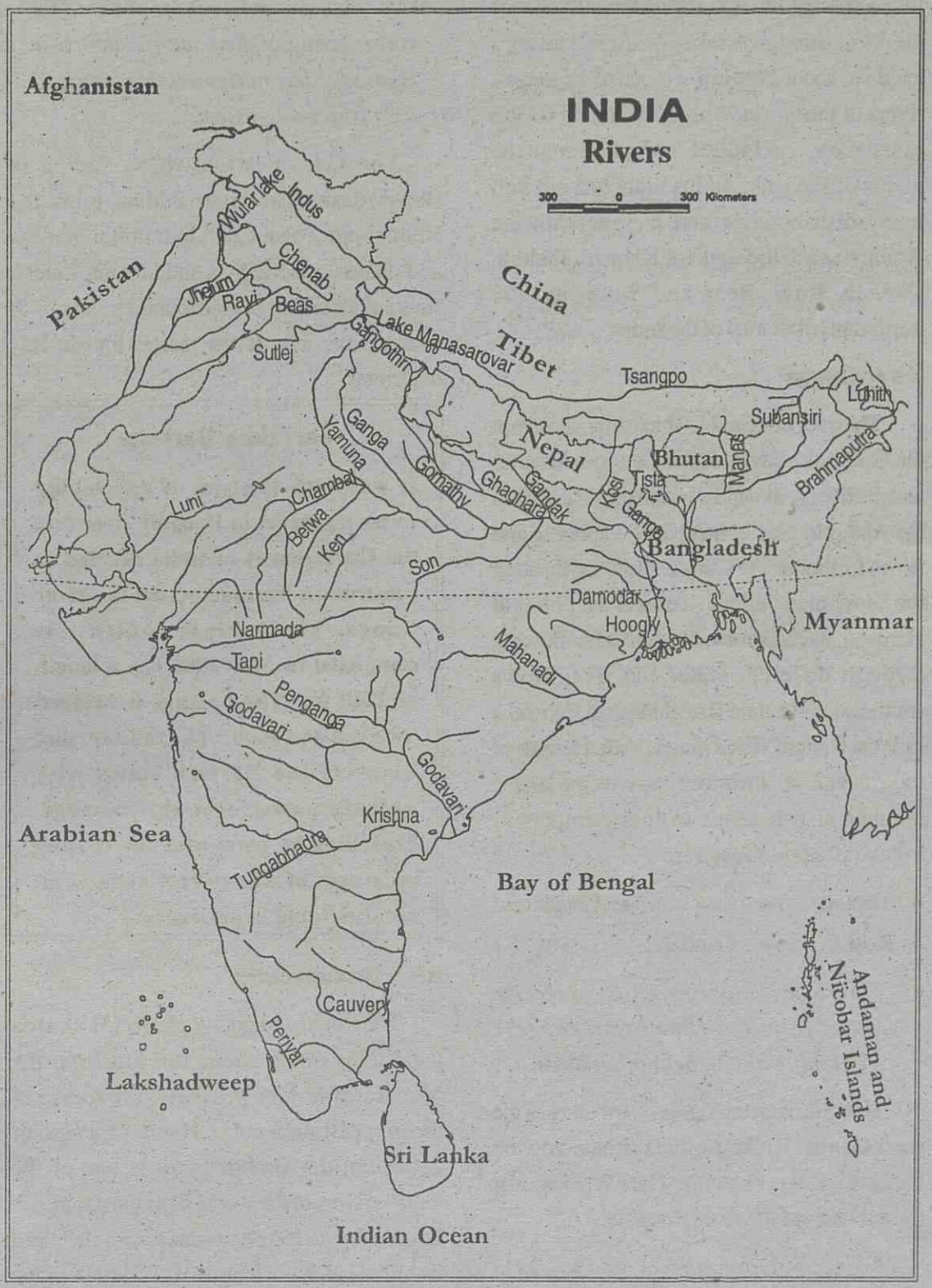


figure 5.5

Indus crosses the Indian border and reaches the plains through Attok in Pakistan. Having a length of about 2880 km, it is one of the longest rivers of the world. Only a length of 709 km of the river is in India. Flowing through the plains of Pakistan, Indus branches out into many distributaries and merges with the Arabian sea to the south of Karachi. Jhelum, Chenab, Ravi, Beas and Sutlej are the important tributaries of the Indus.

River Ganga

The river Bhagirathi, which originates from the Gaumukh caves of the Gangotri Glacier and the river Alaknanda, which originates from the Alakpuri glacier meet at Devaprayag and flows further as the Ganga. Flowing through the snow-clad valleys, it enters the plains at Hardwar and becomes sluggish. After flowing through different states the river flows southeast and enters Bangladesh at Farrakka in West Bengal. The Ganga, with a length of more than 2500 km is the river with the largest number of tributaries in India. Important tributaries of the Ganga are

- Yamuna
- Son
- Ghaghara
- Kosi
- Gandak.

- *Do all the tributaries of Ganga receive water from the Himalayan ranges? Find out with the help of an atlas.*

Hooghly is an important distributary of the river Ganga. Kolkata city is situated on the banks of the river Hooghly. The river Damodar is a tributary of the river Hooghly.

The river Damodar is known as "Sorrow of Bengal". This is because of the severe threat it posed to the life and property due to the frequent floods and change in river course. The construction of dams across the river Damodar has mitigated this havoc to a considerable extent.

The Ganga is known as Padma in Bangladesh. The river Padma joins the Brahmaputra near Chandpur in Bangladesh and is known as Meghna and Jamuna. Later it flows as a number of distributaries and builds an extensive delta. It then merges into the Bay of Bengal.

Farrakka Barrage

It was with the aim of developing water transport in Hooghly river that the Government of India decided to construct a barrage across the river Ganga. The barrage, which was completed in May 1986 has a length of 2240 m. The barrage is bridged with rail and road. The railway that connects the Eastern states with Kolkata passes over this barrage. Travelling by train over the roaring greatness of the river Ganga is an unforgettable experience.

River Brahmaputra

The Chemayungdung glacier (5150m) on the Kailas range about 100 km from the Manasarowar lake in Tibet is the source of the river Brahmaputra. Having a length of 2900 km, the Brahmaputra is one of the longest rivers of the world. This river, which is known by different names in Tibet and Bangladesh, has a length of 725 km in India. The river Tista, river Manas, river Luhit and river Subansiri are the major tributaries. With the maximum discharge among the Himalayan

rivers, Brahmaputra causes severe floods in Assam and Bangladesh.

The red river of India

The Brahmaputra is also known as the red river of India. It's red colour is due to the suspension of red soils of Assam. Brahmaputra is known as Tsangpo in Tibet and Jamuna in Bangladesh.

Water way on mountains !

Ferries and boats of bamboo and leather are in use at a height of 3658 m above MSL. This is a spectacular scene in Brahmaputra River in the Tibetan region. This waterway has a length of 670 km.

In the mountainous zone, deep valleys have been formed due to soil erosion for centuries by rivers that originate from the Himalayas. These valleys break the continuity of the Himalayas. The Himalayas are divided into different divisions. The regions from one river bank to other have different names too.

From River Indus to River Sutlej – Punjab Himalaya

From River Sutlej to River Kali – Kumaon Himalaya

From River Kali to River Tista – Nepal Himalaya

From River Tista to River Brahmaputra- Assam Himalaya

What are the different landforms formed due to the depositional activity of rivers at the foot of the mountains?

- Alluvial fans
-
-

Northern Great Plains

Extensive plains have been formed due to the continuous depositional activity of the Himalayan rivers. With several thousand kilometres of thickness, the Northern Great plains spread out to about 7 lakhs km^2. This plain is one of the world's most extensive alluvial plains.

Examine the map (figure: 5.5) and find out in what different physiographic divisions the Northern Great Plains are situated? These plains are known in different names based on the depositional activity of different river systems responsible for their formation. Find out these divisions from the table (5.3).

Name of the plain	The river causes the formation
Punjab – Haryana plain	River Indus and its tributaries
Marusthali – Bagar plains in Rajasthan	Luni and Saraswathi rivers
Gangetic plains	River Ganga and its tributaries
Brahmaputra plains in Assam	Brahmaputra and its tributaries

Table 5.3

- *On the outline map of India given at the end of the textbook demarcate the different parts of the Great Plains in colours.*
- *The south-western part of the Northern Great Plains is a desert. Find out the name of this desert from atlas.*

The disappeared River Saraswathi

Saraswathi was an ancient river, which originated from Himachal Pradesh and flowed to the south and then to the southwest direction. The river which is mentioned in the Rig Veda remains totally disappeared. Studies, with the help of satellite imageries indicate that the river still flows, beneath the ground!

The Northern mountain zone and the Northern Great Plains have a remarkable role in shaping the physiography, climate, culture, human life, agriculture and economy of India. Examine the table (5.4).

After a clear scrutiny of the table 5.4, and from reading materials and mass media, collect more information about the role of these regions in the evolution and spread of the Indian society and conduct a seminar in the class.

Can you find answers to the following questions after examining the maps (Fig: 5.3, 5.5).

- *Which are the tributaries of River Ganga not originating from the Himalayas?*
- *From which zone do these rivers originate?*

Peninsular Plateau

You have learnt about continental drift. The peninsular plateau is a landmass believed to

Northern mountain zone	Northern Great Plains
• Stands as a natural barrier in the northern part of India • Prevents foreign invasion to a certain extent • Supports an indigenous culture • Protects India from the cold winds blowing from the northern parts of Asia • Obstruct south western monsoon winds and provides rain throughout India • Forms the source of several rivers • This region has a remarkable role in the formation of the Northern Great Plains, which is the food bowl of India • It is the abode of diverse animal and plant species. • This region with cool climate and serene nature is a heaven for tourists	• This is the birth place of Indian culture • It forms the backbone of Indian agriculture • One of the world's most densely populated regions • Many metropolitan cities and industrial centres are situated in this zone. • There is an extensive network of rail and road system in this zone • •

Table 5.4

have got separated from the ancient Gondwanaland. This zone is built of stable rocks and is the most extensive physiographic division of India. Note the characteristic features of the peninsular plateau given below.

- This physiographic division has an area of about 15 lakh km^2
- It has a diverse topography of mountains, plateaus and valleys
- The plateaus of this physiographic division has an average altitude of above 400m from mean sea level.
- Anamudi with a height of 2695m is the highest peak in this zone
- Most of the rivers that originate from this zone flow towards the east
- There are large deposits of different minerals occur in this zone
-

Based on the uniqueness of the different regions, the peninsular plateau has been divided into nine subdivisions. The Aravalli hills, Malwa plateau, Vindhya ranges, Satpura ranges, the Chotta Nagpur plateau, the Deccan plateau, the Western Ghats, the Eastern Ghats, the Kachchh and Kathiawar of Gujarat are these subdivisions. Many small and large hills and plateaus are also included in these subdivisions. Find out these from the map. (figure 5.6)

Deccan Trap Region

The northwestern part of the Deccan plateau was formed due to the cooling down of lava from volcanic eruption that occurred millions of years ago. Formed out of igneous rocks, this region is known as the Deccan Trap. Black soils have developed as a result of weathering of rocks in the lava plateau, one of the largest in the world. This black soil, also known as regur (black cotton soil) is most suitable for cotton cultivation.

- *Based on the lesson and the map (figure 5.6) collect more information about the peninsular plateau and prepare a detailed note on it.*

Rann of Kachchh

The brackish swampy region in the northwestern part of Gujarat is called the Rann of Kachchh. High tides from the Arabian Sea and the rivers Luni and Banas, inundate this region. There are two different divisions in the Rann of Kachchh, namely the Great Rann and the Little Rann. The Great Rann which is situated to the north of the Kachchh peninsula, is a region filled by black sedimentary deposits and salts.

- *On the outline map of India provided at the end of the textbook, mark the sub divisions of the peninsular plateau using different colours.*

Peninsular Rivers

Examine the maps (figure 5.5 and 5.6) and find the rivers that originate from the peninsular plateau and classify them in the following table according to the rivers that merge into the Arabian Sea and those that merge into the Bay of Bengal.

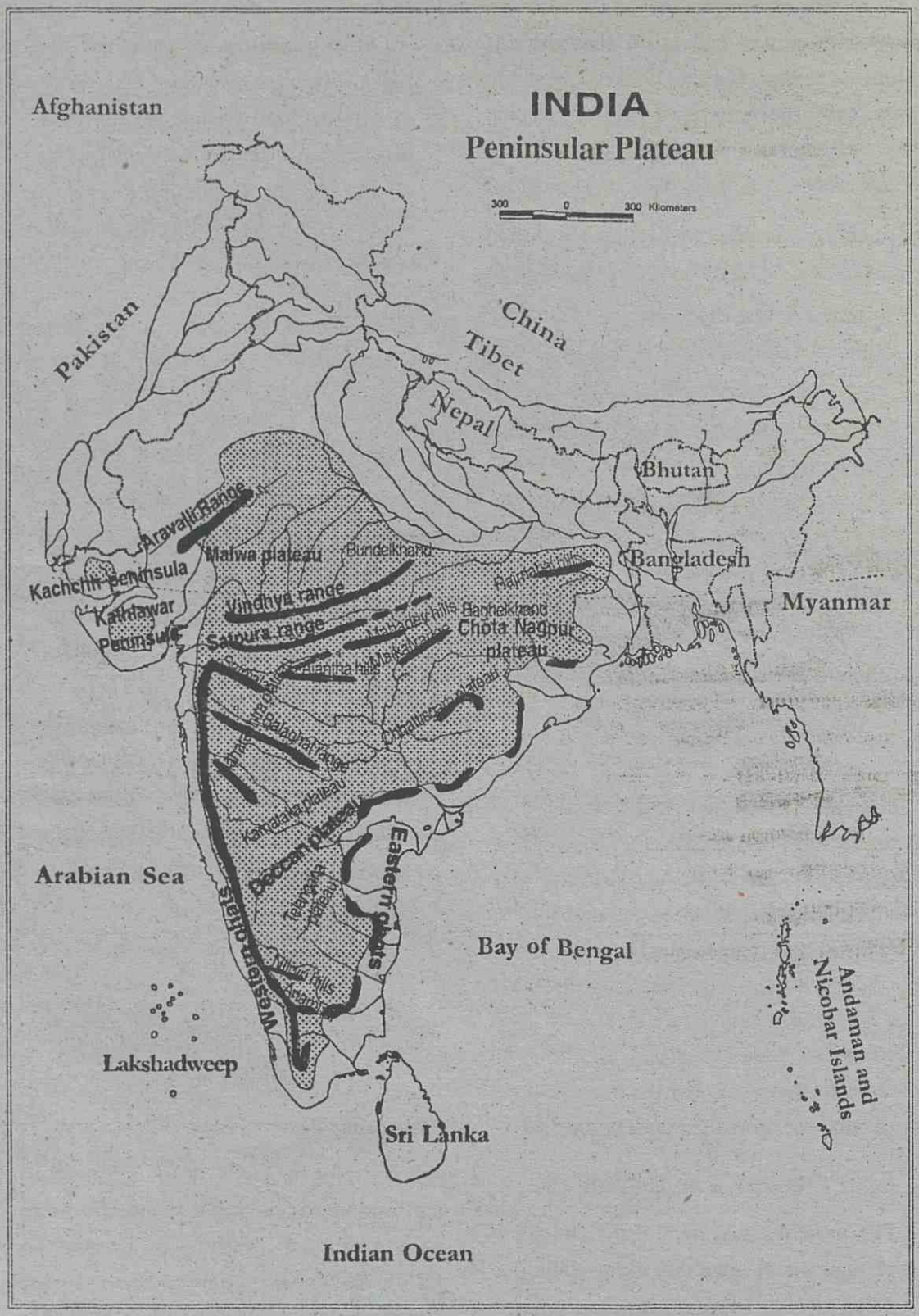


Figure 5.6

Name of river	Debouching Place
• Mahanadi	• Bay of Bengal
• Narmada	• Arabian Sea
•	•
•	•

The peninsular rivers can be divided into two, namely, east flowing rivers and west flowing rivers. For additional information, refer table, (5.5)

Classify the peninsular rivers as east flowing rivers and west flowing rivers. Find out the states through which these rivers flow and make a report on it. For this, you can make use of the drainage map of India, political map of India as well as table (5.5)

Originating from the Peninsular Plateau, rivers Chambal, Betwa, Ken and Sind flow towards the north and joins the Yamuna and the river Son joins the River Ganga. When compared to other peninsular rivers, these rivers are comparatively smaller in length.

Let us now have a comparative study of the Himalayan rivers and the Peninsular rivers based on their characteristic features. Examine table (5.6).

With the help of an atlas find out the location of the urban centres shown below and the river banks on which they situate.

- *Thanjavur*
- *Baruch*
- *Agra*
- *Vijayawada*
- *Surat*
- *Thiruchirapalli*
- *Guwahati*
- *Cuttack*
- *Kolkata*
- *Ladakh*
- *Devaprayag*

River	Source	Length	Major tributaries	The sea to which it merges
Mahanadi	Maikala ranges (Madhya Pradesh)	857 km	Ib, Tel	Bay of Bengal
Godavari	Western Ghats (Nasik district of Maharashtra)	1465 km	Indravati, Sabari	Bay of Bengal
Krishna	Western Ghats (a spring to the north of Mahabaleshwar in Maharashtra)	1400 km	Bhima, Tungabhadra	Bay of Bengal
Cauveri	Western Ghats (Brahmagiri hills in Coorg district of Karnataka)	800 km	Kabani, Amaravati	Bay of Bengal
Narmada	Maikala ranges (Chhattisgarh)	1312 km	Hiran, Bajan	Arabian Sea
Tapti	Multai plateau (Betul district of Madhya Pradesh)	724 km	Aanar, Girna	Arabian Sea

Table 5.5

Himalayan Rivers	Peninsular Rivers
• Extensive catchment area • Rain fed and snowfed • High erosive capability • Develop gorges in the mountains and meanders in the plains • Inland navigation is possible in the plains. •	• Comparatively small catchment area • Rainfed • Low erosive capability • Deep valleys are not produced as they flow through hard crystalline rocks • Less chances for inland navigation. •

Table 5.6

Mark the course of the major rivers of India on the outline map (river systems) of India given at the end of the textbook and name them.

Coasts and Islands

Examine the map of India (fig: 5.2) and find out the states with coastline.

Extending from the Rann of Kachchh in Gujarat to the Ganga-Brahmaputra delta, it has a length of about 6083 km and lies divided into the west and the east coasts. You can learn their characteristic features from table 5.7.

Islands

There are many islands situated in the Indian Ocean, which form part of our country. These are distributed in the Bay of Bengal, Arabian Sea and in the Gulf of Mannar, between India and Sri Lanka.

Lakshadweep means a hundred thousand islands. But, there are only 36 coral islands present in this group of islands. Only ten islands in the group have been inhabited. This group of islands is situated about 300 km away from the Kerala coast. Kavarati is the capital of

West Coast	East Coast
• Between Arabian Sea and Western Ghats • Stretches from Rann of Kachchh to Kanyakumari. • Comparatively narrow • Divided into Gujarat coastal plain, Konkan coast and Malabar coast • Lagoons and estuaries are formed in the west coast • Highly influenced by the south west monsoon	• Between Eastern Ghats and Bay of Bengal • Stretches from Sundarbans to Kanyakumari. • Comparatively wider • Divided into Coromondel coast and North Sircar coastal plains • Deltas are formed in this coastal stretch • Influenced by north east monsoons

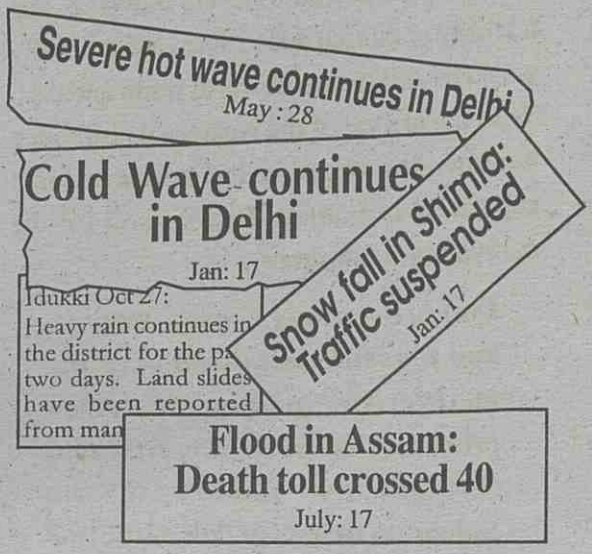
Table 5.7

Lakshadweep. With the help of additional references gather information and find out the inhabited islands in the Lakshadweep group.

Known as Bay Islands, the Andaman and Nicobar islands are located in the Bay of Bengal. There are about 200 islands, in this group the majority of which are uninhibited. The Barren volcano is situated in the Barren Island of this island group.

Climate

Note the news reports given below.



From the reports, it can be presumed that in all places of India, the climate is not the same in all the months. Find out the factors that are responsible for climatic changes.

- Latitude of a place
- Nearness to sea
-

Although the Tropic of Cancer divides India into tropical and sub tropical regions, India is considered to be a tropical country. The Himalayan Mountains and the sea around the peninsula have a major role in maintaining the climate of the whole country as a tropical one. The great Himalayas obstruct the monsoon winds and provide rain throughout the country as well as protect from the cold winds which blow from the North.

Though there is much local diversity in climate, India in general, has a monsoon climate.

With the seasons

The Arabs who traded with India used the seasonal winds for sailing their ships. They called these winds "Mousim" which means season. The term monsoon has evolved from Mousim. It was the Greek philosopher Hippallus who for the first time observed and recognised the seasonal winds that blow between Africa and India.

Have you learnt about monsoon winds? Which are the seasons in which they blow? Which are the two rainy seasons we have?

Based on temperature and rainfall the seasons of India are divided into four.

- Cold weather season
- Hot weather season
- South West monsoon season
- North East monsoon season (season of retreating monsoons)

Cold Weather Season

Have you heard of the extreme cold in north India? Extreme cold and dense fog is experienced in certain months, throughout north India. Some places experience heavy snowfall. Even airports remain closed down

and vehicular transport gets affected in this season.

- *Which are the months in which we have cold season in India?*

The average daily temperature recorded at different places from south to north for two different months is given in the table5.8. Examine the temperature for January and find out the direction in which the temperature change occurs.

Place	Temperature (in °C)	
	January	May
Thiruvananthapuram	26.5	28.5
Chennai	24.3	29
Bangalore	21.0	29.4
Pune	20.6	29.7
Kolkata	18.5	30.6
Delhi	13.8	33.2

Table 5.8

The distribution of temperature in India from December to February is almost like this. This period is the cold season in India. In this period, north India experiences moderate temperature in the day time and cold condition at night. You might have read in the newspapers about the snowfall in the cold seasons in the hill stations away from the coast, such as Shimla, Darjeeling, Manali and Mussorie. In this season, the north east winds that blow from the land to the seas produce a dry climate throughout the country.

But, these winds cause high rainfall in the east coast of India during this period, especially on the Tamil Nadu coast.

Condensing moisture

Condensation is the process of cooling down of moisture that has evaporated. Based on the rate of condensation, it has been classified into dew, mist, fog, snow, rain, hailstone, etc.

The phenomenon of "western disturbance" is another feature of the cold season. When these winds reach the Himalaya Mountains, they lead to severe snow fall. The intensity of rainfall due to this wind gradually weakens as it moves towards north and east. With the arrival of the western disturbance winter rains occur in the northern plain especially in Punjab. This is ideal for the cultivation of rabi crops.

During the winter season, extreme low pressure is formed over the Mediterranean Sea. It moves gradually towards the east and through the passes in the Sulaiman ranges of Pakistan. This phenomenon which causes heavy rainfall to Punjab, Haryana, Delhi and Uttar Pradesh is known as Western Disturbance. Jet streams have a major role in bringing the western disturbance to India. A strong flow of air through the tropopause is called the Jet Streams.

- *Extreme cold season is not felt in the northern states. What could be the reason for this?*

Holi – the festival of colours

Spring season comes after winter. Blooming grasses, shrubs and trees, all heralding the advent of spring season is a period of joy and festival to our motherland. The people of north India celebrate it as 'Holi'. Today all Indians celebrate the occasion alike strewing colours and warmth in each and every minds.

Hot weather Season

Burning sun above, parched fields and dried up streams below..... Cattle grazing on the arid grounds, village women carrying pots and walking for miles in search of potable water, the hot dusty wind that blows all around....

What you read is a sketch of an Indian village during hot-weather season. This season in India is from March to June. Examine the table 5.8 and find out how the temperature is distributed in the month of May.

Didn't you understand that some places experience different temperatures in different months. The apparent movement of the sun is the reason for this. In India, summer occurs when the sun shines above the northern hemisphere. Likewise when it is winter the sun's position is in the southern hemisphere. The maximum temperature recorded ever in India is at Barmer (55°C) in the western border of Rajasthan.

To manage drought

Western Rajasthan, Kachchh, Telengana regions, Karnataka, Tamil Nadu and some places in Orissa are regions that experience extreme drought conditions. Today, Kerala has also started experiencing drought conditions. How can we tackle droughts?

- **Give more importance to water shed development programmes.**
- **Establish local development programmes on a par with water-shed regions.**
- **Cultivate crops which can resist drought.**
- **Popularise rain pits and rainwater harvesting.**
- **Plant trees**
- **Participate in awareness programmes for the conservation of water and motivate others to participate in such programmes.**

Due to intense hot condition that continues from March to May over the northern plains, a low-pressure region is formed. During this season a dry dusty wind called 'Loo' blows over the north western Uttar pradesh and Rajasthan resulting in the rise of atmospheric temperature further. Other local winds that blow in this season are the Kalbaisakhi, Mango showers, etc.

Local winds of India

Kalbaisakhi is a dry local wind of West Bengal during summer season. Originating from the Chota Nagpur plateau and influenced by the westerlies, this warm wind moves

eastwards and is responsible for heavy rain and hailstones in West Bengal, Assam and Orissa. These winds many a time cause destruction to life and property. Cherry Blossom is a local wind blows over the interior Karnataka during the same season is good for coffee cultivation. Mango shower is another local wind that blows during the summer season along the Karnataka coast and in Kerala.

South West Monsoon Season

- *Which are the months in which the south west monsoon is experienced in India?*
- *Why does India receive extensive rainfall during the south west monsoon?*

Examine the map (fig: 5.7)

The south west monsoon appears to enter the Indian subcontinent in two branches; the Arabian Sea branch and the Bay of Bengal branch. The Arabian Sea branch causes extensive rainfall in the western and central states and the Bay of Bengal branch gives rainfall to the northeastern states and eastern coastal plains.

- *What is the reason for heavy rainfall in the western slopes of the Western Ghats while the Eastern Ghats receive scanty rainfall?*

The Arabian Sea branch, which gives moderate rainfall in the Deccan plateau and Madhya Pradesh, joins the Bay of Bengal branch over the Gangetic plains. A branch of the Arabian Sea branch monsoon blows over Saurashtra and Kachchh in Gujarat and it gives scanty rainfall in broken spells as it reaches western Rajasthan. But when it reaches Punjab and Haryana it joins with the Bay of Bengal branch and blows northwards and gives good rainfall in the northern Himalayan regions.

Aravalli Mountains

One of the oldest mountains of the world, Aravalli extends from Delhi to the northern part of Gujarat covering a distance of about 800km. The mountain range has played a major role in the formation of Rajasthan desert (Thar desert). Lying parallel to the monsoon winds from the Arabian sea, it cannot obstruct the moisture-laden monsoon winds. Rajasthan receives only scanty rainfall due to this reason. The highest peak Guru Sikhar, (1722m) in the Aravalli range is located in Mount Abu.

The Bay of Bengal branch monsoon which enters Bangladesh and West Bengal from the south and southeast directions, bifurcates into two as it crosses West Bengal. One branch enters the Brahmaputra valley and gives heavy rainfall in the north and north-eastern regions. The Khasi-Jaintia hills of Meghalaya obstruct these winds and cause heavy rainfall in these regions. Cherrapunji and Mousinram are in this region.

The other branch moves towards the northwest and through the Ganga plains it reaches Punjab - Haryana plains and joins the Arabian Sea branch.

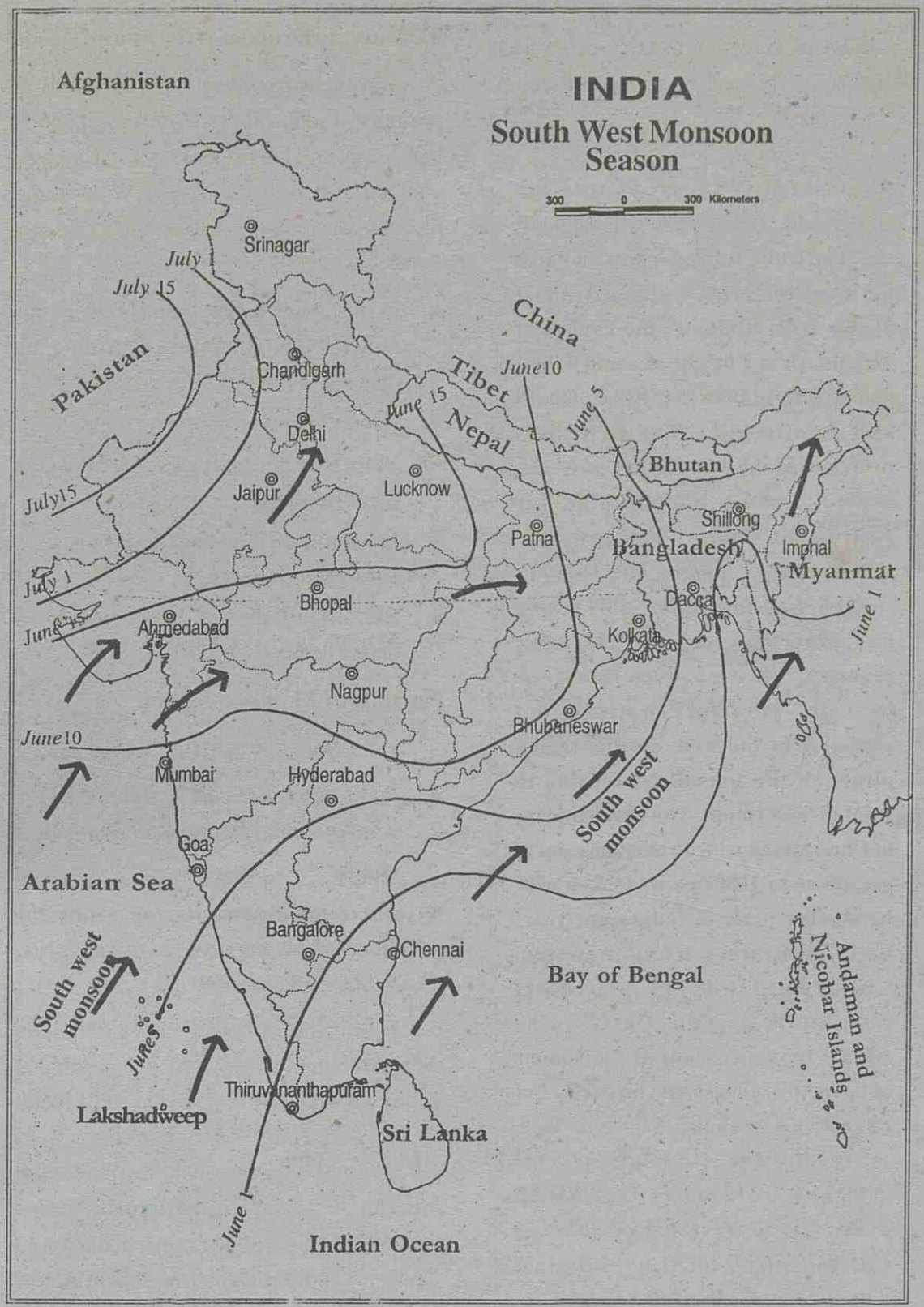


Figure 5.7

India receives about 60% of its total rainfall during the south west monsoon season.

Land of Rain

No doubt it is Cherrapunji – the village, which receives rain throughout the year is the rainiest place on earth for many centuries, is situated about 56kms from Shillong, the capital of Meghalaya in a height of about 4500ft above MSL in between Khasi, Gharo and Jaintia hills. The Britishers pronounced the word Sohra as Chira. 'Sohra' means not suitable for cultivation. 'punji' means soil. 'Cherrapunji' means the soil not suitable for cultivation. This region has very poor topsoil has large reserves of coal and limestone beneath. Therefore water is not available in the wells in this region although the topsoil is wet due to rainfall year round. The coveted place of Cherrapunji with an average rainfall greater than 1080cms was taken over by another place in India some years back. Mousinram, 6 km away from Cherrapunji was the place that captured the position. The Hawaiian Islands have also claimed the honour of being the rainiest spot on earth. But recently Cherrapunji has come back to regain the first place. Our neighbouring country Bangladesh prays not to have heavy rains in Cherrapunji – for the reason that when heavy rainfall occurs in Cherrapunji many places in Bangladesh will get inundated.

Measures to be taken at the time of floods

You might have heard about the floods in the north Indian rivers from newspapers, television etc. Do floods occur in rivers of your place during rainy seasons? What are the precautionary measures to be taken during a flood?

- Do not ignore the governments warnings issued by the authorities regarding the opening of dams during a flood.
- Avoid entering rivers during flood.
- Move to secure places from areas which could be affected.
- Be cautious about contagious diseases during flood seasons.
- Be cautious about broken power lines during thunderstorms.

North East Monsoon Season

Study the map (fig: 5.8)

- *What difference can you notice in the wind direction from that of South West monsoon?*
- *Name the months during which the monsoon winds blow in the direction as shown in the map (fig 5.8).*

During the northward march of the sun the monsoon blows towards the north and during the southward march of the sun it blows to the south. This southward progression is called the retreating monsoon. You have learnt that during the southward movement of the sun the northern hemisphere is gripped by cold weather conditions. During this season the low pressure formed over the Bay of Bengal attracts air from the north. These winds pick

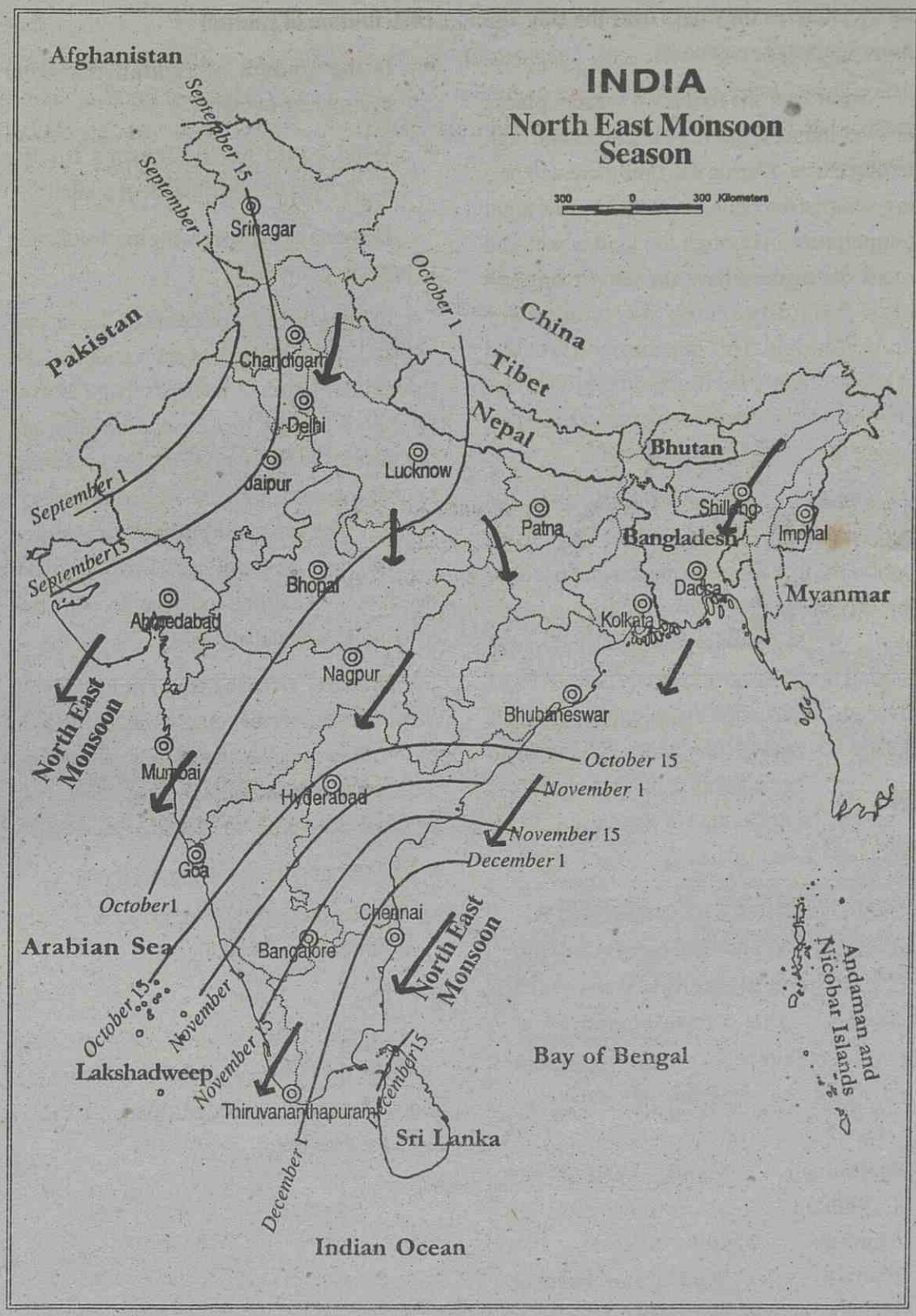


Figure 5.8

up moisture as they pass over the Bay and blow against the east coast.

Soon after the monsoon season, places all over India experience clear skies and high temperatures. During this time there will be a high diurnal temperature and a very low night temperature. Although the land is wet and moist during these days, the temperature and high humidity make day time very uncomfortable. This phenomenon is called "October heat". By the middle of October atmospheric temperature decreases fast and winter season begins in north India.

October - November months are a gap between rainy season and winter. During this period the low pressure region that occur in the Bay of Bengal causes the formation of cyclones. These cyclones give extensive rainfall in the eastern coastal states of India and cause destruction to the highly populated deltaic regions of Godavari, Krishna and Cauvery. The influence of this rainfall is experienced in the state of Karnataka, Tamil Nadu and Kerala also.

Traditional Indian seasons

Ancient Indians had recognised and demarcated different seasons much before the development of meteorological studies. They had divided the year into six different seasons.

Vasantham → March - April
Grishmam → May - June
Varsham → July - August
Sharath → September - October
Hemantham → November -December
Shishiram → January - February

Distribution of rainfall

- Is the amount of rainfall the same everywhere in India?
- What could be the reasons for the disparity in the distribution of rainfall?

Examine the map showing the distribution of rainfall (figure 5.9)

In India there are places like Cherrapunji with more than 1080cm of annual rainfall and places like Jaisalmer with less than 12 cm of rainfall. While the western coastal plain and the north-eastern region receive an annual rainfall greater than 400cm. western Rajasthan, Gujarat, Haryana and Punjab have annual rainfall less than 60cm. Based on the distribution of rainfall India has been divided into different rainfall regions.

Draw the rainfall map of India with the help of a tracing table. Superimpose this map on the physiographic map of India and analyse the relation between distribution of rainfall and physiography. What conclusions can we have.

- High rainfall regions and their reasons
- Reasons for the local difference in the distribution of rainfall
-

We can have a discussion in the class based on the information gathered. Prepare a report incorporating the information gathered from the discussion.

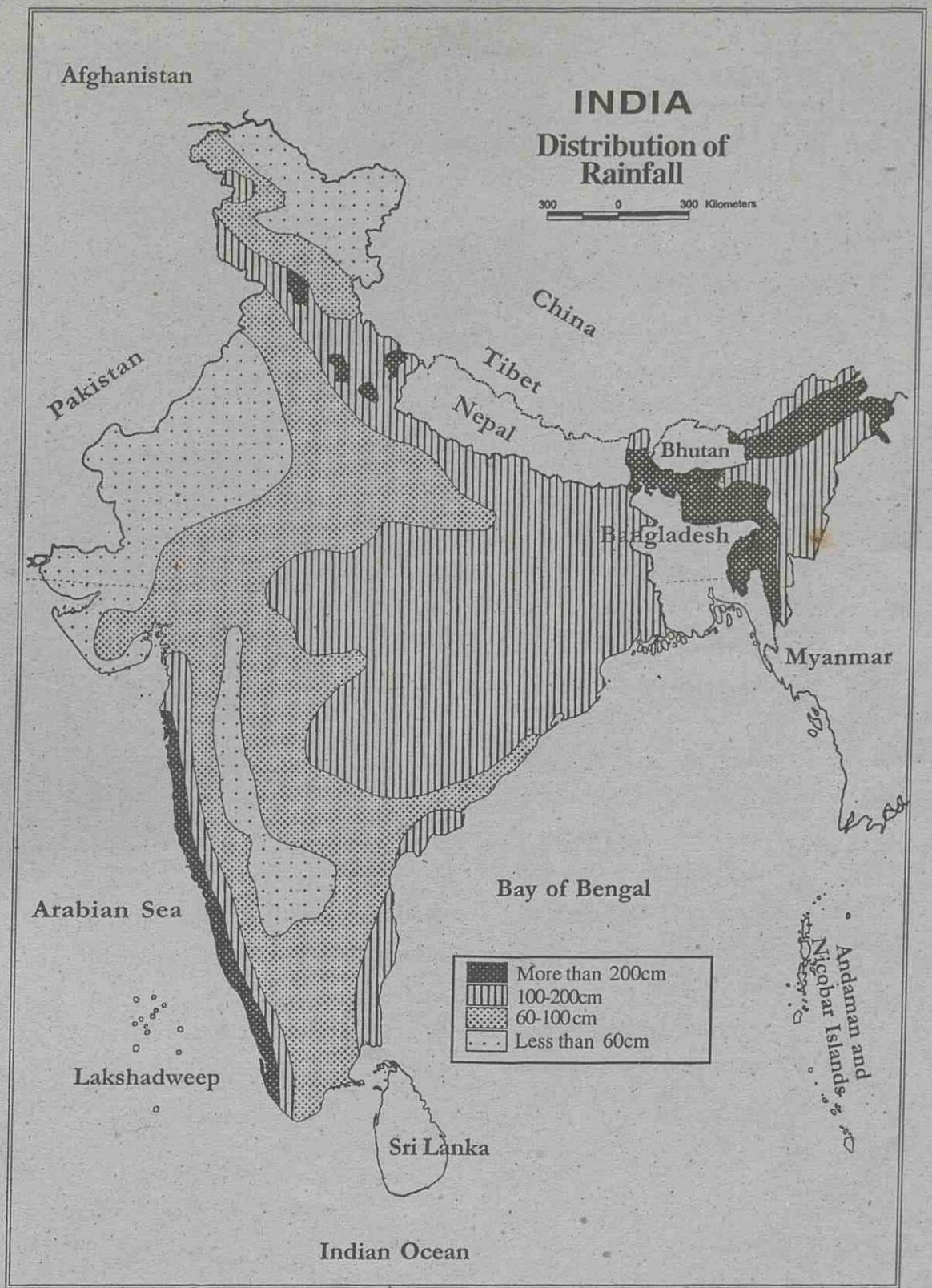


Figure 5.9

SUMMARY

- India is a unique land with diverse physiography, climate and many rivers
- India with an area of 3287782 km^2 and an extent of 3214 km from north to south and 2933km from east to west is situated between $8^0 4'$ N and $37^0 6'$ N and from $68^0 7'$ E to $97^0 25'$ E.
- Physiographically, the regions of India has been divided into the Northern Mountain region, the Great Plains of the North, Peninsular plateau, the Coastal plains and Islands.
- Although there is climatic diversity, the climate of India is termed as monsoon climate
- Based on temperature and rainfall the seasons of India have been divided into four viz., cold, weather season, hot-weather season southwest monsoon season and northeast monsoon season.

QUESTIONS

1. Describe the importance of Northern mountain regions and Northern Great Plains.
2. Explain the role of Northern mountain regions in the formation of Northern Great plains
3. Explain the differences between Peninsular Rivers and Himalayan Rivers.
4. Classify the Indian seasons based on temperature, and rainfall and prepare a report.
5. What are the differences between the western coastal plains and eastern coastal plains?

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6 INDIA - RESOURCES

What we have learnt

- Resources are substances found in nature, which are useful to human beings.
- Resources are classified as renewable and non-renewable, perishable and non-perishable & biotic and abiotic.
- Various agricultural resources are produced in different parts of India.
- Many multi-purpose river valley projects are established in India.
- Different types of mineral recourses are present in India.
- Different types of soils and natural vegetation are seen in India.

Resources are the basis for the development of any country. India, one of the largest countries in the world, is blessed with diverse and abundant resources. Only a judicious use of resources will help the development of a country. Over exploitation and unscientific land-use practices will lead to environmental problems and to resource depletion. We shall learn about the various resources and their distribution in our country.

Water Resources

Water plays an equally crucial role as air in sustaining life on earth. With a population of over 100 crores and lakhs of hectares of cultivable land, the importance of water resources in India is immeasurable. Some information about the water resources in India is given below.

Water obtained from rain and melting of ice is stored in various surface sources and underground aquifers. Human beings use this water for various purposes. You have learnt that the amount of rainfall received in different places of India is not same. Seasonal and regional variation in the distribution of rainfall is the peculiarity of India. Due to this the agriculture sector in India has to depend more on irrigation.

Irrigation

84% of the water resources of India is used for irrigation. Irrigation facilities are established based on the surface as well as underground sources of water. Various sources of irrigation in India are:

- Ponds
- Wells
- Canals
- Springs

Multipurpose River Valley Projects

Several river valley projects, aimed at agricultural and industrial development, were set up after independence. Most of them were multipurpose projects.

The objectives of multipurpose projects:

- Irrigation
- Flood control
- Soil conservation
- Supply of drinking water
- Water transport
- Tourism
- Pisciculture
- Electricity generation
-
-
-

Table 6.1 gives information about the important multipurpose projects in India.

Project	River	Beneficiary States
Damodar Valley Project	Damodar	Jharkhand, West Bengal
Bhakra Nangal	Sutlej	Punjab, Haryana, Rajasthan
Hirakud	Mahanadi	Orissa
Kosi River Valley Project	Kosi	Bihar
Chambal River Valley Project	Chambal	Madhya Pradesh, Rajasthan
Thungabhadra River Valley Project	Thungabhadra	Karnataka, Andhra Pradesh
Nagarjuna Sagar	Krishna	Andhra Pradesh
Narmada River Valley Project	Narmada	Madhya Pradesh, Gujarat, Rajasthan
Indira Gandhi Canal	Beas, Sutlej	Punjab, Haryana, Rajasthan

Table 6.1

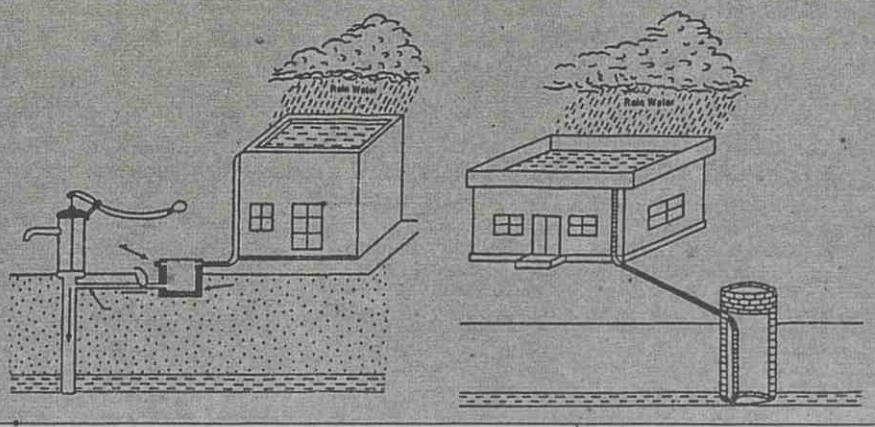
You have learnt about the various water conservation methods in previous classes.

A major portion of fresh water available in India is lost due to the unscientific ways of usage and improper conservation methods.

Water conservation attains prime importance in a country like India where agricultural and domestic needs of water are solely dependent on rainfall. Water conservation can be made possible to a certain extent through watershed management and rain harvesting programmes.

Rainwater Harvesting

You have learnt about the various measures taken to increase the amount of underground water. Rainwater harvesting is a technique to store the rainwater without being wasted. Rainwater collected on the terraces of concrete buildings is diverted to the subsurface soil through pipelines. Water thus collected in the soil becomes part of underground water.



Soils

Soil is one of the most important natural resources. It is indispensable for the existence of plants and animals. Soils are formed by the combined work of rocks, topography, climate and plants. Soils of India are classified based on their colour, structure and place where they are found. Find out those soil types and their characteristics from the following table (Table6.2).

Based on the table 6.2 and the map (fig. 6.1) find out the various types of soils and the states where they are found, through the superimposition technique, and prepare notes.

Natural Vegetation

Vegetation evolved according to the environmental conditions of a region is known as natural vegetation. Factors that influence natural vegetation are

- Topography
- Soil
- Amount of rainfall
- Temperature.
-

Observe the map (fig. 6.2). What are the various natural types of vegetation in India?

Soil Type	Characteristics
Alluvial Soil	• High fertility. • Newly formed alluvial soils are called 'Khader' and old soils are called 'Bhangar'. • Found mostly in flood plains and deltas.
Black Soil (Cotton soil)	• Black in colour. • Suitable for cotton cultivation. • Also known as 'Regur'. • Formed due to the disintegration of lava rocks. • Highly fertile and moisture holding capacity is high.
Red Soil	• Formed due to disintegration of metamorphic and igneous rocks. • Comparatively less fertile. • Presence of iron gives the red colour.
Laterite	• Very low fertility. • Formed in the monsoon climatic regions. • Mixture of clay and red soil.
Desert Soil	• Moisture content very low. • Able to give more yield if water is available. • Insoluble salts are seen.
Mountain Soil	• Rich in humus content. • Dark brown or black in colour. • Comparatively high fertility

Table 6.2

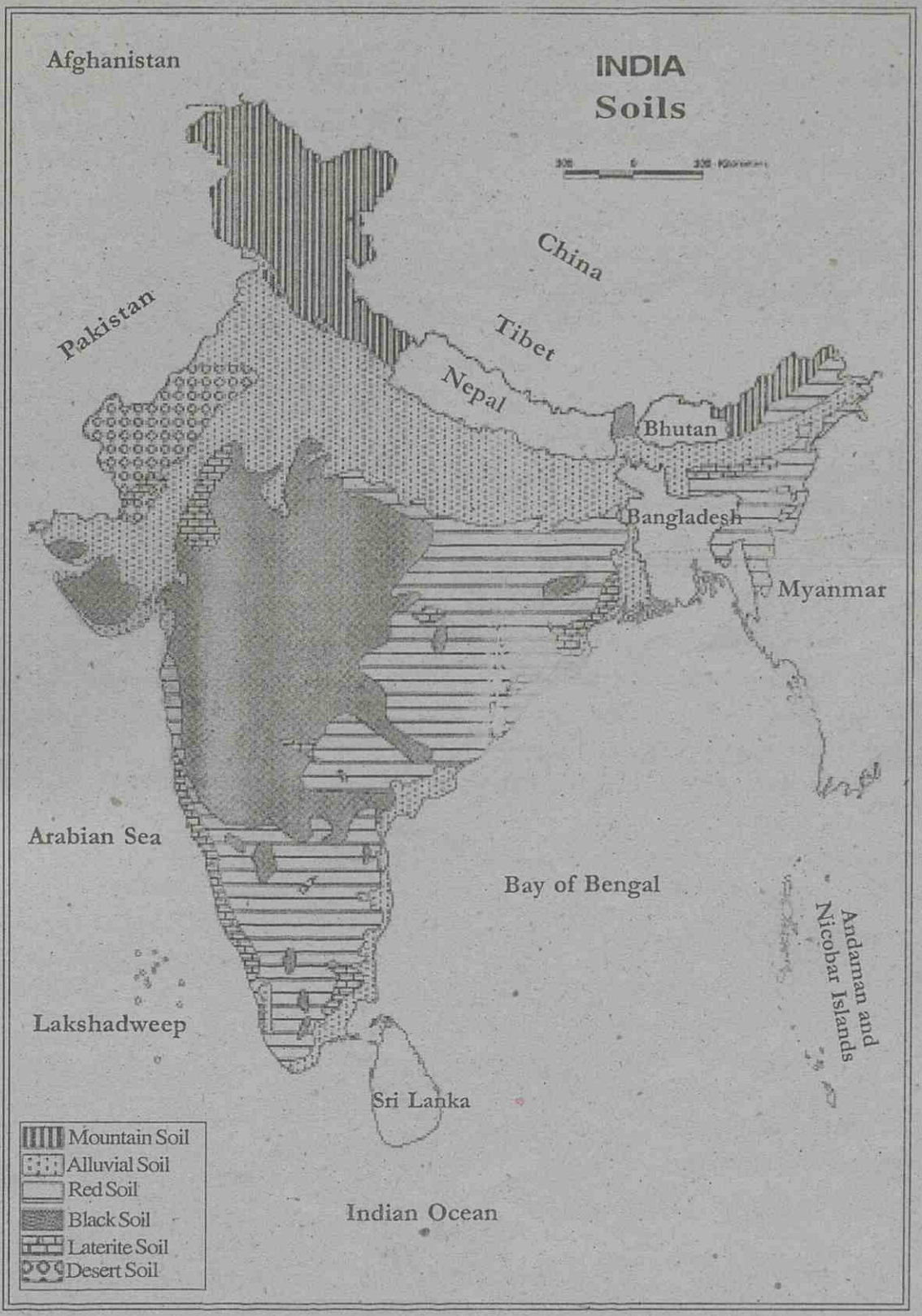


figure 6.1

The following are the common characteristics of various types of natural vegetation of India.

Tropical Rain Forests

Our tropical rain forests include tropical evergreen forests and tropical semi-evergreen forests. They are mostly found in places where there is plenty of rainfall and sunshine throughout the year.

Observe maps and find out the topography of the places where the tropical rain forests are found. In which of the states these are distributed? Prepare notes.

Tropical Deciduous Forests

You have learnt in the previous classes about the characteristics of tropical deciduous forests, major trees types and the places where they are found in Kerala. Teak, sal, and sandalwood are some of the important trees found in the tropical deciduous forests of the eastern slopes of Western Ghats as well as in the northeastern parts of the peninsular plateau and in the valleys of the Himalayas.

Thorn Forests and Shrubs

Thorn and Shrubs are found in dry places where the annual rainfall is less than 70 cms. Major plant species found are babul, kikar and coarse grasses. Observe the map (figure 6.2)and find out the places where these types of vegetation are found.

Temperate Forests and Grasslands

Various types of plants are found in the Himalayas in relation to the varying altitudes. Broad-leaved evergreen trees grow between altitudes 1000 metres and 2000 metres. Oak, chestnut and maple belong to this category. Coniferous trees such as pine, deodar, silver fir and spruce are seen between altitudes 1500 metres and 3000 metres. They are found in the southern slopes of the Himalayas. Temperate grasslands are commonly seen at higher altitudes in these regions.

Alpine and Tundra Vegetation

Vegetation growing at altitudes above 3600 meters MSL is known as alpine vegetation. It can be noticed that as the altitude increases plants show stunted growth. Silver fir, pine, juniper and birch belong to this category. Alpine grasslands are found at higher altitudes in this region. People belonging to Gujjar and Bakarwal tribal groups, whose main occupation is sheep grazing, make use of this region. The vegetations like lichen and mosses are found in high altitudinal regions.

Mineral Resources

As one of the most important resources, minerals have a decisive influence on the economic development of a country. They are seen in solid, liquid and gaseous forms. Minerals can be classified into metallic and non-metallic minerals. Table 6.3 gives the major minerals of India.

Metallic Minerals		Non Metallic Minerals
Ferrous	Non-ferrous	
Iron Ore	Gold	Sand stone
Manganese	Silver	Nitrate
Pyrite	Copper	Potash
Nickel	Lead	Dolomite
Tungsten	Bauxite	Mica
Cobalt	Tin	Gypsum
		Coal
		Petroleum

Table 6.3

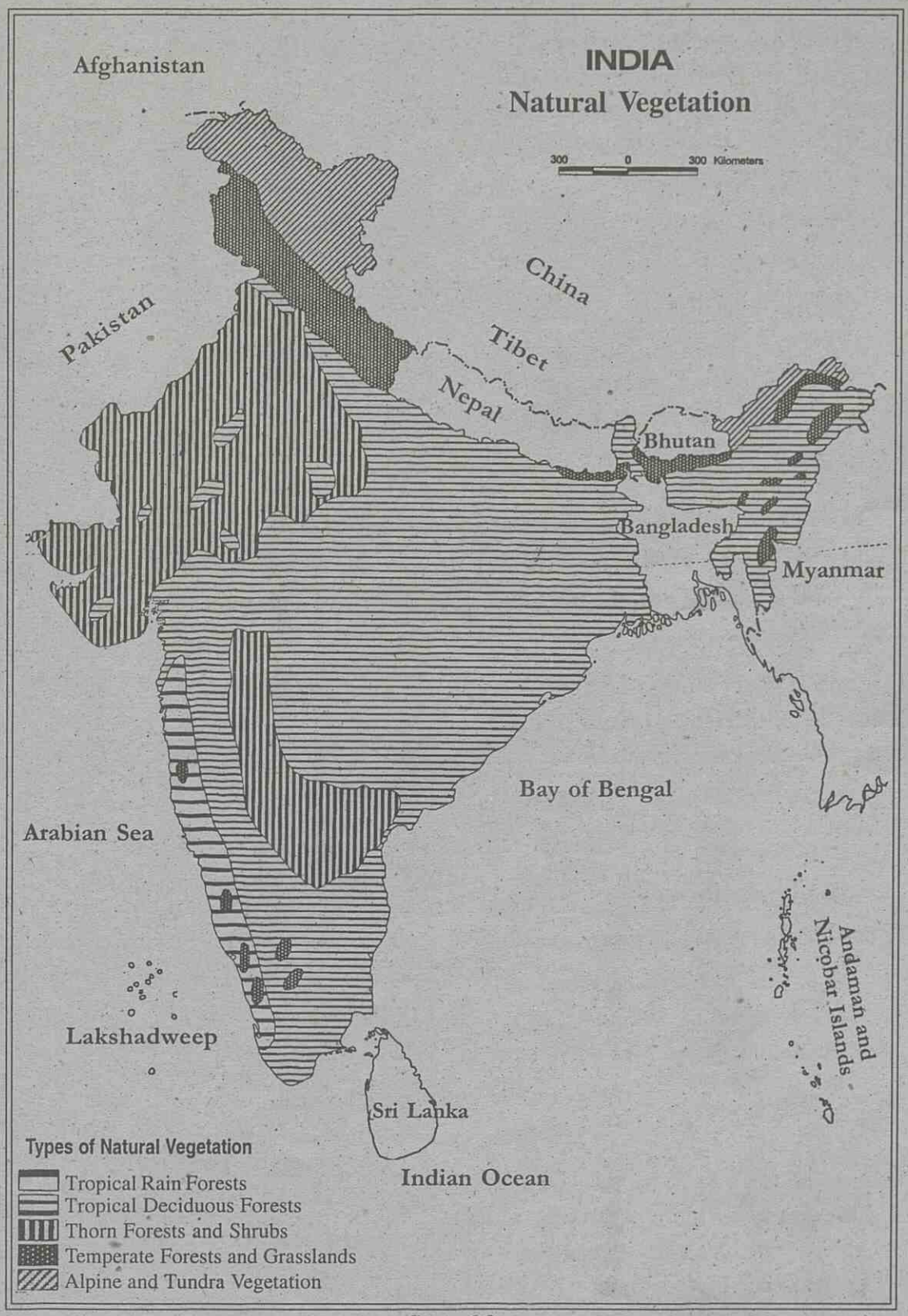


figure 6.2

Iron Ore

Iron ore is the basic resource for a nation's development. Iron is described as the backbone of civilization. As the major raw material for the iron and steel industry, iron ore is found in four varieties.

- Magnetite
- Limonite
- Hematite
- Siderite

20% of the iron ore deposits of the world is found in India. Major iron ore deposits of India are given in the Table. 6.4.

Producing Centres	State
Durg, Dandiwara Districts	Chattisgargh
West Singhbhum, East Singhbhum Districts	Jharkhand
Sundergarh, Kendujhar, Mayurganj Districts.	Orissa
North Goa District	Goa
Chickmagalore, Bellari Districts	Karnataka

Table 6.4

Find out from the map (Fig. 6.3) other states where iron ore deposits are found.

About half of the iron ore produced in India is exported to Japan, Korea and Western Europe.

Manganese

It is estimated that about 20% of the manganese deposits of the world are in India. India has the fifth position in the production of manganese. Manganese is used in the manufacture of many items. Let us see what they are.

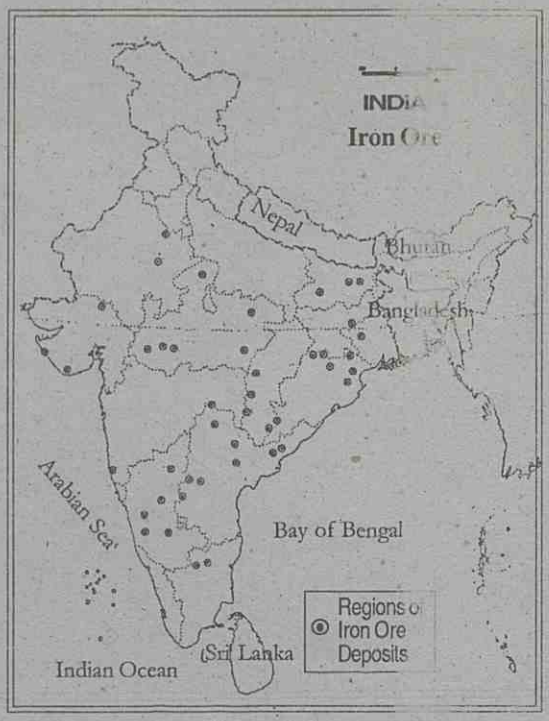


figure 6.3

- Iron and Steel
- Bleaching powder
- Pesticides
- Paint
- Batteries

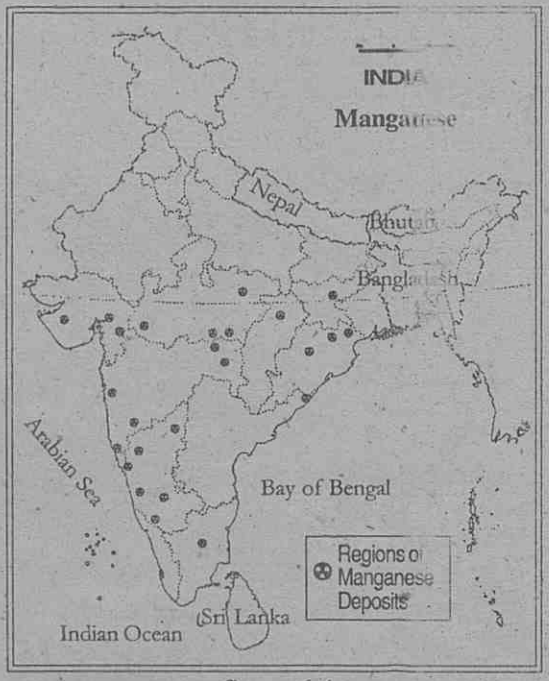


figure 6.4

Find out from the map (Fig. 6.4) major manganese producing centres of India.

Bauxite

Bauxite is the ore of aluminium. Since aluminium is a light metal it has enormous industrial importance. Find out from Table 6.5, the major bauxite producing centres of India.

Producing Centres	States
Bilaspur	Chhattisgarh
Mandila, Shakdol	Madhya Pradesh
Vishakhapatnam	Andra Pradesh
Ranchi	Jharkhand
Ratnagiri, Raigarh	Maharashtra
Sambhalpur, Kalahandi	Orissa
Sancune	Goa
Salem, Madurai, Nilgiris	Tamil Nadu
Jam Nagar, Surat	Gujarat
Belgaum	Karnataka

Table 6.5

Copper

Copper is another metal seen in nature. As a good conductor of heat and electricity copper has an important role in the electrical goods industry. Copper is mixed with other metals to form alloys. Find out from Table 6.6, the major copper producing centres.

Producing Centres	State
Sighbhum	Jharkhand
Jun Jun, Alwar districts	Rajasthan
Chitradurga, Gulbarga	Karnataka
Guntur, Nellore	Andhra Pradesh
Balaghat	Madhya Pradesh

Table 6.6

Mica

Mica is a bad conductor of electricity and is used in the manufacture of electrical goods. India contributes about 60% of the mica produced in the world. Major mica producing states of India are Jharkhand, Bihar, Andhra Pradesh and Rajasthan.

Lead

Lead is a soft and heavy metal. Its ore is known as 'Galena'. It is a metal with very low heat conductivity. It is used in the manufacture of paint, glass and rubber products. Lead is mainly produced in Rajasthan, Gujarat, Maharashtra, West Bengal, Orissa, Uttar Pradesh, Meghalaya, Madhya Pradesh, Andhra Pradesh and Tamil Nadu states.

Agricultural Resources

India is one of the countries where agriculture has got a very important place. Like other resources, agricultural resources have significant influence on Indian economy. Three fourths of her population depend on agriculture. Agriculture sector is the source of raw materials for many industries. It makes the food basket richer for a nation like India which stands second in the world in terms of population.

Agricultural sector in India is dynamic throughout the year. Variety in seasonal crops is the peculiarity of our agricultural sector.

What are the factors that influence the agricultural sector?

- Climate
-

Agricultural crops are classified into three, based on seasonal changes. Observe table 6.7.

Name	Sowing Period	Harvest Period	Major Crops
Kharif	June (Beginning of monsoon)	Early days of November (End of monsoon)	Paddy, maize, cotton, millets, jute, sugarcane groundnut
Rabi	November (Beginning of winter)	March (Beginning of summer)	Wheat, tobacco, mustard, pulses, linseed
Zaid	March (Beginning of summer)	June (Beginning of Monsoon)	Fruits, vegetables, water melon

Table 6.7

India has the first position in the production of many crops.

Since India is an extensive country the diverse agricultural crops can also be classified as shown below.

- **Tropical Crops:** Paddy, coffee, sugar cane, jute, rubber, spices, mango, pineapple.
- **Sub-tropical Crops:** Cotton, tea
- **Temperate Crops:** Wheat, maize, barley

Let us understand the major food crops of India and their characteristics.

Food Crops

Diversity of food crops of India should be ascertained according to the factors of temperature, rainfall and soil. Paddy, wheat, millets and pulses are the major food crops of India.

❑ PADDY

Paddy is the most important food crop of India. India stands second in the production of paddy. India and China together produce about 90% of the total world production of paddy.

Geographical Requirements

Temperature: 16°C to 20°C of temperature in the early stages of growth. 18°C to 32°C of temperature is essential during the harvesting period.

Rainfall: Paddy is cultivated in places where rainfall is between 150 cm. to 300 cm. If irrigation facilities are available paddy can be cultivated in places where the rainfall is low.

Soil: Even though paddy can be cultivated in variety of soils, alluvial soil is the most suited for its cultivation.

If required temperature is available, the altitude of a place is not at all a problem for the cultivation of paddy. It grows at an altitude of over 2000m in Kashmir and at Kuttanad in Kerala, which is below sea level.

Find out the major rice growing states from the map (figure 6.5).

❑ WHEAT

Wheat is another important food grain, after paddy. It is the staple food of the people in the states of Punjab, Haryana and Uttar Pradesh. Even though wheat is

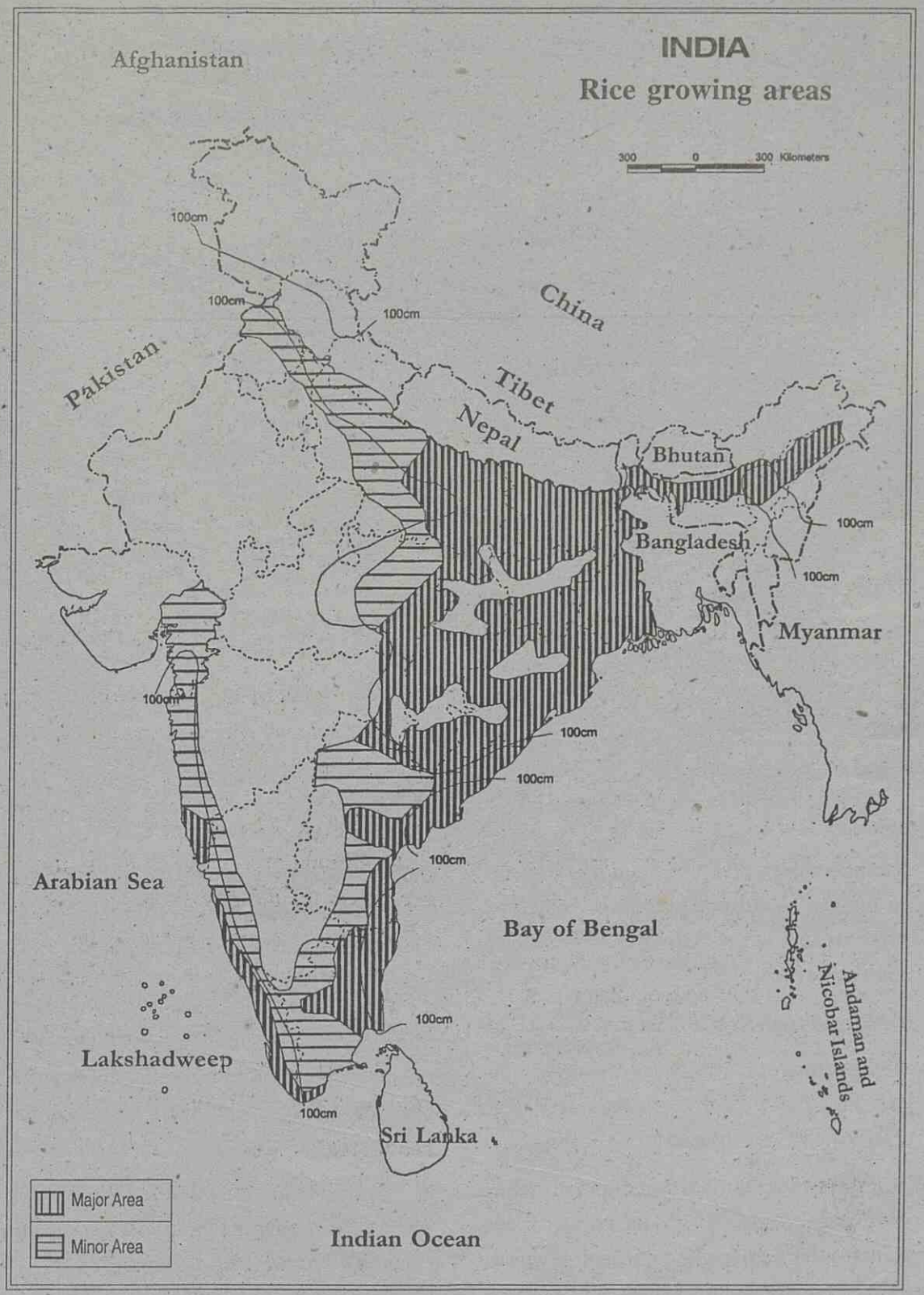


figure 6.5

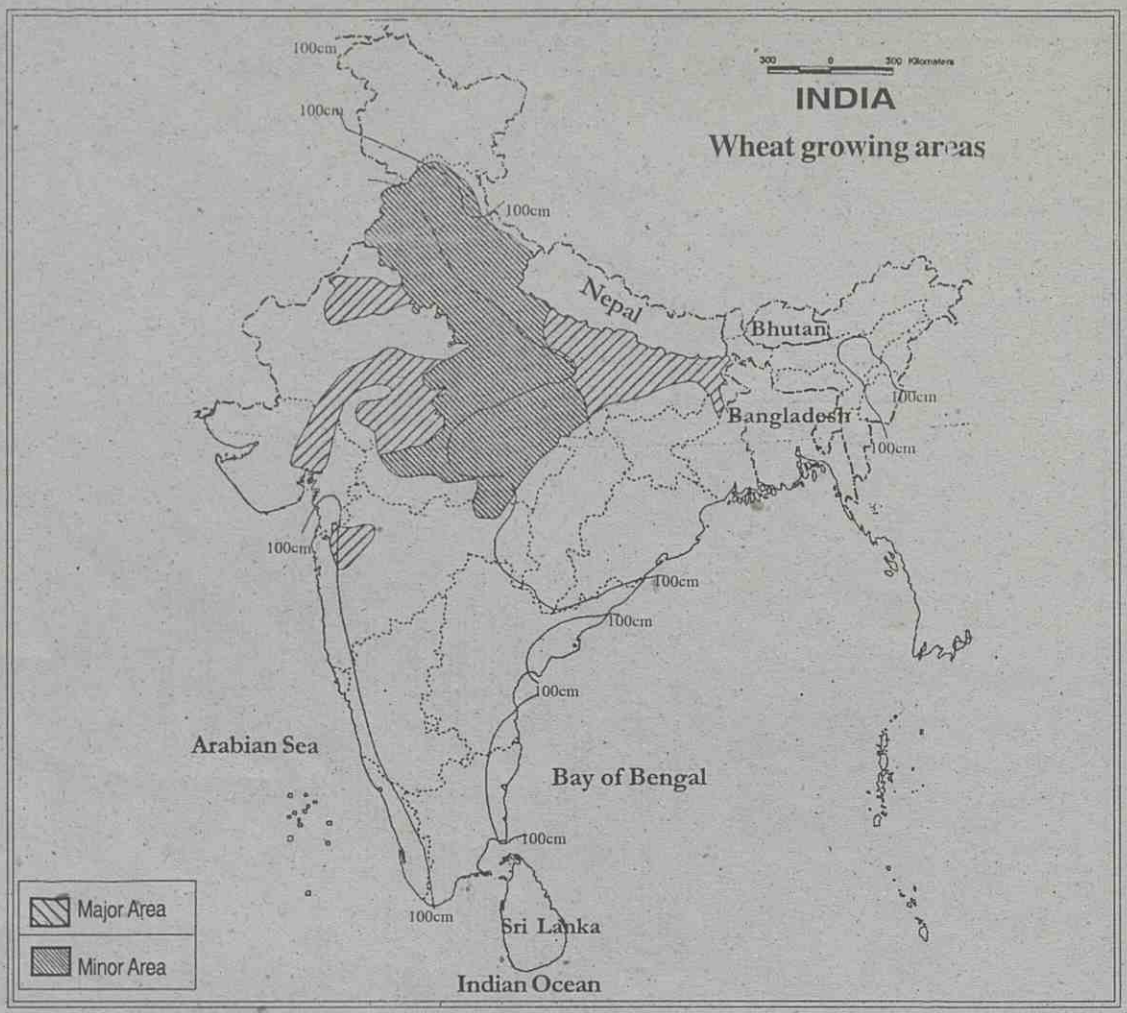


figure 6.6

a temperate crop it is considered a rabi crop in India. It is cultivated in those places in northern India where the temperature in winter does not exceed 15°C.

Geographical Requirements

Temperature: During the growing season 10°C to 15°C and during the harvest season 25°C to 28°C is required.

Rainfall: 150 cm to 300 cm of rainfall during the growing season is good for wheat. Excess rainfall is harmful for the cultivation of wheat. If irrigation is available wheat can be grown in places where the rainfall is low.

Soil: Porous soil with content of lime is suitable for wheat cultivation. It is cultivated in the Ganga Plain and in the Deccan Plateau.

Find out from the map (Fig. 6.6) the places where wheat is grown in India.

Note from table 6.8 other food crops cultivated in India and their geographical requirements.

- *Colour out the various food crops producing states in India in the map shown at the end of this textbook.*

Crops	Temperature	Rainfall	Soil	Producing States
Maize 	Between 20°C and 27°C. Snow fall is harmful.	50-100 cm. Sun shine after the rain is good for the growth of the plant	Soil with high nitrogen content.	Uttaranchal, Uttar Pradesh, Bihar, Madhya Pradesh, Rajasthan Jharkhand, Punjab
Millets *(Jowar, Bajra, Ragi)* 	27°C – 32°C (These plants can withstand high temperature and drought)	50 cm – 120 cm	-Need not necessarily have high fertile soil. Grows in alluvial soil with less salt content and in black soil.	Maharashtra, Karnataka, Andhra Pradesh, Madhya Pradesh, Tamil Nadu, Gujarat, Rajasthan and Uttar Pradesh.
Pulses *(Black gram, Thur Dal, Green gram, Groundnut)* 	20°C – 30°C	25 cm - 50 cm	Dry silty soil	Punjab, Haryana, Uttar Pradesh, Maharashtra, Madhya Pradesh, Jharkhand, Chhattisgarh, Rajasthan and Bihar

Table 6.8

Many other crops are also cultivated in our country in addition to the above food crops. They are mainly produced as raw materials for industries. Sugarcane, cotton, jute, tea, coffee, oil seeds, tobacco and rubber are some among them. They are known as cash crops cultivated in plantations. Besides being the raw materials for industries, they are also export items that can earn foreign exchange. Hence they have great influence on the Indian economy. Cash crops are classified as follows.

Fibre crops. - *Cotton, jute.*

Oil Seeds. - *Groundnut, mustard, coconut, gingelly, linseed, Castor seed.*

Beverage crops - *Tea, coffee, cocoa.*

Some of the important cash crops of India are shown in the following table (table 6.9). Find out the geographical conditions congenial to their cultivation and the states producing these crops.

Crops	Climatic Conditions	Soil	Major Producing States	Remarks
Sugarcane 	20°C - 30°C of temperature, 75 cm - 150 cm of rainfall. Plenty of water is required during the growing season	Well drained alluvial soil	Uttar Pradesh (50% of the total production)	• India is the birth place of sugarcane. • In production India has the second position after Brazil. • It is the raw material for the production of sugar.
Cotton 	21°C – 25°C of temperature 50 cm – 80 cm rainfall	Black soil Alluvial soil	Gujarat, Maharashtra, Andhra Pradesh, Karnataka, Tamil Nadu, Madhya Pradesh	• It is a major fibre crop in India. • India has the fourth position in the world in the production of cotton. • Short staple variety is mainly cultivated in India
Jute 	27°C – 34°C of temperature, 170 cm – 200 cm of rainfall	Alluvial soils of flood plains and deltas	West Bengal (Ganga-Brahmaputra Plain)	• India has the second position after Bangladesh in the production of jute • This fibre has an important position in earning foreign exchange. • A fibre called mestha is used in place of jute. This low quality fibre is cultivated in Bihar, Assam and Orissa.
Tobacco 	20°C – 30°C of temperature, 75 cm – 150 cm of rainfall	Sandy soil containing potash, iron and phosphorous	Andhra Pradesh, Karnataka and Tamil Nadu ($^2/_3$ of total production)	• Third place in the production of tobacco. • The Portuguese were the first to cultivate tobacco in India in 1588. • Tobacco is injurious to health.

Tea 	13°C – 35°C of temperature, 150 cm – 250 cm of rainfall. Frost is harmful	Well drained soil with iron content	Assam (50%) occupies the first position, West Bengal – second and Tamil Nadu – third.	• India is the largest producer of tea in the world. • Tea cultivation was started in India in 1823. • It is a major beverage crop
Coffee 	18°C – 28°C of temperature, 125 – 200 cm of rainfall. Wind and frost are harmful	Well drained saline alluvial soil	Karnataka (60% of total production) Kerala	• It is the most important beverage crop in the world. • The British were the first to introduce coffee in India (Karnataka) in the year 1830. • Arabica, Robusta and Liberica are the three varieties of coffee.
Rubber 	21°C – 35°C of temperature, 175 cm – 300 cm of rainfall	Alluvial soil	Kerala (91%) Tamil Nadu (5%)	• In 1902 the British established the first rubber plantation on the banks of Periyar in Kerala. • The sap obtained from rubber tree is known as latex. • Rubber is used in the production of tyres, chappals, sports goods, mattresses, cables etc.

Table 6.9

You have found out from the table (6.9) the states that are leading producers of cash crops. Find out the other important cash crops and producing states from the map and reading materials.

- *Prepare a report on the cash crops based on Table 6.9. Using colours and symbols show the distribution of cash crops on the map given at the end of this book.*

Fruits and Vegetables

India has the second position in the production of fruits and vegetables. Banana and mango are important among them. India contributes about 13% of the world's production of vegetables. Apple is an important temperate fruit. Apple is mostly produced in Himachal Pradesh, Kashmir and Uttaranchal. Production of banana, a sub-tropical fruit, is concentrated in Tamil Nadu and Maharashtra. Orange is cultivated in Maharashtra, Uttaranchal, Himachal Pradesh, Tamil Nadu and Kerala. Grape is another sub-tropical fruit. It's cultivation is concentrated mainly in Uttaranchal, Himachal Pradesh, Jammu and Kashmir, Maharashtra, Andhra Pradesh, Tamil Nadu and Karnataka.

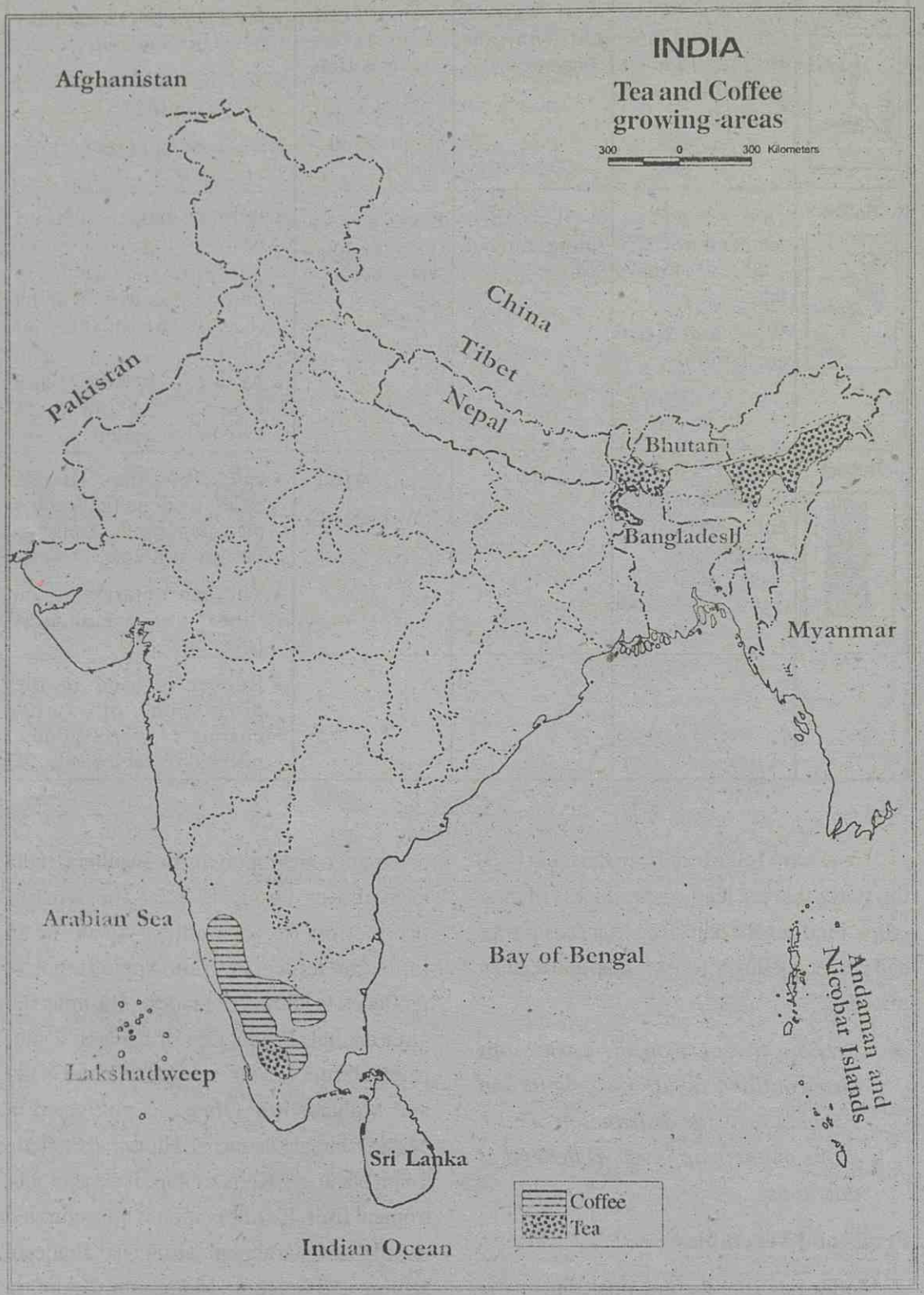


figure 6.7

Energy Resources

Energy is an inevitable resource for existence. It has an important position in our day-to-day life. It is an indispensable component in economic as well as technological development. Coal, petroleum, natural gas solar energy and electricity from wind etc. are some of the sources of energy. Some of these are renewable and others are non-renewable. You have learnt about them in previous classes. Energy resources can be further classified into conventional and non- conventional categories. Find out what these resources are and complete the following table.

Conventional Energy Resources	Non Conventional Energy Resources
• Coal • •	• Solar energy • •

Conventional Energy Resources

Coal

Coal is the major energy resource in India. 67% of the energy requirement of the country is met from coal. It is mainly used in industries such as iron and steel. Coal, also known as 'Black Gold', is classified into many varieties based on its quality and the amount of carbon content in it. Find out from the following table (6.10) the types of coal, their characteristics and the states in India where they are found.

India, which has about 214000 million tons of coal deposits, produces about 330 million tons annually. Many coalfields of India are located in the northeastern region of the sub-continent. About two thirds of the total production of coal is made from Jharkhand, Madhya Pradesh, Chhattisgarh and Orissa. One third of the total production is obtained from Andhra Pradesh, Maharashtra, West

Variety	Characteristics	Places were found
Anthracite	• Hard and black in colour • 80% carbon • Highest quality	• Jammu & Kashmir
Bitumen	• 60-80% carbon • Widely used	• Jharkhand • Orissa • West Bengal • Madhya Pradesh
Lignite	• 60% carbon • Low quality • Known as brown coal	• Rajasthan • Tamil Nadu • Assam
Peat	• Less than 50% carbon • High in smoke and less in heat	• Wetlands, marshy places

Table 6.10

Bengal and Uttar Pradesh. Coal mining in India gives employment to about seven lakh people.

Petroleum

Petroleum, known as 'Mineral Oil', is mined from the layers of sedimentary rocks. India has a reserve of about 4000 million tons, but only 25% of it is possible to be excavated. About 33 million tons of petroleum is mined in India annually. 63% of this is from Mumbai High, 18% from Gujarat and 16% from Assam. The remaining 3% is rigged from Arunachal Pradesh, Andhra Pradesh and Tamil Nadu.

Petroleum (crude oil) is purified at the oil refineries to produce various by-products. There are eighteen oil refineries in India, which can purify about 112.54 million tons of crude oil annually. Now a days the demand for petroleum products in India is increasing and about 102 million tones of petroleum is needed annually. There is no doubt that this demand will increase in the future too. Our country imports about 60 million tones of petroleum and petroleum products annually.

Natural Gas

Deposits of natural gas are seen in the crust of the earth either independently or along with petroleum. About 23 billion cubic metres of natural gas is used in India. India's natural gas reserve is only 700 billion cubic metres. Most of the deposits of natural gas is found in Andhra Pradesh, Maharashtra, Gujarat, Assam and Andaman-Nicobar islands. Andaman alone has about 47.6 million cubic metres of natural gas reserve. Recently it has been found out that Krishna-Godavari delta has large reserves of natural gas. India's annual natural gas production is about 27860 million cubic metres.

Electricity

The role of electricity in the growth and development of a nation is very large. Electricity is mainly produced in three ways. They are thermal electricity, hydro electricity and nuclear electricity.

Thermal Electricity

Thermal electricity is produced using coal, petroleum, natural gas etc. India has 310 thermal power stations. The state of Assam, Jharkhand, Uttar Pradesh, West Bengal and Tamil Nadu depend mainly on thermal electricity. It is also produced in Punjab, Haryana, Rajasthan, Karnataka, Kerala, Orissa and Delhi. Seventy percent of the total production of electricity in India is from thermal power stations.

Hydroelectricity

In India the hydro electric power generation started with the installation of a power station in 1897 for the supply of electricity to Darjeeling. In 1902 another power station was established at Sivasamudram waterfall in river Cauvery. At present twenty five percent of the electricity produced in India is from hydropower. It highly influences the economic development of India. India has the capacity to produce 150000 MW of hydroelectricity but only 25000 MW is generated. Hydroelectricity is mainly produced in Himachal Pradesh, Karnataka, Kerala, Jammu & Kashmir, Meghalaya, Tripura and Sikkim. Kerala depends mainly on hydroelectric projects for the generation of electricity.

Nuclear Electricity

Nuclear electricity is produced from minerals such as uranium and thorium. They are mined mainly from the state of Jharkhand and the Aravalli ranges of Rajasthan. Uranium is seperated from the coastal sands of Kerala containing monazite. Fifty percent of the world's thorium deposit is found in India. Tharapur (Maharashtra), Kalpakkam (Tamil Nadu), Rawath Bhatta (Kota-Rajasthan), Narora (Uttar Pradesh), Kakrapara (Gujarat) and Kaiga (Karnataka) are the nuclear power stations in India. India produces 272 MW of nuclear energy annually. This constitutes only about 3.4 percent of the total production of electricity in the country. What are the possibilities of nuclear power production in Kerala? Discuss.

Non-Conventional Energy Sources

As the demand for energy increases the importance for non-conventional sources of energy such as sun, wind, tide, biogas etc. is increasing. What are the peculiarities of these sources of energy?

- Easily available
- Renewable
- Environment friendly
- Pollution free
-

Solar Energy

India, located in the tropical region, has immense potential for the conversion of solar energy. Sunlight can be directly converted to electricity through the photo voltaic technology. It is possible to generate 20 MW of electricity through this method from 1 sq. km. area. Solar energy is most commonly used for the following purposes now.

- Cooking
- Lighting
-

The largest solar energy conversion centre in India is located at Madhapuri, near Bhuj in Gujarat.

Wind Energy

Wind energy producing centres are established in many parts of the country. The initial expenses for erecting the wind mills are huge. Tamil Nadu, Andhra Pradesh, Karnataka, Gujarat, Kerala, Madhya Pradesh, Maharashtra and Lakhshadweep have wind energy producing centres. The largest centre is located at Tamil Nadu.

Bio gas

Bushes, wastes from crops, human and animal wastes are used to produce biogas. These materials are allowed to decay in order to produce the gas. This gas is used for domestic purposes in rural areas. Biogas can give higher temperature compared with kerosene and charcoal.

Geothermal energy, tidal energy, wave energy etc. are other non-conventional sources of energy. In future they will also be developed and used more.

Conservation of Energy Resources

A law is enacted in India as 'Energy Conservation Act' for the conservation of energy resources. It came into effect in March 2002. It is aimed at the judicious use and conservation of energy. In order to conserve energy we have to:

- Switch off electrical appliances when not in use.
- Use appliances that need very little energy for functioning.
- Follow periodic maintenance of appliances.
- Give importance to non-conventional sources of energy.
- Depend more on public transport and use of private vehicles to be reduced.
-

SUMMARY

- India is blessed in resource potential and resource diversity.
- India has many multi-purpose river valley projects.
- The soils of India are classified into various categories based on its colour, structure and places where they are found.
- India has different types of natural vegetation.
- Variety of crops cultivated according to seasons is the speciality of India.

QUESTIONS

1. Which are the multi-purpose projects in India? Prepare a report.
2. Which are the states in India where the different soil types are distributed?
3. What are the geographical conditions required for the cultivation of paddy?
4. Make notes on the distribution, production and utilisation of important mineral resources and energy resources in India.
5. Energy crisis in one of the challenges posed by us today. Make your suggestions to manage this crisis faced by the humanity.
6. Even though India is an agricultural country, poverty is still prevailing in many parts of India. What may be the reasons for it. What are your suggestions to solve this problem?

****

7 INDIA - INDUSTRIES, TRANSPORT AND COMMUNICATION

What we have learnt

- The major minerals and ores being mined in India are iron ore, manganese, limestone, mica, bauxite etc.
- Raw materials for agro-based industries namely sugarcane, cotton, jute, tobacco, rubber, coffee, tea etc are being cultivated in India.
- There are several rivers in India which are used for the generation of hydroelectric power and water transport.
- Another major source of energy being produced in India is coal.

You might have understood that our vast and diverse country is rich in natural resources.

With the help of technology we could process these resources into various products in India itself.

This marked the beginning of industrialization in India. The various developments that we see in India today are mainly due to industrialization. The role played by industries in leading an agricultural society like India to progress is crucial. We shall make a survey of the major industries in India and the role played by geographic factors in their locational efficiency and development.

Industry

You are already aware of the factors influencing production. Certain locational factors are crucial in the beginning of any industrial enterprise. Let us take a look at the factors influencing the location of industries.

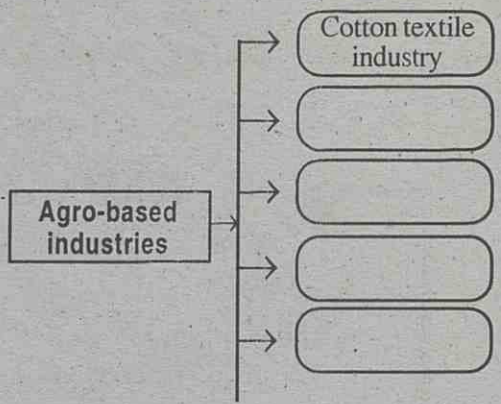
- The availability of raw materials
- Climate
- The availability of water
- Suitable topography
- Transport and communication facilities.
- Human resources potential
- The availability of energy resources

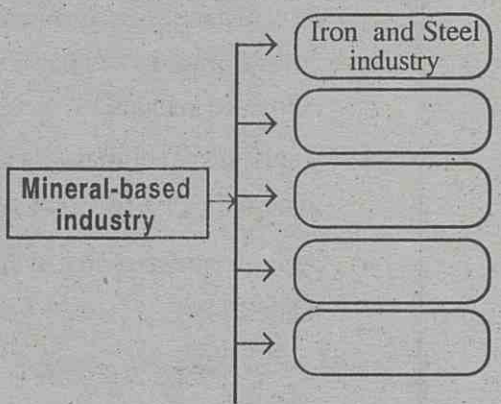
Classification of industries

Industries can be classified into two types, based on the raw materials used. They are :

- Agro-based industry
- Mineral-based industry

Find out more examples of these and add them in the boxes below.





You might have understood about the major crops being grown in India. As agriculture was given considerable importance since ancient times, many agro-based industries came into being in our country.

- Which are the agro-based industries in India?

- Which are the agro-based industries in your locality?

Agro-based industries

There are a number of industries in India which use agricultural products as raw materials. Such industries are called agro-based industries. Let us find out some important facts about the major agro-based industries in India.

Cotton textile industries

India has been renowned for cotton cloths since very old times. Marco Polo, the famed world traveller who lived during the 13th century had mentioned in his travel accounts the quality of cotton cloths of India. It is the cotton textile industry that laid the foundation for industrialization in India. Though cotton textile mills function in various parts of the country, the majority of them are located in the states of Gujarat, Maharashtra, Tamil Nadu and West Bengal.

Mumbai is the largest cotton textile manufacturing centre in India. The reasons for this are listed below.

- Nearness to cotton growing regions.
- The availability of electricity at cheaper rates.
- Humid climate
- Availability of fresh water
- Nearness to harbour
- Availabilty of human resources
-

Ahmedabad city which is located in the centre of the cotton growing region stands second in the production of cotton textiles. In West Bengal, cheap thermal power, abundant fresh water availability and the proximity to harbour are favouring location of this industry.

Cotton textiles industry in India started with the establishment of a textile mill in 1818 at Fort Glaster near Kolkata. However, large scale cotton textiles industry started in Mumbai in 1854.

Examine the map (figure. 7.1) and complete the table 7.1.

Important cotton textile industrial cities	State
• Nagpur	Maharashtra
•	
•	
•	
•	

Table 7.1

Jute Industries

Jute industry holds an important place among the agro-based industries in India. Jute thread, gunny bags, bags, clothes, carpets etc are products made of jute. The first jute mill was established at a place called 'Rishra' on the banks of the river Hooghly in 1854. Jute industry is mainly concentrated in about 98 km stretch on either banks of the river Hooghly. Let us analyse the geographic factors that have influenced the location of these industries.

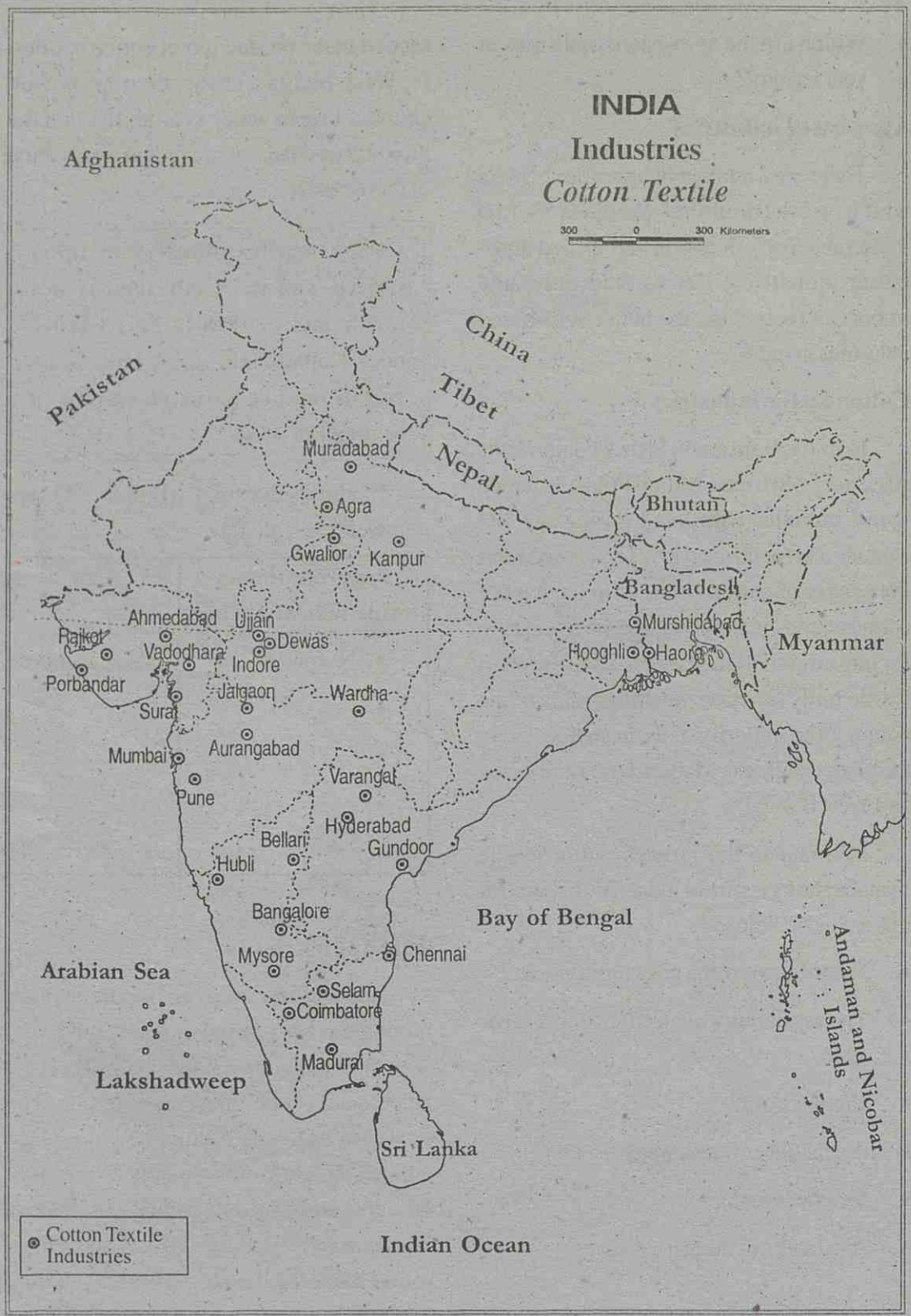


figure 7.1

- Jute is extensively cultivated on the banks of the rivers Ganga and Brahmaputra.
- Transport facilities along the rivers Ganga and Brahmaputra
- Rail facilities which helps the transport of raw materials and finished products.
- Large scale availability of thermal power owing to proximity of coal mines.
- Nearness to port facilities.
- Availability of human resources.
-
-

Find the location of major jute mills in India from altas.

Woollen industries

The raw material for woollen products is wool obtained from sheep. Woollen industrial units are largely concentrated in the north Indian states namely Punjab and Haryana. The major centres of this industry are in Dharival, Amritsar and Ludhiana.

- *Take a look at the map of India (figure 7.2). Find out the location of the woollen industries in different states and prepare a table.*

Silk industries

Indian silk is world famous. Silk worms are grown in mulberry plants for the production of cocoon, the raw material for silk. The major silk manufacturing states are Karnataka, West Bengal and Kashmir.

The first modern silk manufacturing unit was started in Howra in 1832. The process of growing silk worms and separating silk from them is called sericulture.

From the map (figure 7.2) find out the regions where silk industries are concentrated in India and prepare a table based on it.

Natural fibres are giving way

The invention of synthetic fibres has brought about revolutionary changes in the field of cloth manufacture. With the advent of these fibres we could manufacture durable and beautiful cloths. The most popular synthetic fibres are rayon, nylon, terin and decron. These threads are produced by the chemical processing of petroleum, coal and pulp. By blending cotton, silk and wool with synthetic fibres we are able to make better cloths. Mumbai, Ahmedabad, Surat, Delhi, Amritsar, Gwalior and Kolkata are the places where we can find most of the cloth manufacturing units that use synthetic fibres.

Sugar industries

Among agro-based industries, sugar holds the second place. Haven't you studied about the regions in India where sugarcane is cultivated? If sugarcane is kept for a longer period after their cropping, the content of sugar (sucrose) in it decreases. Therefore, all sugar factories have been located near sugar fields.

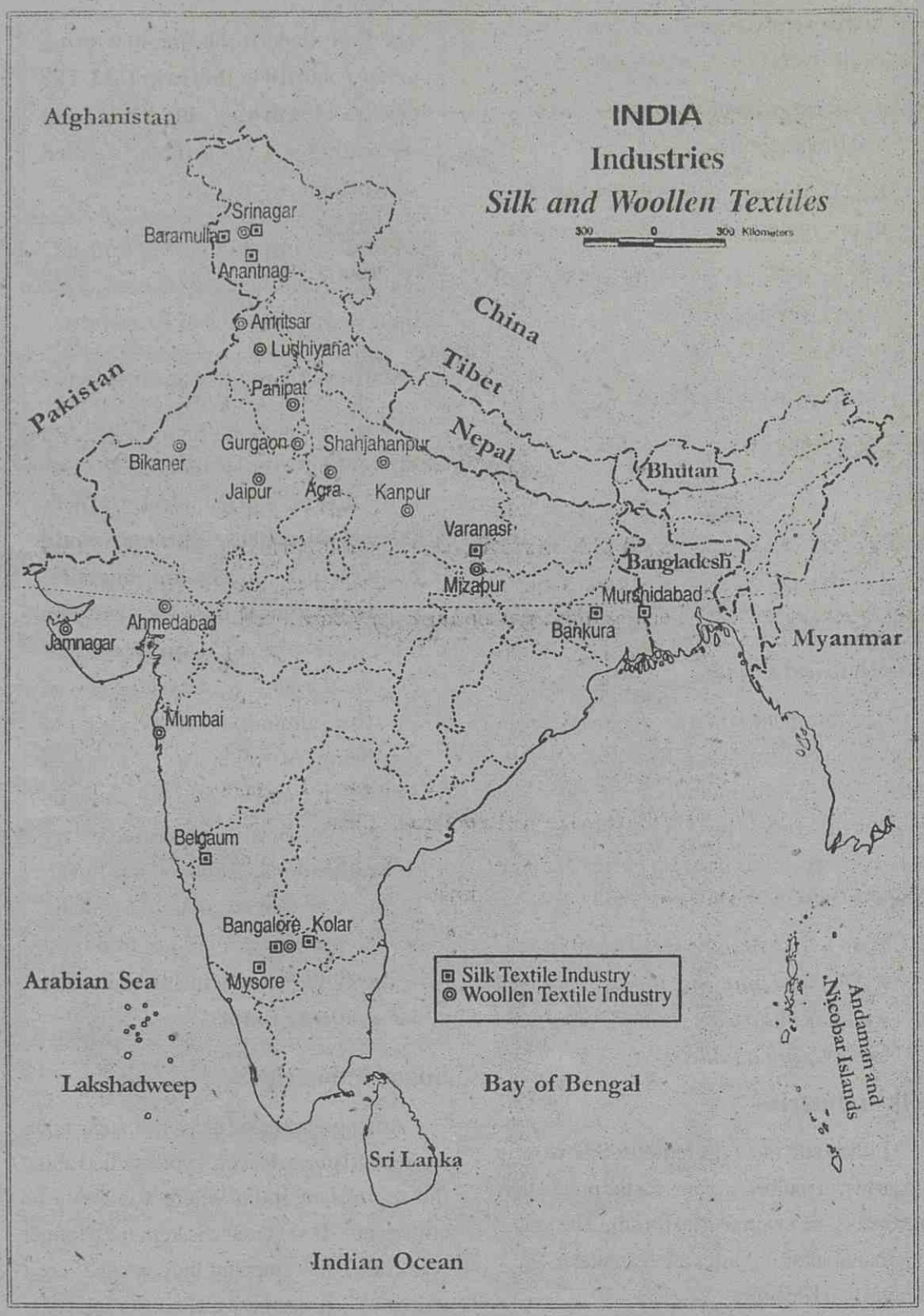


figure 7.2

About 60 % of the sugar being manufactured in India is from the states of Uttar Pradesh and Bihar. Which are the other sugar producing states in India? Study the map (figure 7.3) and find out.

Paper Industry

The industry where bamboo, bagasse and softwood like eucalyptus are used as raw materials in the paper industry.

Similarly, there are more such agro-based industries is our country. Find them out and complete table 7.2.

Industry	Raw materials	State
•	•	•
•	•	•
•	•	•

Table 7.2

- *Mark the locations of various agro-based industries using different symbols in the outline map of India given at the end of the textbook.*

Mineral-based industries

Haven't you understood about the various agro-based industries and the locational factors that are necessary for them. A large number of machines are needed for the functioning of each of these industries. These machines are the products of certain other industries. Minerals are the raw materials for these industries. Why not have a survey of the major mineral-based industries of our country?

Iron and steel industries

You know that the base for progress we witness today in our country is the result of the development of iron and steel industries. Iron and steel are the essential constituents of railway lines, engines, ships, motor vehicles and machines. Similarly, they are essential for the construction of bridges and buildings.

Iron ore, coal, manganese and limestone are the essential raw materials for the iron and steel industry.

Won't you try to gather some information about the important iron and steel industries from table 7.3

Besides these, three steel plants have been established in the public sector. Their locations are :

- Bailadila - Orissa
- Vijayanagar - Andra Pradesh
- Salem - Tamil Nadu

- *Prepare a note on the topic "the major iron and steel industries in India"*

Aluminium Industries

- *What are the purposes for which aluminium is used?*

The ore of aluminium is bauxite. The characteristics of this durable metal are low weight, strength, resistance to alteration and electrical conductivity. Aluminium processing industries are mainly located in the states of Orissa, West Bengal, Uttar Pradesh, Chhattisgarh, Maharashtra, Tamil Nadu, Karnataka and Kerala.

- *Refer the atlas and prepare a table of the state wise distribution of different aluminium processing industries in India.*

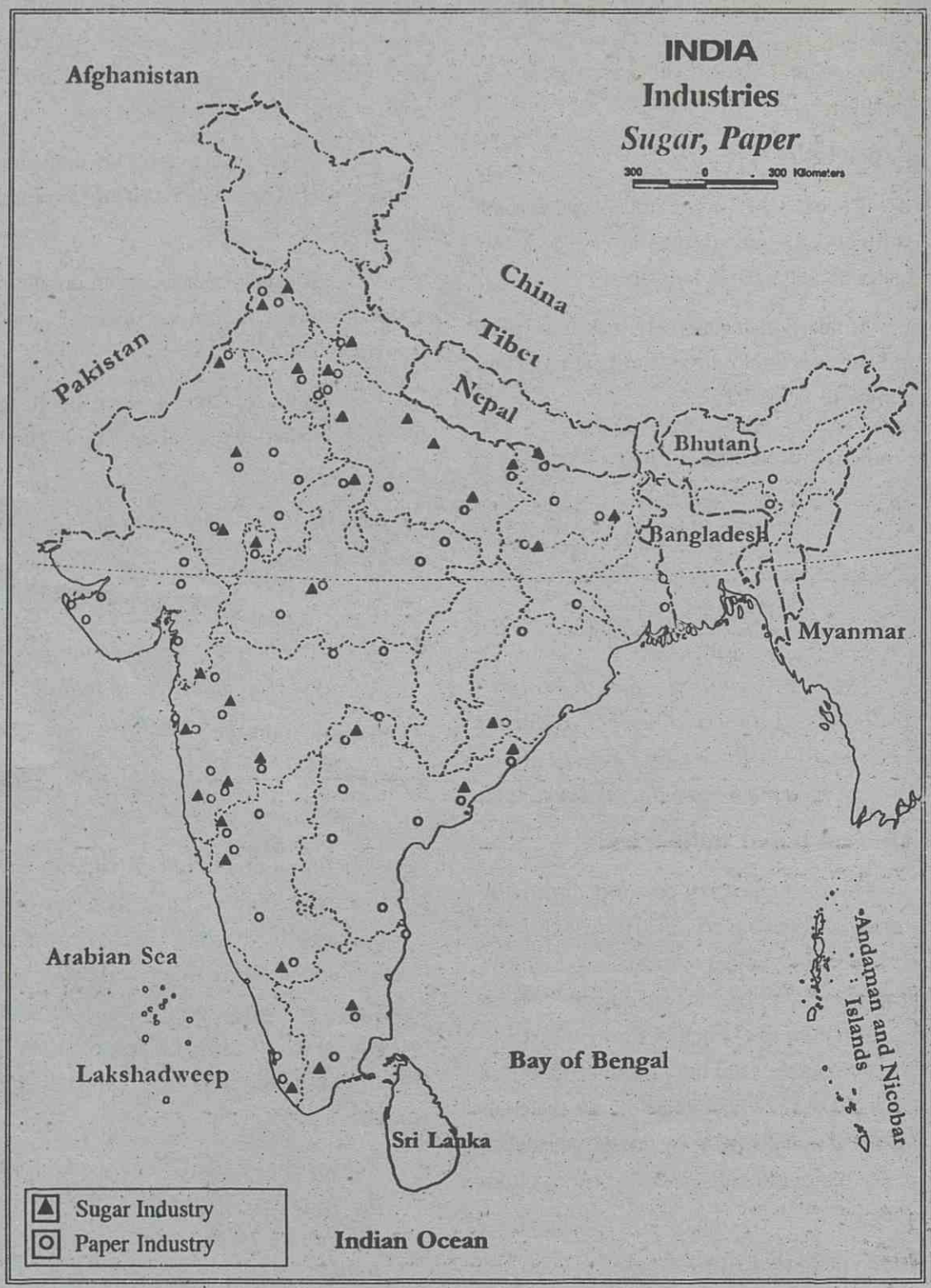


figure 7.3

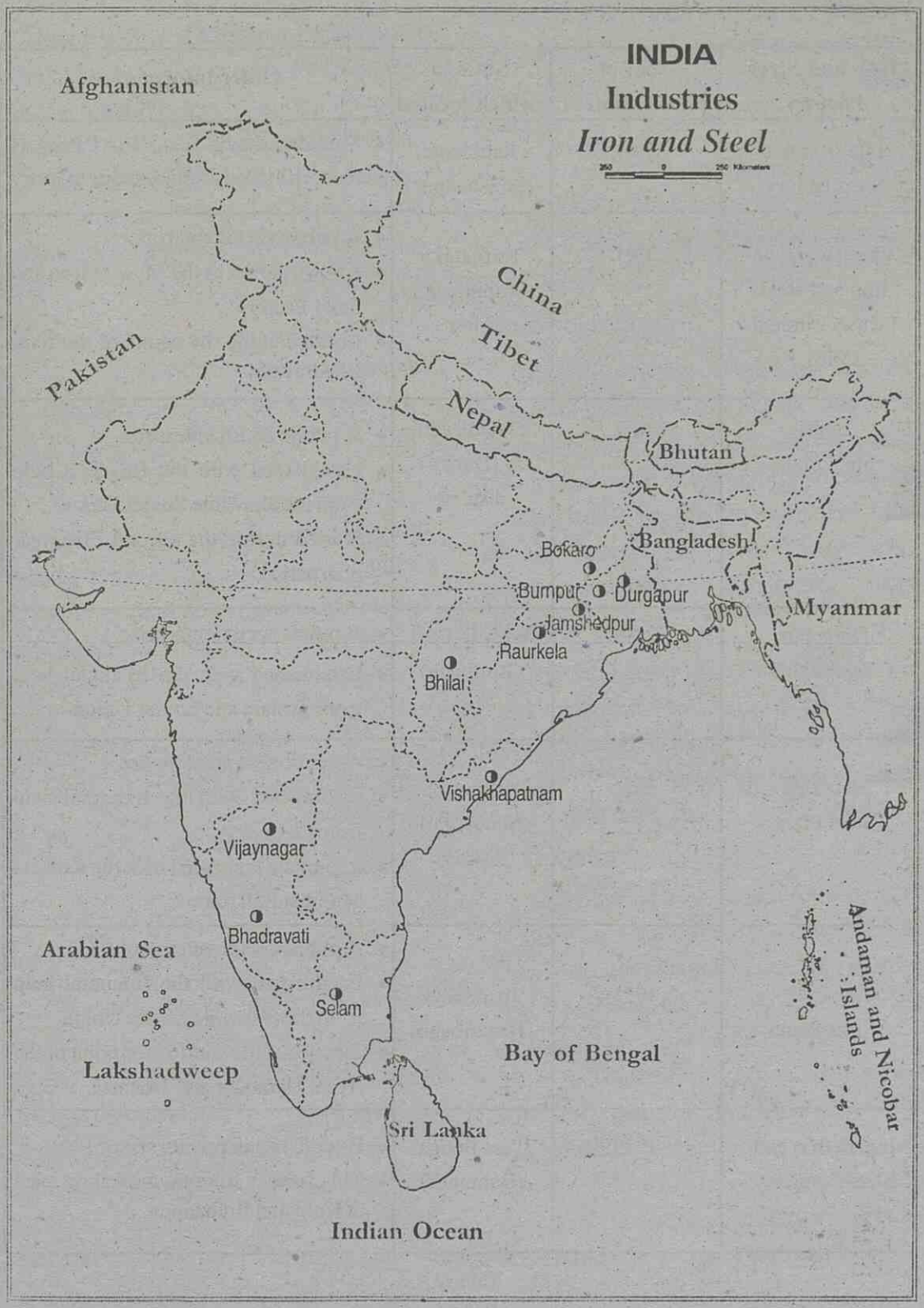


figure 7.4

Iron and Steel Factory	Year of establishment	State in which located	Other information
Tata Iron and Steel factory	1907	Jharkhand (Jamshedpur)	• Shri. Jamshedji Tata, "the Father of modern industry", started this industry
Visveswarayya Iron and steel factory Limited (VISL)	1923	Karnataka (Shimoga district)	• A public sector enterprise • Known earlier as the Mysore Iron and Steel Factory • Located along the banks of the river Bhadravathi
Bhilai Steel Plant	1959	Chhattisgarh (Durg district)	• A public sector enterprise • Established with the financial help from the erstwhile Soviet Union • Started during the second Five year plan period
Durgapur Steel Plant	1959	West Bengal (Burdwan)	• A public sector enterprise • Established with the financial help from Britain and Soviet Union
Raurkela Steel Plant	1959	Orissa (Sundergarh district)	• A public sector enterprise • Established with the financial help from Germany • Raourkela is situated near the Kolkata Mumbai Rail route
Bokaro Steel Plant	1972	Jharkhand (Hazaribagh)	• A public sector enterprise • Established with the financial help from the erstwhile Soviet Union • Situated at the confluence point of the rivers Damodar and Bokaro
Indian Iron and Steel Company	1919	West Bengal (Baranpur)	• Established in private sector • This factory has one workshop each at Kulti and Bulhanpur

Table 7.3

Cement Industries

Along with iron and steel, cement is an important material for constructional activities. The raw materials for cement manufacture include limestone, silica, gypsum, dolomite and clay. Besides these, the availability of electric power is also vital. The first cement manufacturing unit was started in Chennai in 1904.

- *From the map (figure 7.5) find out the location of the cement industries in India and prepare a table out of it.*

Other Industries

Apart from these, there are a number of industries in our country related to the manufacture of chemical substances, chemical fertilizers, glass, plastics, paint, leather, vehicles, electrical appliances, rubber etc. Find out their locations and complete table 7.4.

Industry	Location
• Glass	Ferozabad, Mumbai, Kalyan
• Chemical Fertilisers	Sindri, Sangal, Trombay, Haldia, Chennai, Raurkela, Korba
•	

Table 7.4

The electronic industry has been considerably developing in the 21st century. It holds further development possibilities. With the introduction of modern technology, several sophisticated equipments have become quite common. The manufacture of the components of these equipments, computer hardware, software and other related equipments is being done widely in our country. The cities of Hyderabad, Delhi, Bangalore, Kolkata and Chennai are the centres of such industries. Besides thes, software technology parks are functioning in several parts of the country. The technopark at Thiruvananthapuram is an example.

- *On the outline of India given at the end of the text book, mark the location of mineral-based industries using different symbols.*

Transportation

Travel by man is as old as himself. Initially, he used to travel in search of food, work and for exchanging things. The discovery of wheels paved the way for various means of transportation. They helped him in reaching distant places at faster speeds. Today a large number of people travel to distant parts of the world.

The emergence of modern transport and communication facilities has helped to bring people of different parts of the country closer together. This has greatly helped in cultural exchanges and above all for national integration.

This change in the transport sector has resulted in revolutionary changes in the communication sector too. Communication has become indispensable to man's everyday life. Today we have many modern communication facilities. Transport and communication have conquered distance and made the world a single village. Let us now try to understand about the different transport and communication facilities and their role in public travel and exchange of commodities and services.

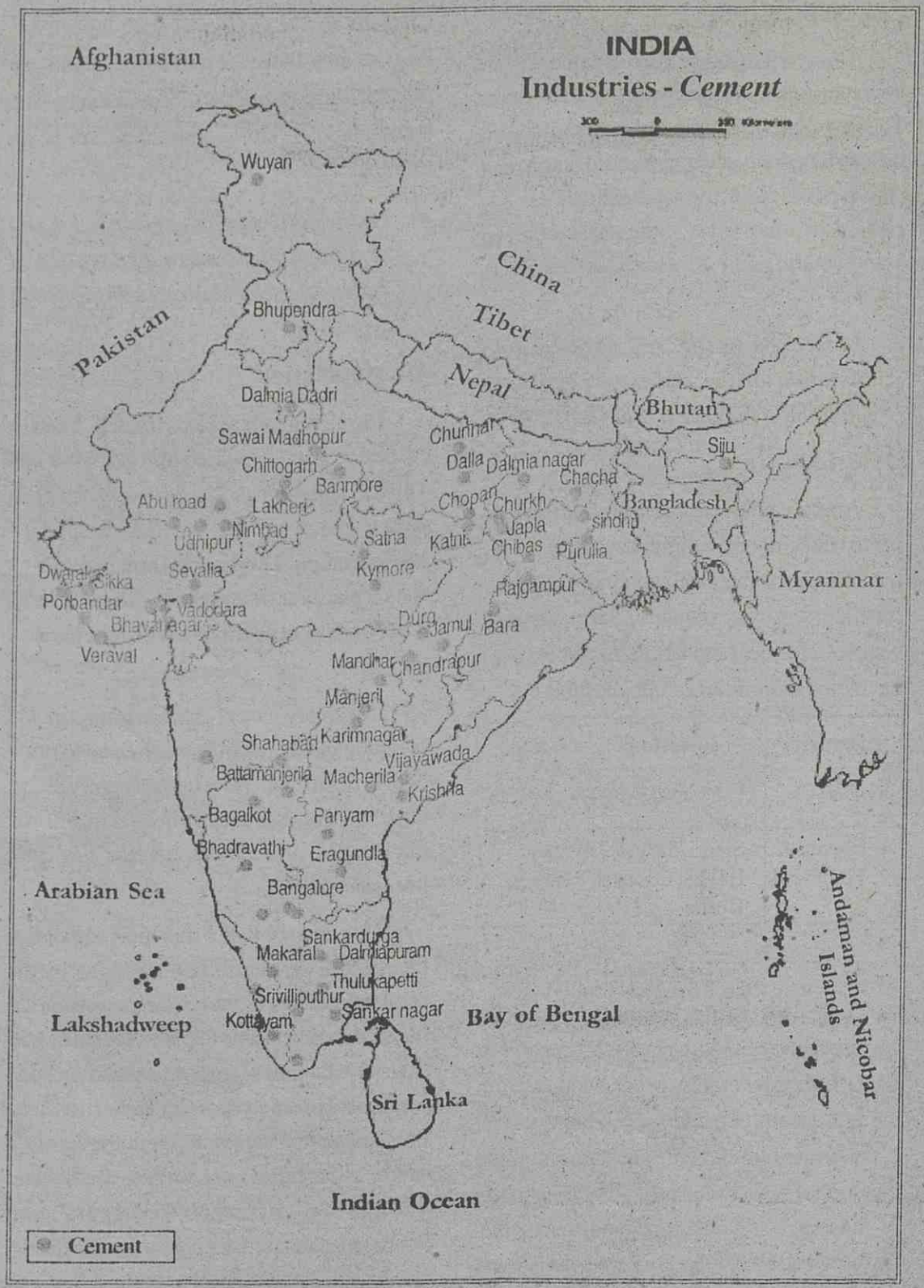


figure 7.5

The various transport routes of the country are

- Roads
-

Road transportation

India is one of the countries of the world having the largest road network. We have an extensive road network that links the different parts of the country. The influence of topography in road construction is noticeable. The regions with the largest road network include:

- The Gangetic plains
- The Damodar valley
- The Punjab-Haryana plains
- The south Indian states such as Tamil Nadu, Karnataka and Kerala

Do you know why road transportation developed to this extent in the above mentioned regions.?

Roads in India can be classified as shown below.

- National Highways
- State Highways
- District roads
- Village roads

From the map (figure 7.6) find out the various national highways and the states they pass through and complete the table 7.5.

National Highway	States
• NH 47	Tamil Nadu, Kerala
•	
•	

Table 7.5

Railway

India is the country with the largest railway network in Asia. This is the most convenient mode of transport for large scale goods movement as well as for long distance travel. Based on the spacing between rails, railways are classified into broad gauge (1.69 m), metre gauge (1.0m) and narrow gauge (0.762 m).

Won't you enquire about and find out the type of gauges of the railway lines of Kerala. For administrative convenience there are fifteen zones in the Indian Railways.

Region	Head quarters
1. Central Railway	Mumbai (Sivaji Terminal)
2. Western Railway	Mumbai Church gate
3. Eastern Railway	Kolkata
4. Northern Railway	New Delhi
5. North-eastern Railway	Gorakhpur
6. Southern Railway	Chennai
7. South-central Railway	Secunderabad
8. North-eastern border Railway	Maligavu
9. South-eastern border Railway	Kolkota
10. North-central Border Railway	Allahabad
11. North-west Border Railway	Jaipur
12. South-western Railway	Bangalore
13. East-central Railway	Hajipur
14. West-central Railway	Jabalpur
15. East-coast Railway	Bhubaneswar

Table 7.6

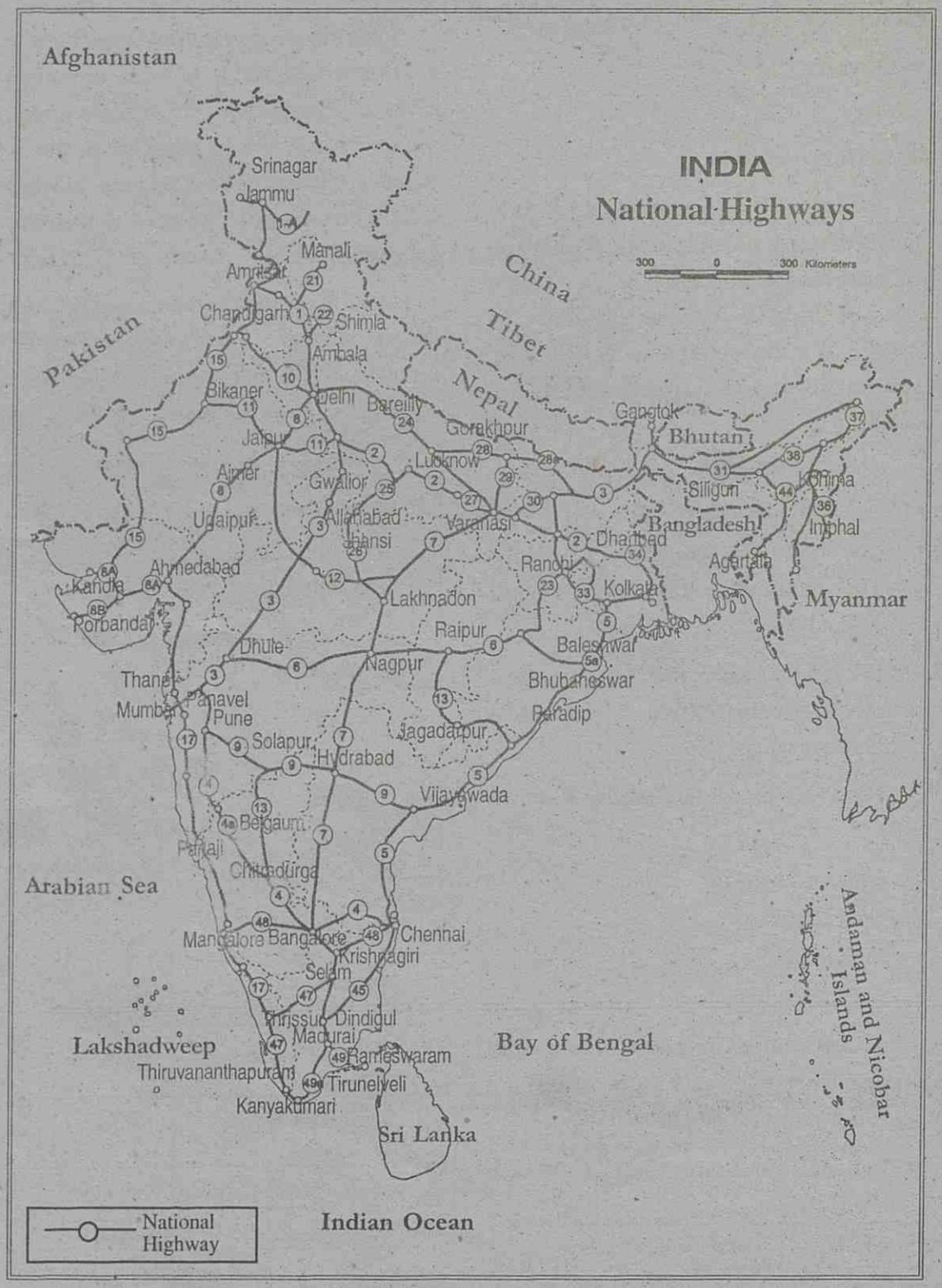


figure 7.6

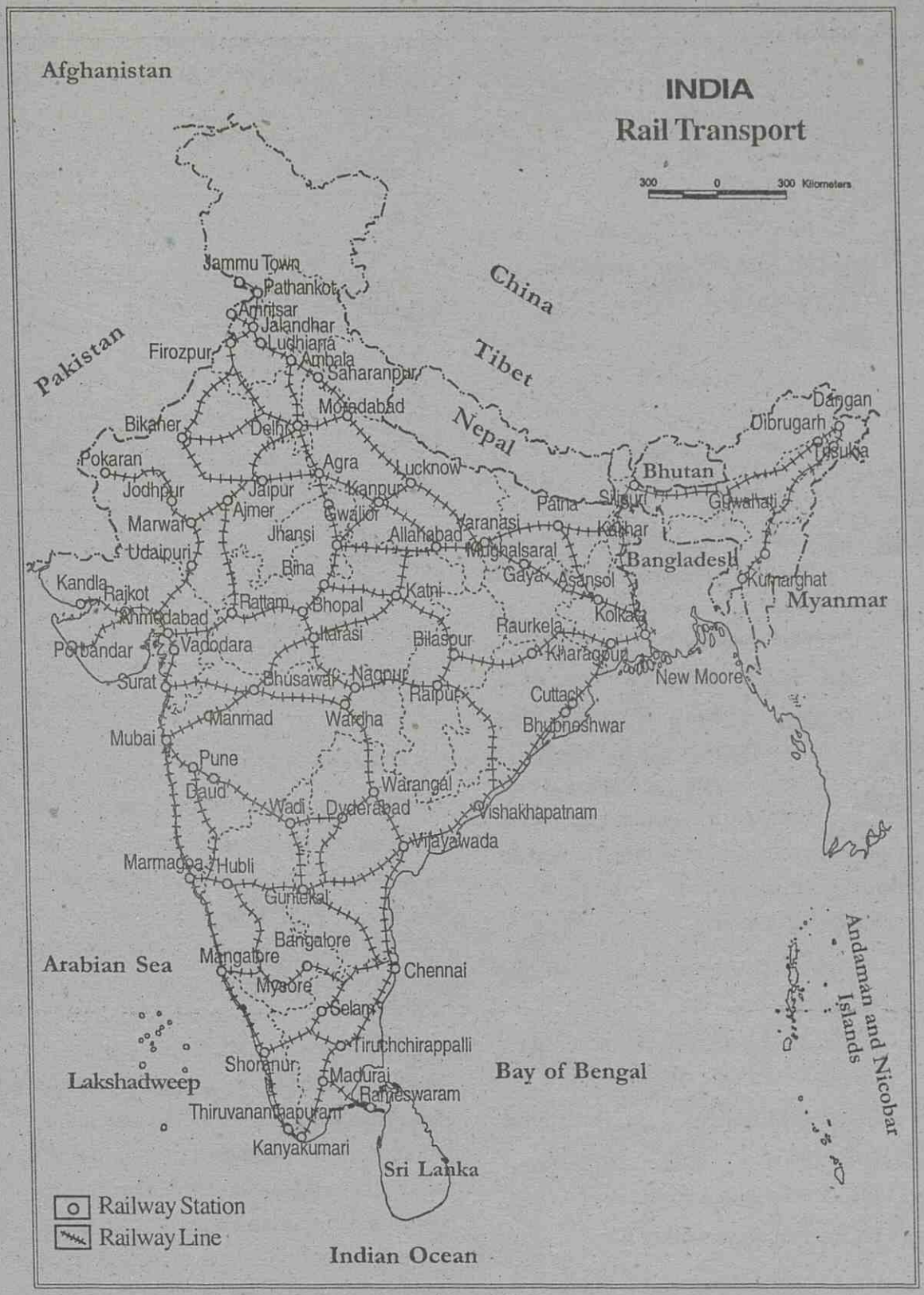


figure 7.7

Do you know ?

- *Rail traffic started in India in 1854 between Mumbai and Thane.*
- *At present there are 6853 railway stations in India.*
- *The total length of the railway line in India is 1,08,706 km, within a distance of 862813km.*
- *The Himasagar Express, which runs between Kanyakumari and Jammu-Tawi is the train that covers the longest distance in the country.*

Water transportation

Our country with a long coast line and a large number of rivers holds vast potential for water transportation. This mode of transportation with its relatively little cost, less noise and very little air pollution is best suited for large scale commodity movement. Still it has significant importance in goods transportation. Water transportation has been classified into inland transportation and ocean water transportation. Let us take a look at the major waterways of inland water transportation in India.

- Ganga and Brahmaputra rivers and their tributaries.
- Godavari and Krishna rivers and their canals.
- Buckingham canal in Andhra Pradesh and Tamil Nadu.
- Mandovi and Suvari rivers in Goa.
- Backwaters and canals of Kerala.

India holds the second place in Asia in terms of ship ownership. Today, India operates shipping services along almost all ship routes.

Find out the location of major ports in India from the map (figure 7.8) and complete the table 7.7.

Harbour	State	Coast
Mumbai	Maharashtra	Western coast
Kandla		
Kolkata		
Paradip		
Marmagoa		
Vishakhapatnam		
Kochi		
Mangalapuram		
Tuticorin		
Chennai		

Table 7.7

Air transportation

It is possible to travel longer distances at faster speeds by air. In regions of rugged topography where road and rail transportation are difficult, this is the single transportation mode that can be relied upon. Hence, domestic air transportation has considerable importance in the North eastern states of India. Air transportation in India is mainly controlled by Air India and the Indian Airlines Corporation. While Air India deals with international traffic, Indian Airlines handles domestic traffic. Besides these, private as well as international agencies also operate air services in India. The map (figure 7.9) depicts air transportation in India. Find out the national and international airports from the map (figure 7.9) and prepare a table out of it.

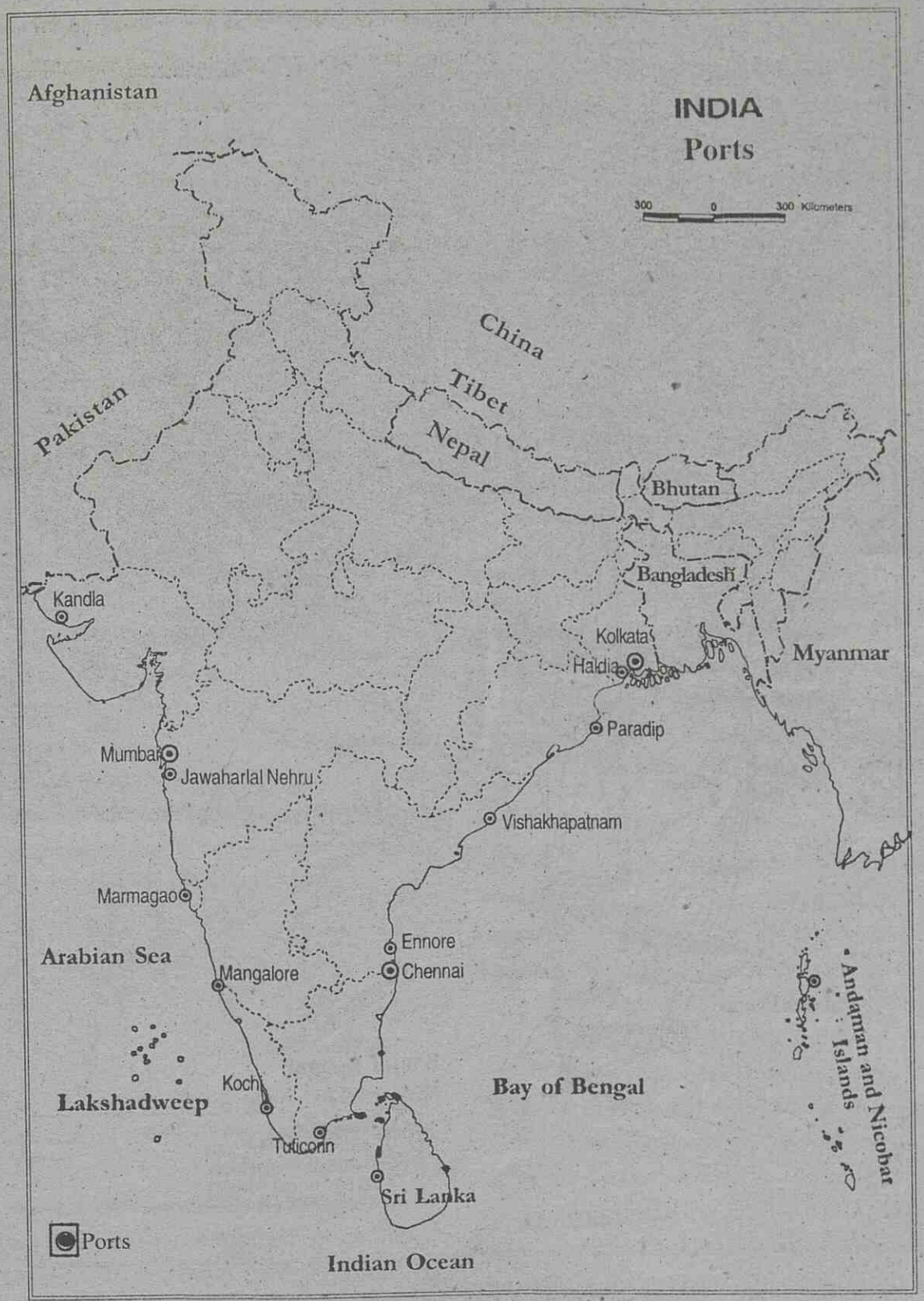


figure 7.8

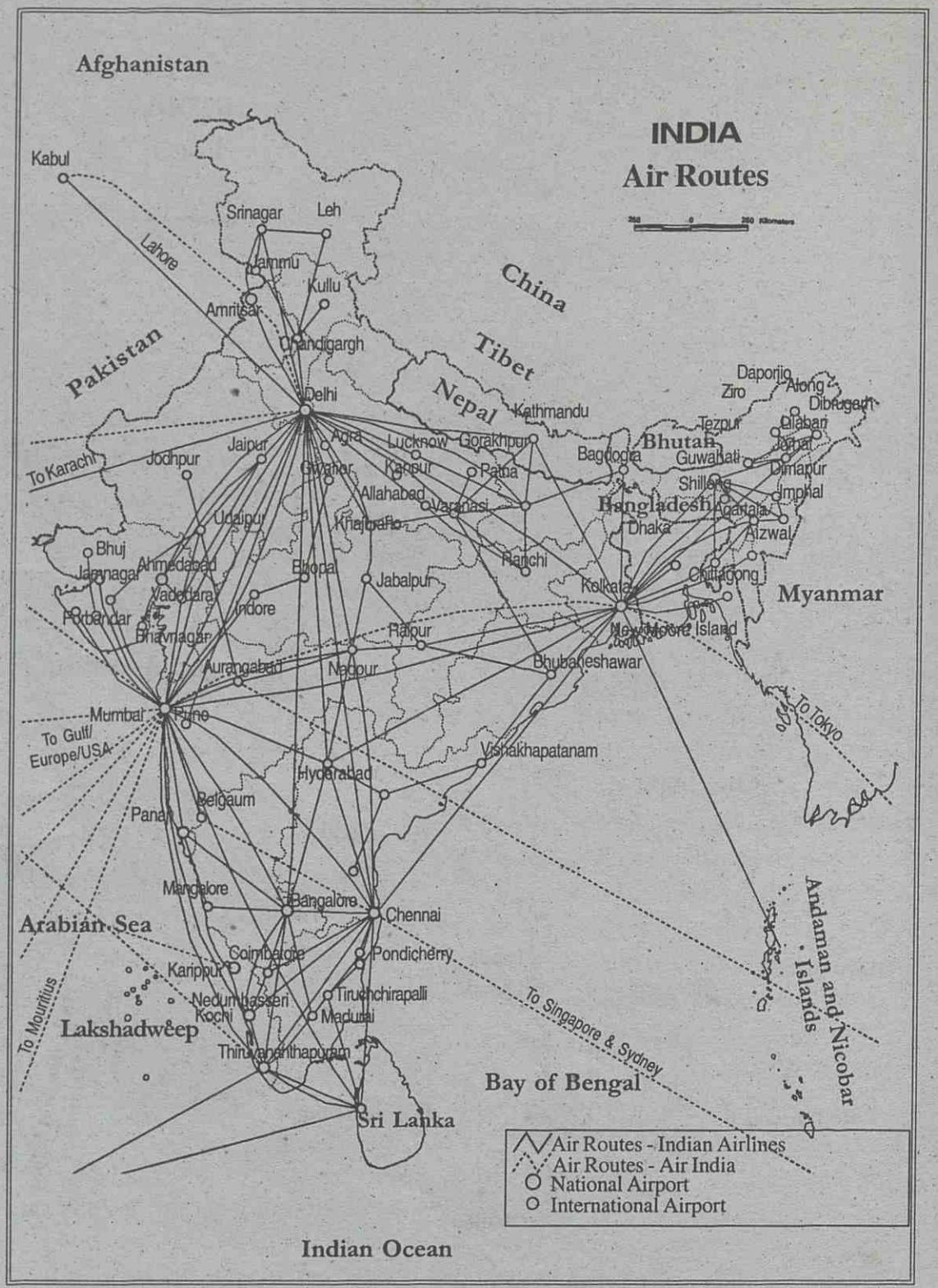


figure 7.9

Communication

Communication of ideas is a common characteristic of all animals. If gestures and simple sounds were used for communication during the initial days, later on they were replaced by more complex languages. This resulted in more clarity for expression of ideas.

What are the devices that we use today for passing on communication?

- Newspaper
-
-

Postal communication

India has the largest postal network in the world. There are about 1.5 lakh post offices in the country. Of these, 89 % are in the rural region and 11 % in the urban region. The postal department offers different postal services including the speed post. Besides, the postal department has introduced recently certain services for people that will soon spread to the villages also. These are :

- E – post
- Money transfer
-
-

E – post is a facility offered by the postal department of India. Using this facility one can send an e-mail to the post office of the addressee. A copy of the information received in the computer of the post office is delivered to the addressee by the postman. Similarly, another facility introduced by the postal department is 'International money transfer'. With the help of this, you can receive money from friends or relatives abroad within a short time. This is a safe, legally valid, reliable and faster means of transferring money. This mode of sending money is available in most foreign countries. This is being facilitated by the global network of computers. By this facility an addressee can receive money within minutes of its sending.

Telephone

India has the largest telephone network in Asia. There are about 32,000 telephone exchanges in our country today. The most important telephone service provider of the country is BSNL, a public sector company.

The introduction of mobile phones has brought in revolutionary changes in the communication sector. Apart from B.S.N.L. there are several other mobile phone companies of private sectors in our country. Won't you try to find out the details?

Newspapers and periodicals

News papers and periodicals had been in existence in our country even before independence. The role played by newspapers in giving vigor to the Indian Freedom Struggle and in strengthening the nationalist feeling is unforgettable. Newspapers and periodicals published in various languages still continue to be the most preferred news media of the common man. The Press Information Bureau is the central government agency that provides the media with the information about the policies adopted by the government. Won't you find out the newspapers and periodicals in circulation in your place?

Radio and television

Radio and television are the media which are used to disseminate instantaneous news to people over a considerable distance. Hence these are termed as the popular news media. In India the responsibility of radio broadcasting rests with the All India Radio and the telecasting of programmes with the Doordarshan.

You know that besides these, there are several private television channels and radio working in the field.

The internet exerts considerable influence in the field of communication. With the help of web cameras people can see face to face and exchange information.

- *Organise a seminar based on the topic 'Communication in India'*

SUMMARY

- Geographical factors have considerable influence upon the location of industries.
- Industries where agricultural crops are used as raw materials are called agro-based industries.
- Important agro-based industrial products are sugar, wool, silk and jute.
- Industries based on mineral resources are called mineral-based industries
- The production of iron and steel, aluminium, cement and glass comes under mineral-based industries.
- Transport and communication plays a vital role in the development of any nation.
- In India the land, water and air routes are used for transportation.
- The important communication facilities in India are post, telephones, radio, television, internet etc.

QUESTIONS

1. What are the conclusions to be drawn on the analysis of the location of the agro-based industries in relation to the agricultural regions.
2. Iron and steel industry is mostly concentrated in the eastern states of India. What could be the reason?
3. What is the role of water transportation in the development of mineral-based industries in India ?
4. Find out the geographical reason
   - Woolen industry is mainly concentrated in northern India.
   - Ahmedabad has developed as an important centre of cotton textile industry.
5. Transportation and communication can be considered the lifeline of a country. Why ?

****

8 POPULATION AND ECONOMIC PROBLEMS

What we have Learnt

- Resource can be classified into two categories-Natural resource and Human resource.
- By increasing human resource more and better economic progress can be achieved.
- The human resource required by a country is provided by its population.
- Birth rate, death rate, life expectancy and literacy are some of the factors of population.

People are to be equipped to achieve progress in social and economic fields. For this, all countries give special significance on human resource development. The quality and size of population are two factors that are emphasised in the development of human resource. Rapid growth in population will create many obstacles to economic progress. Also, it affects the quality of human resource adversely. In this background, let us examine in detail the world population, the Indian population, growth and its reasons, problems, population policy etc.

What is population?

The significance of population in the production-consumption sector of an economy is very great. The demand for consumer goods depends mainly on the size of population, sex ratio, population-density, age-structure of the people, income, preferences etc. Since there is day-to-day variation in the population of a country, it is difficult to calculate the exact population.

Population

Total number of people living in a country at a given time is called its population.

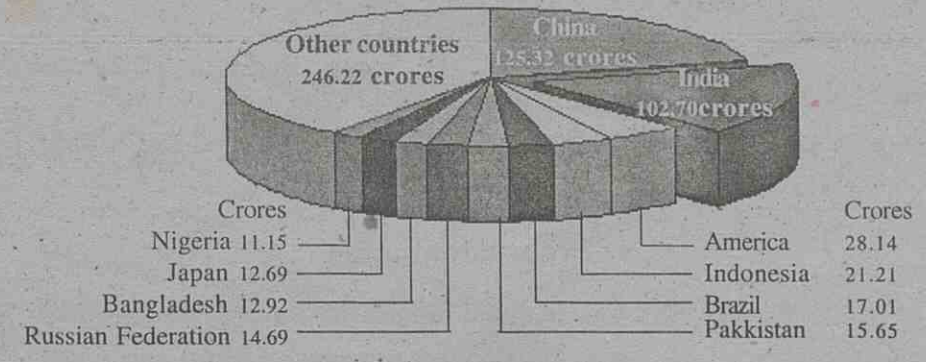
Analyse the data given in figure (8.1) and prepare a table of countries having population of more than ten crores.

- America - 28.14 crores.
-
-

List out the countries having population of more than hundred crores in the world today?

World Population and Countries

According to the census 2001, world population is 613.7 crores. Note the population of some countries given in the figure.



Source: Census India -2001

India : 2001 Census, America, Japan: 2000 Census, other countries: 1998 World Population Prospects (Revision Vol-II United State)

figure 8.1

Country	Population in the mid 2003 (in crores)	Annual growth rate (Percentage)	Birth Rate (per 1000)	Death Rate (Per 1000)	Life expectancy	
					Male	Female
China	131.98	0.7	15.2	6.5	69	73
India	106.85	1.7	23.7	8.5	63	65
Indonesia	21.99	1.3	20.6	7.3	65	69
Pakistan	15.36	2.4	35.8	9.5	61	61
Russian Federation	14.32	-0.6	8.6	14.6	61	73
Bangladesh	13.57	1.9	28.1	8.6	61	62
Japan	12.75	0.1	9.4	7.7	78	85

Source: 2003 ESCAP - Population Data Sheet (Projected)

Table 8.1

Features of population in selected countries

Based on growth rate, birth rate, death rate and life expectancy in table 8.1, analyse the position of India and note down conclusions.

Significance of the Study of Population

We know that family includes parents and children. We need better food, clothing, shelter, health, education and other facilities. Think how these are related to the number of members of the family. In addition to the number of members, age difference, number of males and females, their preferences and income also play an important role in estimating the quantity of essential commodities and services required for the family.

The study of population of a country can be made use of for the following purposes.

- To assess the availability of human resource needed for production.
- To estimate the required basic infrastructure.
- To estimate the requirements of products and services.
- To understand the social and cultural structure of a population.
- To compare with the population of other countries.
- To assess the quality of standard of living.

For your information

- **World Population Day was observed for the first time on 11 July, 1987**
- **The year in which world population reached 100 crores - 1804**
- **The day on which world population reached 600 crores - 12 October, 1999**

Population of India

The process of calculating population is known as census. The first census in India was conducted in 1881. Find out the intervals at which census is taken and complete the table of census for the post-independence period of India.

- 1951
-
-

Indian Population reached 100 crores on 11, June 2000.

Census

Census is the collection, compilation, analysis and publication of different types of information related to the people living in a country in a given period.

India has only 2.4% of the land area of the world. According to the census 2001, the population of India (1,02,70,15,247) is 16.87% of world population. Of this, 51.73% (53,12,77,078) are males and 48.27% (49,57,38,169) are females. Population of Kerala comes to 3.10% (3,18,38,619) of the population of India. Out of this, 48.58% (1,54,68,664) are males and 51.42% (1,63,69,955) are females. The population of India which was 23.83 crores in 1901 increased by 78.87 crores within 100 years.

Every Sixth Person

One among every six persons of world population is an Indian.

Look at the following table showing population growth in India and Kerala from 1951 to 2001.

With the help of the table draw a multiple graph representing the population growth in India and Kerala. Analyse the table according to the indicators given below and note down the conclusions.

Year	India		Kerala	
	Population (in crores)	Decadal growth %	Population (in crores)	Decadal growth %
1951	36.10	13.31	1.35	22.82
1961	43.92	21.64	1.69	24.76
1971	54.82	24.80	2.13	26.29
1981	68.63	24.66	2.55	19.24
1991	84.34	23.86	2.91	14.32
2001	102.70	21.34	3.18	9.42

Source: Census Report 2001. India Series 1 & Series 33 Kerala Provisional Population Totals.

Table 8.2

Population growth India - Kerala 1951-2001

Indicators

- The period in which growth rate of population in Kerala stands above the national growth rate.
- The period in which growth rate stands below the national growth rate.
- The period in which growth rate of population in India and Kerala are equal.

The present figures state that in India 29 children are born in every one minute. Due to the rapid increase of population, we have to explore more resources for economic development. We have learned about the factors such as birth rate, death rate and immigration which influence the population. Let us see how the other factors of population are related to the economic scenario.

Sex Ratio

The number of females per thousand (1000) males in a population is known as sex ratio or female to male ratio. On the basis of Census 2001, in India there are 933 females per 1000 males, while in Kerala it is 1058. Increase in the death rate of females (female mortality) is the main reason for the low sex ratio at all India level. The reasons for higher sex ratio in Kerala are better health, literacy, better standard of living, economic security etc. More programmes are planned and carried out in the economic sector to reduce the death rate of females.

Age Structure

On the basis of age, population is classified into three divisions. They are:

- Children upto the age of 14.
- Those between the age of 15 and 59.
- Those who are above the age of 60.

Age Structure of population in India

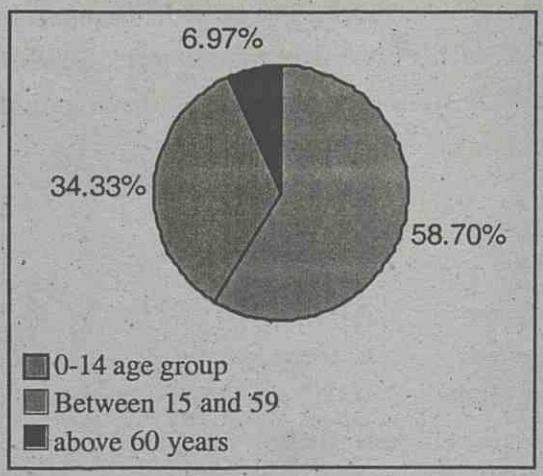


Figure (8.2)

Look at figure (8.2). It can be understood that only 58.70% of the people come under the employed sector. The remaining 41.30% of people live depending upon them. Increased rate of dependency affects economic activities adversely.

Dependency Rate

Dependency rate is the percentage of people depending on those who are employed (below 15 years and above 60 years of age.)

Occupational Structure of Population

It is the distribution of population on the basis of employment in sectors like agriculture, industry and services. In developed nations, most people work in the service sector. But in developing countries like India, it is the agricultural sector which provides employment to more people. This is

because the industrial and service sectors are not so developed. Employment structure helps us to know the participation of population in production sectors.

Literacy

The literacy rate of the population of a country can be considered as an indicator of the economic progress achieved by that country. According to the census 2001, literacy rate in India is 65.38% and that in Kerala is 90.92%. In literacy, men are at a higher level than women. In India, 75.85% of men and 54.16% of women are literates. In Kerala, they are 94.20% and 87.86% respectively.

Population growth at a higher rate makes universal education difficult. This interrupts economic growth.

Life expectancy

You have learned about the relation between human resource and life expectancy. On the basis of the Census -2001, life expectancy of males in India is 63.9 and that of females is 66.9. In Kerala they are 74.47 and 80.47 respectively. While life expectancy in Kerala stands equal to that in developed countries, it is lower in the other states of India. Life expectancy can be increased by providing basic comforts, employment, improved health care etc.

Do you know?

In 2001:

Country having highest density of population - *Japan*

Urban population of India - 28%

State having highest population - *Uttar Pradesh*

State having highest population density - *West Bengal*

Population density in India - 324

Population density in Kerala - 819

You have seen the important characteristics of the population of India. On the basis of a discussion, prepare note on how these affect the economic progress of a country and present it in the class.

Kerala - 2001

- **State having 12th place in population in India**
- **State having 3.1% of Indian population**
- **State having lowest population growth rate.**
- **State having third place in population density.**
- **The only state where females outnumber males.**
- **State having the longest life expectancy.**
- **State having the highest literacy rate.**

Population growth - Reasons

We have seen that the population of India is growing. It is estimated that the present population will become double in 36 years. We shall examine the reasons for population growth in developing countries like India.

- Poverty
- Superstitions
- Religious beliefs
- Illiteracy and ignorance
- Early marriage
- High fertility
- Increased birth rate
- Decreased death rate
-

Economic Problems

Rapid increase in population may give rise to many economic problems. We shall look into some important problems.

Poverty and Unemployment

India is an agricultural nation. As industrial and service sectors do not develop in proportion to the growth of population, most people depend on agriculture. Due to the increase in the cost of production, agriculture is becoming unprofitable. Besides, there is no increase in the employment opportunities in other sectors and this creates more unemployment problems.

Unemployment

Unemployment is a situation in which employment opportunity is not available to an adult person who is willing to work.

It is obvious that when there is decrease in employment and income, purchase of food stuffs for maintaining health becomes impossible. Such people naturally come below poverty line. In India, those people who do not get 2100 calories of food in rural areas and 2400 calories of food in urban areas are considered to be Below Poverty Line (BPL). As per the estimate of the year 2000, 26.1% of people are below poverty line in India. About 40 per cent of people are poor. Poverty encourages child labour.

Today in India, unemployment continues to be the most serious problem. The reasons might be

- Collapse of agricultural sector
- Decline of indigenous/traditional industries.
- Lack of industrial enterprises
- Inadequate development of service sector
- Lack of capital
- Lack of entrepreneurship
- Mechanisation
-

Shelter / Housing

Among the basic needs of man, shelter is very important. As population increases corresponding increase in the housing facilities should also be there. According to the figures available, there are 103297 households in Kerala that do not have shelters. The government extends subsidy relief, income tax relief etc. through various institutions and agencies to promote construction of houses. Besides, the government gives housing finance also.

Find out from news papers, the names of agencies and institutions which grant housing finance and complete the table

- Life Insurance Corporation of India. (LIC).
- General Insurance Corporation of India. (GIC).
-

Environmental problems

When population increases, there is an increased and unscientific exploitation of resources. This type of exploitation of resources creates obstacles in sustainable development. Shortage of shelter paves the way for the growth of slums and insanitation. Pollution of environment causes different types of communicable diseases. Diseases like Rat fever and Dengue fever, wide spread in Kerala now a days, are the outcome of environmental pollution. This has placed a heavy financial commitment on the primary healthcare scenario for the government and the people.

The government has to mobilise more funds from time to time for furnishing the increasing population with health, education, drinking water and other basic needs. If population is controlled properly, these funds can be utilised for other productive developmental activities. In short, population growth has to be checked so as to face the challenges raised by population explosion in the economic field.

We have seen many factors related to population and economic problems. You can visit five houses in your ward and conduct a survey regarding population and economic problems. The format and questionnaire shall be prepared in the class with the help of your teacher.

What particulars can be incorporated in the format?

- House name / House No.
- Head of the household
- Age
- Occupation
- Number of members
- Male/Female/Total
- Educational qualification
-

Discuss in the class the data collected and on the basis of it prepare a project on "Features of Population and Economic Problems."

Population Policy

Now you are aware of the problems created by rapid growth of population. To solve these problems and to attain national welfare, a population policy is essential. In India, it was in 1976 that population policy (Population control policy) was declared. Many schemes were also implemented for family planning and family welfare.

Need for Population Policy

We shall see why population policy is essential:

- To improve the economy of a country
- To maintain population suitable to the economy.
- To attain economic and social progress.
- To improve the standard of living.
- To improve education and health.
- To solve unemployment problem.

National Population Policy 2000- NPP 2000

This policy lays emphasis on health care of the people especially, that of women and children. Following are the aims of the new population policy.

- To meet the basic needs in public health sector.
- To ensure free and compulsory education to all children upto the age of 14.
- To reduce infant mortality rate below 30 in every 1000 live births.
- Popularise preventive measures against the communicable diseases
- To take steps for raising the age at marriage of women, above 20.

Let us hope that by implementing the policy, the declared objects can be attained by the year 2010.

There are commissions at the national and state levels to monitor and evaluate the implementation of the policies. You will collect more details about National Population Policy 2000 from magazines and various media, won't you?

SUMMARY

- Population of a country is the total number of people living in that country at a given time period.
- Demand of consumer items varies in accordance with the size of the population, sex ratio, population density, age structure, income and preferences.
- Study of population is essential to know the availability of human resources required for production, to estimate the basic needs, commodities and services required, and to make a comparison with the population of other countries.
- An estimate of population is known as Census. In India, census is conducted in every ten years.
- Poverty, unemployment, lack of shelter, environmental problems etc., are the economic problems arising out of rapid increase in population
- Population policy 2000 emphasises the health care of women and children and the welfare of the nation.

QUESTIONS

1. A factor determining the demand for consumer goods is population density. What are the other factors?
2. The study of population of a country helps to estimate the demand for basic needs of the country. What are the other significant reasons for the study of population?
3. In India census is conducted in every ten years. Find out the interval of census in Britain, America, Japan, Russian Federation and China?
4. Compare the population of Kerala with that of other states, and find out the peculiarities.
5. How are different factors of population such as birth rate related to economic progress. Elucidate?
6. One of the reasons for population growth in India is increase in birth rate. What are the other reasons?
7. Prepare a note including your suggestions, on solutions for the economic problems raised by population growth.
8. To popularise preventive measures against the communicable diseases is an aim of the population policy of 2000. What are the other aims?
9. Prepare a note on
   a. Population and environmental problem
   b. Population Policy
10. According to the figures of the year 2001, 58.7% of Indian population is between 15 and 59 years of age. How does this peculiar feature affects the Indian economy?

****

9 PUBLIC FINANCE

What we have learnt

- Wage, interest, profit, rent etc are the different sources of income to a family. This is used for consumption and savings.
- Following 73, 74 constitution amendment, 'Panchayat Raj' system came into existence. This has helped the introduction of decentralised planning.

You have already learnt what the different sources of income to a family are and how it is being spent. Like the families, Central Government, State Government and Local Self Governments have various sources of income and expenditure.

Individuals spend money mainly to maximise their welfare. The study on the income and the expenditure of individuals and private institutions is called Private Finance. But Government spends money to run public institutions and for social welfare. For this purpose Governments mobilise income from various sources. Public finance is the study of the income and the expenditure of Central Government, State Governments and Local Self Governments. In this chapter, let us examine the various sources of income, expenditure, public debt, budget and fiscal policy of Governments.

Do you think the sources of income and expenditure of a Government is similar to an individual's sources of income and expenditure? Let us examine the differences and try to identify more.

Sources of Public Revenue

Governments spend money for development and welfare activities. The expenditure on food, education, health, infrastructure, urbanisation etc are increasing day by day. To meet these expenses Government mobilises income from various sources. This income is called public revenue.

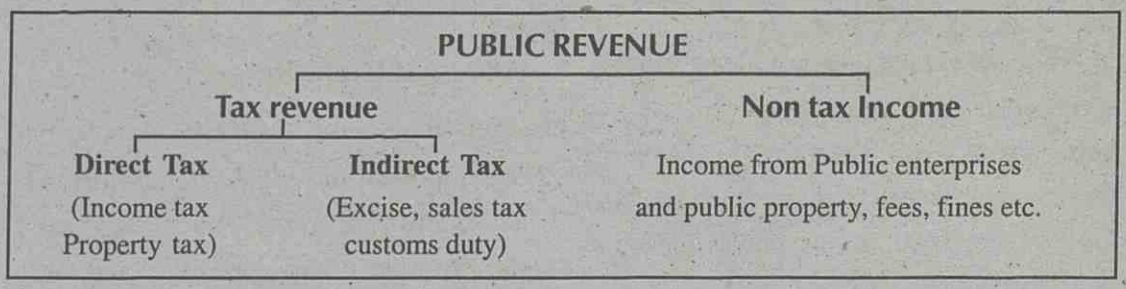
What could be the different sources of income?

- Tax
- Fees
- Income from public enterprises
-
-

Tax is a compulsory payment made by the citizens to meet the expenses incurred by the Government. Tax payer need not get direct benefit from paying a tax. Fees is the payment for the services received from the government

Public Finance	Private Finance
◆ After deciding the expenditure governments mobilise revenue.	◆ Expenditure is done after estimating income.
◆ Expenditure is done for the development and welfare of the society.	• Expenditure is done for private welfare
◆ Government can borrow money from foreign countries.	• Chances to borrow money from foreign countries are limited.
◆ The income and expenditure of the government are to be revealed.	• Income and expenditure remain secret.

The different sources of income to a government is given in the flow chart.



Tax is the main source of income of the Government. It is divided into two - Direct Tax and Indirect Tex. Let's examine their features.

Direct Tax

- Tax payer bears the burden himself. Direct tax is based on the principle of the ability to pay.
- Collected on the basis of the financial status of a person.
- Cost of collection is usually high.
- Income from tax can be increased either by raising tax rate or by widening tax base.

Indirect Tax

- Tax burden can be shifted.
- Collected by raising the price of commodities. Tax payer is ignorant of the tax.
- Higher rates of tax can be imposed on luxury commodities.

Value Added Tax (VAT)

It was first introduced in France in 1954. It is determined on the basis of the value addition made in each stage of production and sale. This is an example of indirect tax.

Let us see how value added tax is determined. Assume that 10% tax is imposed on a fan worth Rs 1450. The tax amount will be Rs 145. The value added tax of Rs.145 will be collected through different stages. An example is given below.

	Value *(in Rs.)*	Value added *(in Rs.)*	Tax (10%) *(in Rs.)*
For purchasing raw materials	800	–	80
Producer	1100	300	30
Whole sale Trader	1300	200	20
Retail Trader	1450	150	15
		Total Tax	**145**

Non Tax Revenue

We have already seen that Government can get income from non tax sources too. Some important non tax sources are given below.

- Central government gets profit from public sector undertakings like Railways, BSNL etc. The state government receives profit from state enterprises like KSFE, KELTRON etc.

- Income from public property which includes rent for government owned land and rent for government buildings.
- Payment for government services like tuition fee, registration fee, license fee etc.
- Various grants to government
- Internal and external borrowings.
-
-

Public Expenditure

Promotion of social welfare and improving the status of the poor are the main objectives of modern Government. When Government undertakes welfare activities, public expenditure automatically increases. The expenditure of Central, State and Local Governments is known as Public Expenditure.

Let us see the major areas of expenditure of Government

- Defence
- Law and order
- Education and Health
- Maintenance of democratic process.
- Development plans like
  - Agriculture
  - Industry
  - Infrastructure
- Transport and Communication

You have already seen the various items of Government expenditure. Now list out the various items of expenses and sources of income of your Panchayat/Municipality/ Corporation.

Public debt

Suppose our income is insufficient to meet our expenses. What will we do? Naturally we borrow money from banks or other institutions. Like this, when the income of the Government is insufficient to meet its expenses, Government borrows money from within the country and abroad. This borrowing creates public debt. You can understand why Government borrow money?

When Government borrows money from with in the country, internal debt emerges. When Government borrows from foreign Government and international institutions, there is external debt.

Public debt is mainly classified as productive and non-productive debt. If the borrowed money is used for productive purposes like railways, dam etc, it is called productive debt.

If the borrowed amount is utilized for unproductive purposes, it is known as unproductive debt. (eg: war, payment of interest etc).

For the development planning and defence purpose, India has borrowed much since independence and thus her public debt has gone up. It has now become a serious problem for our country.

What could be the reason for the growth of public debt in India?

- Population growth
- Social welfare activities

- Defence expenses
- Increase in imports
-
-

Budget

The word Budget is derived from the French word 'BOUGHETTE' which means leather bag. Generally, Finance Minister brings financial proposals in leather bags. Budget is a blueprint of proposed expenses and expected revenue during a financial year. Governments prepare budget for one year. In India, the financial year starts on April 1 and ends on March 31. Do you think financial year for all countries is the same?

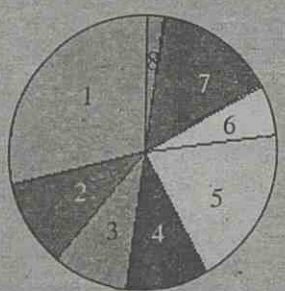
Suppose there is a war, natural calamity etc., Government revenue becomes insufficient to meet the situation. In such cases Government resorts to Supplementary budget to find out additional revenue to meet the circumstances.

Kinds of Budget

What are the different kinds of budget that you know?

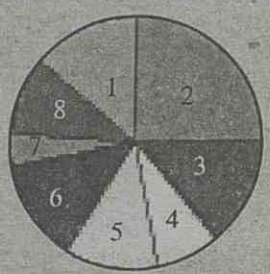
Central Budget - 2002-2003

One Rupee : Income



	Items	Paise
1	Loans and liabilities	29
2.	Corporation Tax	10
3.	Income Tax	9
4.	Customs duty	10
5.	Excise duty	19
6.	Capital receipt other than borrowings	6
7.	Non tax revenue	15
8.	Other taxes	2
	Total	100

One Rupee : Expenditure



	Items	Paise
1.	Central Plan	14
2.	Interest	25
3	Defence	14
4	Grant	8
5.	Non plan expenditure	12
6	State's share	13
7.	Non plan expenses to state	4
8.	Plan grant to states	10
	Total	100

figure 9.1

- Balanced budget
- Deficit budget
-

From media and other sources, try to collect more information on each of this and prepare short notes.

Budget clearly shows how each rupee is coming to the treasury and how it is being expended. Based on the central budget for 2002-2003, let us see how each rupee comes and goes (see figure 9.1).

Analyse the data given in figure 9.1, with regard to the significance of each item of income and expenditure and draw conclusions.

Excess of Budget expenses over Budget revenue including borrowings is called Budget deficit

Budget deficit = Total Budget expenses - Total Revenue income.

Revenue deficit is the excess of revenue expenses over revenue.

Revenue deficit = Revenue expenses- Revenue income

Fiscal deficit include budget deficit and borrowings from Reserve Bank and Treasury

Fiscal deficit = Budget deficit+ Borrowings (Reserve bank, Treasury etc.)

Fiscal deficit is shown in the budget - now a days

Plan Account shows the accounts of projects and other programmes included in the plan. Eg: Agriculture, Health, industry etc.

The items that do not come in plan programme fall in Non-plan Account. Eg: Interest payment, salary, pension etc.

Fiscal Policy

Budget usually reflects the financial position of the government. The policy relating to taxes, public expenditure and borrowings is known as Fiscal policy. Budget is an important instrument of fiscal policy. Governments which continuously present deficit budget will definitely fall into debt trap. A good fiscal policy can effectively control budget deficit. Budget policy is implemented by raising taxes in times of inflation and increasing expenditure in times of deflation.

A general rise in price of commodities is called inflation. When there is inflation, value of money comes down. A general fall in price of commodities is called deflation. When there is deflation, value of money will go up.

Objectives of Fiscal Policy

- Economic development of a nation
- Control unnecessary expenses
- Increase employment opportunities.
- Control prices
- Ensure economic stability
-

We have seen that the Government mobilise income from tax and non tax sources Inorder to reduce tax burden, we have to find out more non tax sources. Service sector is the most ideal area for this. When the income of the Government is insufficient to meet its expenses, naturally Government borrows internally and externally. You can see the major international financial institutions in the next chapter.

SUMMARY

- Public finance is that part of economic analysis that studies the income and expenditure of the Government.
- Dividend, fees, grant, borrowings etc are known as non tax sources of income.
- Public expenditure includes development activities, welfare activities, defence etc.
- When revenue is insufficient to meet the expenses of government, it borrows money from within the country and abroad. This is called public debt.
- The proposed expenses and expected revenue of a government during a financial year is called Budget.
- Fiscal policy is implemented through budget by raising taxes in times of inflation and increasing expenditure in times of deflation.

QUESTIONS

1. One of the features of public finance is that expenditure is done for the welfare of the society. Identify the other features and compare them with the features of private finance.
2. Classify the following taxes into direct and indirect taxes and make short comment on it.

   Agricultural tax, Entertainment tax, Professional tax, Income tax, Customs duty, Excise duty, Land tax, property tax, Vehicle tax.
3. What are the taxes collected by Local Self Governments?

4. The different stages of production and sale of a silk saree are given below. Raw materials cost Rs.500. Producer sells it to wholesaler for Rs.800. Retailer gets it for Rs 900 and he in turn sells it for Rs.1,000 in the market. Suppose tax rate is 10%. Identify the value added and tax collected in each stage and prepare a schedule for Value Added Tax (VAT)

5. Government imposes a fine upon those who violate traffic rules. In which category does this income come?

6. Grant is an example of non tax revenue to government. Identify the other non tax sources of income to a Government?

7. What do you mean by public expenditure?

8. Identify five areas where Local Self Government undertakes expenditure.

9. The budget of a Local Self Government is given below. Analyse it and write down your conclusion.

PANCHAYAT BUDGET 2003-2004

Revenue	Rs.	Expenses	Rs.
Property tax	70,00,000	Public works	1,25,00,000
Professional tax	20,00,000	Drinking Water	25,00,000
Entertainment tax	9,00,000	Housing	15,00,000
Fees	1,00,000	Agriculture	7,00,000
Grant	1,00,00,000	Small Scale and Cottage industries	8,00,000
		Social welfare	10,00,000
		Salary	10,00,000
Total	**2,00,00,000**	**Total**	**2,00,00,000**

10. "A government presenting deficit budget continuously will fall into debt trap". Discuss?

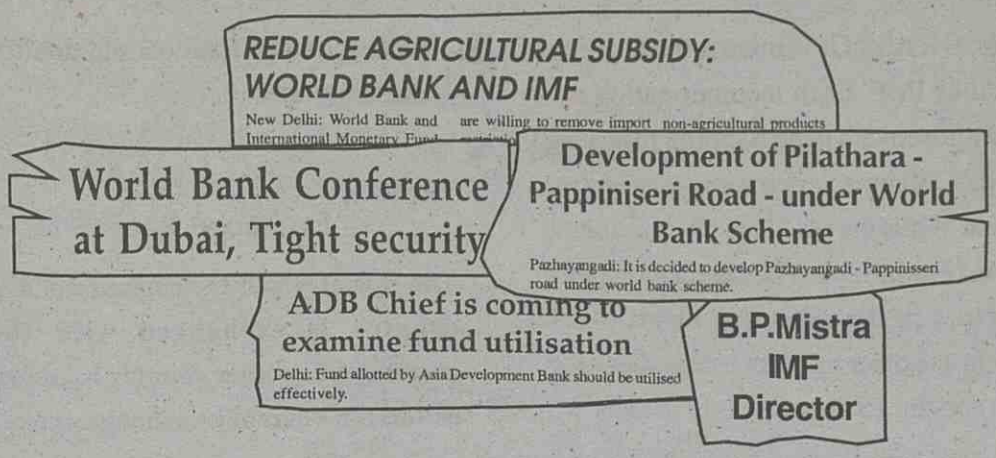
11. What are your suggestions for controlling deficit in a budget?

****

10 INTERNATIONAL FINANCIAL INSTITUTIONS

What we have learnt

- India implemented new economic policy in 1991
- As part of the new economic policy, liberalisation and privatisation were implemented.
- India gets loan and financial help from international institutions like IMF, World Bank etc.



You have already learnt about the disasters caused by the First and Second World wars and the organisations set up for peace after each war. Wars created an impasse in the world economic scenario and acute unemployment problem. War affected trade between nations and stability of money exchange adversely. Finding a permanent solution to this situation became inevitable. We shall see the international financial institutions which came into existence as a result of this.

Brettonwoods Conference

A conference was held at Brettonwoods in New Hamshare, America, from July 1st to July 22, 1944 to discuss the post war economic dead lock. The important topics of discussion in Brettonwoods Conference where the representatives of 44 countries including India participated were:

- Economic restructuring
- Stability of money exchange/ market
-

The international institutions which took shape in this conference are:

- International Monetary Fund (IMF)
- International Bank for Reconstruction and Development (IBRD)

We shall study about these institutions and their activities, which have secured wide popularity today.

Brettonwoods Twins

The two financial institutions, International Monetary Fund and International Bank for Reconstruction and Development which were formed as a result of Brettonwoods Conference are called Brettonwoods Twins.

International Monetary Fund

You might have read much in newspapers regarding the International Monetary fund. Consequent upon the decision of the Bretton woods conference, this institution started functioning in March 1947. The IMF which had 44 members including India has 184 nations as members today. Washington is its headquarters.

Organisation and Control

The Board of Governors is the Supreme Council of IMF. Each member nation can appoint a governor. The authority for managing day to day affairs is vested with the executive directors. While the USA, the UK, Germany, Japan and France having higher quota appoint 5 directors in the executive board of 21 members, the other member nations have the right to appoint 16 directors only.

The eligible number of votes that can be cast for each country is determined on the basis of its quota. The USA has the right to cast the maximum number of votes (19.64%).

There should be a minimum majority of 85% of votes to take policy decisions. From this, it is clear that no policy decisions can be taken without the permission of America and other powerful nations.

How membership quota is mobilised

IMF mobilises working capital by fixing quota for each country. The quota of each country is determined on the basis of the statistics of national income, import, export etc. applying a particular formula. 25% of the quota is to be deposited as gold and remaining 75% as its own currency. The money and gold thus mobilised is the fund of IMF. This fund is utilized by IMF for the following purposes.

Let us see the functions of IMF. Try to find out more.

- To facilitate international trade and development.
- To give technical assistance regarding budget, financial matters and foreign exchange to its member countries.
- To extend loans to its member countries
- To help in the fixation and control of exchange rate.
-

Exchange Rate

The rate at which the currency of one country is exchanged with the currency of another country is known as foreign currency exchange rate.

International Bank for Reconstruction and Development (IBRD) - World Bank

The Bank of International Reconstruction and Development started functioning on 25th June, 1946. IBRD was established with a view to helping its members in reconstructing postwar economy and boosting the economy of developing countries.

Organisation and Control

The board constituted by the Governors appointed by the member countries has the supreme power. The Governors elect Chairman for a term of one year. 21 executive directors control the day-to-day affairs. Among the 21 executive directors, 5 members are elected by countries having higher quota and the other members are elected by the other member countries. The president of IBRD is the chairman of the executive directors.

Mobilisation of capital

Let us see the different ways through which capital is mobilised for the activities of the bank.

- The quota of member countries
- Advances

IBRD grants advance only on the basis of reports made by the council of experts after examining the developmental projects submitted by the member countries. World Bank extends advances mainly for productive purposes.

The functions of the World Bank are given below.

- To reconstruct the economies destroyed due to war
- To give assistance to developmental activities
- To encourage private foreign investments
- To provide finance to developing countries and enable them to mobilise capital to increase production.
-

The members of IMF are the founder members of the World Bank. If a country wants membership, 70% of the total members should support the membership. Likewise a country loses its membership, if it does not obey the rules of the World Bank.

On the basis of the functions of IMF and World Bank, compare them and expand the table (10.1)

Related Institutions

We shall study about the two related institutions of the World Bank and their functions.

International Development Association (IDA)

This is an institution under the control of the World Bank. Backward countries were in need of foreign aid for increasing production, poverty alleviation and control of population. World Bank extends finance only after considering the country's repayment capacity. For this reason many countries failed to obtain the required financial assistance. IDA was constituted in 1960, to extend financial assistance including long term grants to such countries.

Only those countries having membership in the World Bank have membership in IDA. Some officials of the World Bank render service to IDA which also has the same structure as that of the World Bank. The president of the World Bank is also the president of the IDA.

International Finance Corporation (IFC)

IFC, established in 1956, is a financial institution under the control of the World Bank.

IMF	World Bank
• Solve short term economic problems • Financial flows are controlled, protected, stabilised and balanced at global level. •	• Boost activities for the development of capital. • Solve long term economic problems. •

Table 10.1

It is the only international agency which helps private entrepreneurs. IFC gives financial assistance to projects submitted by member nations to improve private sectors. IFC and World Bank are legally and economically independent institutions which exist separately.

Only those who have membership in the World Bank have membership in the IFC. The president of the World Bank is the informal chairman of the Director Board of IFC.

Now you can prepare and present a note on the World Bank and related institutions.

Asian Development Bank (ADB)

As the World Bank suggests and helps in the resolution of global economic problems, often many countries fail to get financial assistance. In this context, in the minister level conference on Asian Economic Co-operation held in Manila in 1963, the idea of establishing a regional bank for South Eastern countries in Asia was mooted. As a result the ADB was formed on 19th December 1966. Currently there are 61 members in the ADB which had 31 members previously. Manila in Philippines is the head quarters of ADB.

Organisation and Control

The supreme power of the ADB, which functions in co-operation with the UNO and its affiliates, is vested in the Board of Governors. Each member country can appoint a Governor. Routine matters are attended by a 12 member Board of Directors. The chairman of the Board of Directors is the President of the ADB.

Mobilisation of capital

ADB mobilises capital mainly through two channels.

- Issuing shares to member countries.
- Through special funds.

Let us look at the objectives of the of the ADB.

- Provides loans to member countries.
- Renders help to member countries for the formulation of development projects and policies.
- Acts as a mediator for the exchange of capital between countries.
- Provides technical assistance to member countries.
-

India and International Financial Institutions

We have seen that India has been a member of international financial institution from the beginning. India has received over the years, loans and technical assistance from these institutions for development projects. If we are to have the capacity to repay loans and their interest in future, the loans should be productively used. Otherwise, foreign debt may have to be repaid through raising the tax burden.

The reasons for the recent increase in India's public debt, were seen in the last chapter. Undoubtedly the country will be trapped in debt with new/more borrowings, if the repayment capacity is not increased. Better financial management becomes necessary in

such circumstances. These institutions provide assistance on the basis of clear criteria. By imposing adequate safeguards and putting such loans only to productive uses, debt trap can be avoided.

You have noted the issues connecting India and the international financial institutions. Try to prepare a note entitled 'India and International Financial Institutions' based on detailed information from newspapers and present it.

SUMMARY

- IMF and IBRD are the two institutions established to find solutions to the deadlock in the world economy.
- While the IMF solves short term economic problems, the IBRD settles long-term economic issues.
- IDA and IFC are the two affiliates of the World Bank.
- Membership in the affiliated institutions is open only to the members of the World Bank.
- ADB has been established with the objective of the economic development of South East Asian Countries.
- India is a member of almost all international financial institutions.

QUESTIONS

1. Prepare a short note on the IMF and its different functions.
2. 'No policy decision can be taken in the IMF without the consent of developed countries including America. Why?
3. Operational objectives of the IMF are different from that of the World Bank Elucidate.
4. Organisation and control of the IMF and the World Bank are different. Elucidate.
5. Explain the circumstances that led to the establishment of the ADB and its objectives.
6. Prepare short notes:
   - *International Development Association*
   - *International Financial Corporation*
   - *Asian Development Bank- structure and control*

11 NATIONAL INCOME

What we have learnt

- Factors of production like land, labour and capital are owned by Households.
- An economy is divided into three sectors - Agricultural sector, Industrial sector and Service sector.
- Gross National Product and Net National Product help us to understand economic progress.

You have studied the circular flow of economic activity which shows the relationship between production and consumption in an economy. Continuous increase in production can be considered as an index of progress that an economy has achieved. This increase in production will naturally promote the growth of National Income. Now examine the total income of a nation or national income, methods of calculating it and the difficulties involved in it.

What is National Income?

Hope you know the factors of production exchanged by house holds and the resulting reward. Fill up the following table.

Factors of production	*Reward*
• Land	• Rent
•	•
•	•

Annual income of a family is the sum total of income it receives from various sources during a year. It is on this basis that the economic position of a family is determined. Therefore, when we calculate the annual income of a nation, naturally we have to take into account the income from various sectors. What are the productive sectors?

- Agricultural sector
-

These sectors produce innumerable items of goods and services ranging from ball pins to space shuttles during a year. The sum total of these goods and services is the gross production of the country. When we express the value of these goods and services in terms of money, we get national income. Now, can you give a definition to national income?

-

J.M.Keynes, a famous economist defined national income as follows.

"National Income is the money value of all goods and services produced in a country during a year"

While family income reflects the economic position of households, national income shows the economic position of a nation. The basic objective of an economy is to achieve economic progress. This is achieved by co-ordinating natural resources, human resources, capital, technology etc. National income will help to assess and compare the progress achieved by a country over a period of time. Let us see why the study of national income is given so much importance.

- To estimate economic development.
- To know how far development objectives were achieved.
- To know the contribution of various sectors to national income.
-

Try to find out more points.

Methods of calculating National Income

National Income calculation is not an easy task. For this, we have to collect more facts and figures. We have already seen that income

is generated through production process. Normally we use this income for purchasing goods and services. When demand for commodities goes up, we have to produce more. Thus income leads to expenditure which again leads to increased production. See the following figure.

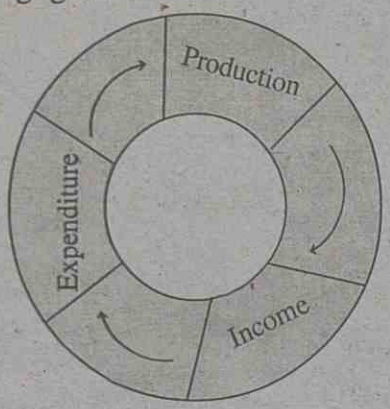


figure 11.1

The figure 11.1 given above shows how production, income and expenditure are mutually related. Economic activity is directly related to these three stages. Based on this, three methods are used for calculating national income. They are:

- Production method
- Income method
- Expenditure method

You can calculate national income by following any one of these methods. Considering the nature and requirements of the economy one or more methods are used for calculating national income. Let us examine these methods separately.

Production Method

This method is based on the total production of a country during a year. First of all production units are classified into primary, secondary and tertiary sectors (Table 11.1). Then we identify the various units that come under these sectors.

We estimate the goods and services produced in each of these sectors. The sum total of products produced in these three sectors is the total output of the nation. The next step is to find out the value of these products in terms of money.

The money sent by Indian citizens working abroad is also added to this. Now we get the gross national income.

GNI = Money value of total goods and services + Income from abroad.

Productive Sectors

Primary	*Secondary*	*Tertiary*
• Agriculture and allied activities	• Registered industries	• Communications
• Forest	• Non registered industries	• Banking/Insurance
• Fishing	• Electricity	• Public Administration
• Mining	• trade	• Health
	• Manufacturing	• Education
		• Other services

Table 11.1

This method helps us to find out contributions of various sectors to national income.

Income Method

Factors of production together produce output and income. The income received by the factors of production during a year can be obtained by adding rent to land, wages to labour, interest to capital and profit to organisations. This will be equal to the income of the nation. In other words, total income is equal to the reward given to various factors of production. By adding the money sent by the Indian citizens from abroad to the income of the various factors of production, we get the gross national income.

GNI = Rent + Wage + Interest + Profit + Income from abroad.

This method will help us to know the contributions made by different agents like landlords, labourers, capitalists and organisers to national income.

Expenditure Method

National income can also be calculated by adding up the expenditure incurred for goods and services. Government as well as private individuals spend money for consumption and production purposes. The sum total of expenditure incurred in a country during a year will be equal to national income.

GNI = Individual Expenditure + Government Expenditure.

This method will help us to identify the expenditure incurred by different agents.

Any one of the above methods can be used for calculating national income.

Production method = Income method = Expenditure method.

Difficulties/Limitations in calculating National Income

We have already seen that calculation of national income is a difficult process. Let us examine these difficulties.

- Non availability of reliable statistics.
- The service of housewives is not included in the national income because this service is not sold in the market.
- Individuals do not keep correct account of their consumption.
- Illiteracy and ignorance.
- Lack of proper criteria for measuring the value of services.

Try to find out more difficulties in calculating national income and prepare a note on "Difficulties and limitations in calculating national income".

As the economy develops, these difficulties get minimised. Organise a discussion to find out how these difficulties are reduced when an economy develops.

National Income calculation in India

The first attempt to calculate national income of India was made by Dada Bai Naoroji in 1867-68. This was followed by several other attempts.

The first scientific attempt was made by Prof.V.K.R.V.Rao in 1931-32. But it was not a satisfactory attempt. The first official attempt

was made by Prof.P.C.Mahalanobis in 1948-49. The final report was submitted in 1954. Today national income is calculated and published by the Central Statistical Organisation. All the three methods are used for calculating national income in India.

The following table shows the gross national product and the net national product of India for the last ten years.

Year	GNP Rs. Crores	NNP Rs. Crores
1992 - 93	618969	546023
93 - 94	769265	685912
94 - 95	901111	803090
95 - 96	1053736	936548
96 - 97	1224208	1089563
97 - 98	1376943	1224946
98 - 99	1583110	1415044
99-2000	1740207	1557781
2000 -01	1900310	1702454
2001-2002	2801350	1864292

Table 11.2

Using the following indicators, analyse the table 11.2 and prepare a report.

- Years in which there was an increase/ decrease in national income.
- The changes in annual growth rate.

From the analysis it is seen that the national income of India is growing slowly. What could be the reasons?

- Slow growth of agricultural sector
- Defect in planning
- Rapid growth of population.
- Under-utilisation of the productive capacity of machines
- Poverty
-

Growth in national income is considered as an index of development. Try to identify various measures whereby India can increase its national income.

-
-

Table 11.3 shows the gross national products (in dollar) of some selected countries. Compare it with India's national income and prepare a report. Write down your conclusions.

Countries	GNP (Billion dollars)			
	1997	1998	1999	2000
Japan	4812.1	4089.9	4054.5	4519.1
America	7783.1	7921.3	8879.5	9601.5
Indonesia	221.5	138.5	125.0	119.9
Pakistan	64.6	63.2	62.9	61.0
China	1055.4	928.9	979.9	1062.9
India	357.4	421.3	441.8	454.8

Source : World Development Report - 2001

Table 11.3

Prepare line graph, bar diagram, pie diagram, histogram etc. by using the information given in the table and after giving suitable colours exhibit them in your class room.

Gross National Product and National Income (GNP & NI)

We have seen that gross national product is the sum total of goods and services produced in a country during a year. There are several stages in arriving at national income from gross national product.

Net National Product

Assume that you have bought a bicycle worth Rs.2,500/- Will you get the same amount for the bicycle, if you sell it after two years? What are the reasons for this?

- It has become old.
- Depreciation due to use.
-

Now the current price of the cycle is calculated by deducting depreciation charges from the original price. Similarly, in the production process a country may use machines and equipments. When there is depreciation, we have to repair or replace machines and equipments. The expenses incurred for this is called the depreciation expenditure. Net National Product is calculated by deducting depreciation expense from gross national product.

NNP = GNP - Depreciation

National Income

Let us see how national income is arrived from NNP.

You might have heard about indirect taxes and subsidies. Sales tax is an example for indirect tax. This is collected by adding tax to the price of commodities. Then if you want to know the original price, you have to deduct sales tax from the selling price of the commodity.

You might have noticed that Handloom and Khadar products were given rebate during festival seasons like Onam, Christmas and Bakrid. Say 20% rebate is given for handloom products. What do you mean by this?

- Goods worth Rs.100/- is given to the consumer for Rs.80/-
- The balance of Rs.20/- is given by the Government as subsidy.

If you want to know the original price of handloom products sold during the festival seasons, naturally you have to add the subsidy given to the sale price of the product.

This process is followed in the calculation of National Income also. National Income is calculated by deducting indirect taxes from Net National Product and adding subsidies.

NI = NNP - Indirect Taxes + Subsidies

Let us see two other concepts related to national income.

Per Capita Income (PCI)

This is the average annual income of the people of a country. It is obtained by dividing national income by the population.

$$\text{PCI} = \frac{\text{National Income}}{\text{Population}}$$

Personal Income (PI)

The sum total of income that a person receives from different sources is his personal income (Eg: wages, rent, interest, profit etc)

PI = Wages + Rent + Interest + Profit + Others

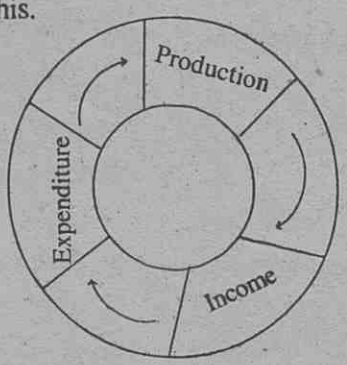
Now you have seen the important concepts of national income. Prepare a note on national income incorporating all the details.

SUMMARY

- National Income is the money value of the total goods and services produced in a country during a year.
- National Income helps us to know the economic progress achieved and to make comparative study.
- Product method, Income method and Expenditure method are the three methods used for national income calculation.
- In India national income is calculated and published by the Central Statistical Organisation (CSO).
- Net National Product, Per Capita Income etc., are some of the important concepts related to National Income.

QUESTIONS

1. National Income helps us to know how far we have achieved developmental goals. Like this find out the other significance of the national income calculation?
2. The figure given below is related to production process. Give an explanatory note on this.



3. Which method is used to find out the contributions made by various sectors to national income? How is national income calculated by this method?

4. Which method is used to find out the contribution of factors of production to national income? Explain.

5. National Income calculation is a difficult task. Substantiate.

6. Population growth adversely affects the growth of national income. What are the other factors?

7. Suggest some measures for increasing national income.

8. How are Net National Product and National Income are calculated from Gross National Product?

9. Write short notes on
   - National Income
   - National income calculation in India
   - Personal Income

10. When production method is followed, we take goods and services produced in various sectors. Categorise the following among the three productive sectors.
    - Health
    - Hotel
    - Public Administration
    - Forest
    - Trade
    - Manufacturing
    - Mining
    - Electricity
    - Transport
    - Agriculture

****

12 BUSINESS ENTERPRISES- THEIR WORKING AND ACCOUNTING

What we have learnt

- On the basis of ownership, business organisations are classified into three sectors -Private sector, Public sector and Joint Sector.
- Sole Proprietorship, Partnership, Cooperative societies and Joint stock companies are different forms of business organisations.
- The main objective of accounting is to determine operating results and financial position of the business.
- Every business transaction has two aspects - Debit aspect and Credit aspect.
- Accounting is based on the Accounting Equation
  Assets = Captial + Liabilities.

Our business environment consists of different forms of business organisations functioning in the private sector. public sector and joint sector. Such organisations are relevant in India, where mixed economy prevails. Let us examine the working of such business units in terms of their department functions and accounting systems.

Private Sector -Different forms of organisation

There are business units owned and operated by individuals in their sole capacity. Try to identify such units in your locality. Can a Joint Family form of organisation undertake similar business? If so, give a few examples. Who will be entitled to receive profits? How is capital acquired for such business?

Joint Family Business

A Joint Family System ensures joint ownership of family property contrary to nucleus family system where inherited property gets divided. In a Joint Family business the inherited property is applied to some business which is collectively managed. Such a business is owned by all the male members of the family and profits are utilised for meeting expenses of the family. The senior most male member (Karta) manages the affairs of the family and others are bound to abide by his decisions.

You have already learned about different forms of business organisations in the private sector. Can you recollect them?

- Sole Proprietorship
- Joint Family business
-
-

There are different forms of business organisations in the public sector too; Let us study more about them.

Public Sector - Different forms of Organisation

You might have heard of organisations like Indian Railways, LIC of India, KSRTC etc. Who owns such organisations? These are public sector organisations. Let us examine the basis on which these organisation can be classified.

- Direct control of the government
- Autonomy
- Acquisition of captial
-

There are, thus, three types of public sector organisations:

(1) Departmental Undertakings

Such organisations are under the direct control of the Government. They function as a Department of the Government. Capital is raised through treasury allocation. The annual report on working of the organisation should be made available to the public. These organisations ensure protection of public interest and hence have service as their prime motto. An example of such a unit is Department of Post and Telegraph. List out other examples of such organisations.

(2) Statutory Corporations

A statutory corporation is formed through a separate Statute or Act passed in the Parliament or Statute Legislature. Such organisations enjoy greater autonomy in their functioning. In lieu of direct control, autonomous bodies manage such organisations. Initial capital is raised through Government support. Examples of such units are Food Corporation of India (FCI), KSRTC etc.

(3) Government companies

Such companies are owned by the government and operate with a profit motive. Capital is raised through issue of shares. At least 51 per cent of the shares issued must be owned by the government. They are registered under the Indian Companies Act, 1956. Kerala Automobiles Ltd., is an example of such a unit.

Based on the above discussion, complete the table 12.1 given below.

Different Departments of a Business Organisation and their Functions

Let us examine the various functions of a Paper manufacturing company.

- Acquisition of finance
- Production and marketing of goods
- Purchase and storage of raw materials like bamboo pulp, old paper for recycling etc
- Production process
- Marketing of finished product
- Recruitment of manpower

Such diverse functions need to be effectively coordinated for efficiency and profitability in the organisation.

Management

Management is the process of planning acquisition of inputs for production and acquisition of manpower, directing and controlling the business activities. For the efficient discharge of these functions, a group of men called managers are required in an organisation.

A business has several functions- buying storage, production, marketing, financing, acquisition of manpower, general administration etc. Separate departments are formed in a business organisation for each of these functions. The departments thus include

Basis	Departmental Undertaking	Statutory Corporation	Government Company
1: Formation 2. Capital 3. Control 4 Staff pattern 5 Autonomy			

Table 12.1

1. Purchase-stores department
2. Production department
3. Marketing department
4. Finance department
5. Human Resource department
6. General administration department

Purchase-stores department

Purchase of the right materials at the right quantity and in the right quality is the primary function of this department. The other functions are:

i Identification of right supplies
ii Purchase at the right price
iii Ensure uninterrupted production through supply of materials
iv Transfer of materials to the production department
v Minimisation of loss in the warehouse
vi Identify and control excessive storage and wasteful consumption

Material Management

Planning, organising, coordinating and controlling the purchase, storage and utilisation of materials is called material management.

Production Department

This department is responsible for appropriate location of the production unit (plant), product design, production process formulation and similar functions. Let us examine these functions.

Location of the production unit

Location of the production unit is based on the following factors.

- availability of resources
- transportation facility
- accessibility to the market
-
-

Product designing

Observe the products you use daily. What are the factors that determine their design?

- ease in handling
- utility
- attractiveness
-

Production process formulation

There are certain products which pass through a simple production process, while for others several processes are essential. Textile manufacturing involves the following production process- dyeing, weaving, fabricating etc. Continuous processes are necessary for designing the product and the output of one process becomes the input for the other and so on. The production of electronic goods and vehicles have a different production process. Here different parts are manufactured separately and assembled together.

Production management

Production management involves planning and implementation of all those activities which are concerned with conversion of rawmaterials into finished products.

Marketing Department

Profitable selling of the finished products alone can sustain a business. You have already learnt that marketing involves all activities which ensure profitable market for a product. It includes all functions that take place from the completion of the production process to making the product available in the hands of the consumer. The functions of marketing are illustrated in the following figure 12.1 given below.

Marketing Management

Marketing management involves planning and implementation of all those activities which are concerned with ensuring profitable market for each product of a business.

Imagine yourself to be engaged in marketing soaps. Prepare a flow chart showing the various activities involved in several marketing functions that take place.

Finance Department

Finance is inevitable for the efficient conduct of a business. Finance department has the responsibility to raise adequate finance and ensure its proper utilisation. Let us examine the functions of this department.

Raising of funds

Funds are raised considering the financial requirements of various departments of the business. Finance can be raised through

- Share captial
- Loans
-

Allocation and Utilisation of finance

Finance is allocated among the departments considering their requirements and in terms of cost benefit analysis. The relative significance of the activities that consume finance also deserve consideration.

Dividend decision

The profits earned through effective utilisation of finance is either distributed to the owners of the business or is reinvested in the business. The ratio at which this is to be done is recommended by the finance department.

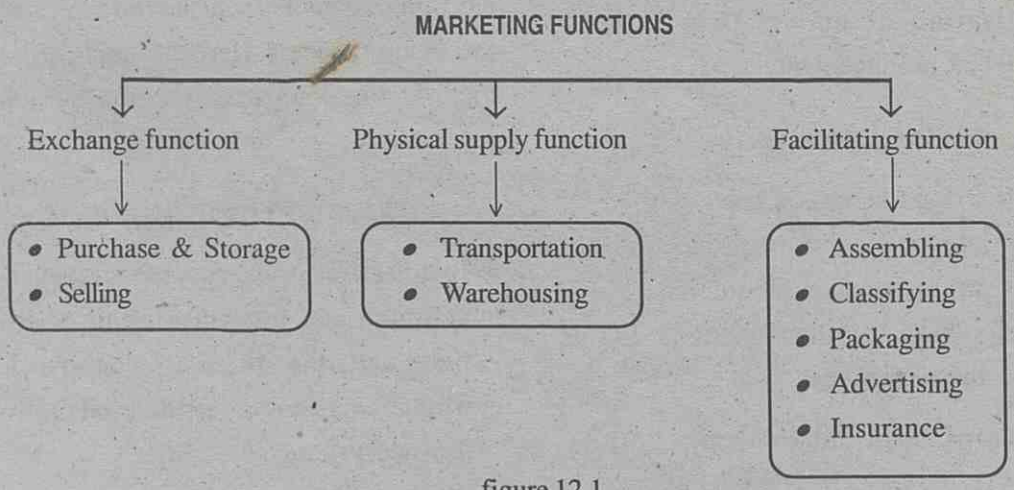


figure 12.1

The functions of the finance department is illustrated in the figure 12.2 given below.

Financial Management

Financial management involves all functions related to financial planning, raising of finance and efficient utilisation of finance in a business.

Human Resources Department

Identification of right men for the efficient conduct of the business activities, their appointment, training, motivation, wage and salary administration, employee welfare etc are the functions of the Human Resource Department. These functions include.

1. Man Power Planning

Manpower Planning involves determining the manpower requirements for the organisation in advance and fixation of qualification, experience, aptitude etc required for individuals to take up various jobs.

2. Recruitment

Recruitment is undertaken through advertisements for suitable men in newspapers, TV, Radio and other media. Similarly employment exchanges and other institutions are also seen as potential sources for recruitment.

3. Selection

It is the process of identifying the most suitable candidate from among the applicants for the job. Several tests are conducted for this purpose. These include written tests, aptitude tests, interviews, experience tests, physical tests etc. Such examinations help in finding the most suitable person for the job.

4. Training

The selected candidates are given appropriate training before posting them on the job. Qualified trainers are used for the purpose. Trained individuals help in minimising loss through wastage of resources and in appropriate use of machinery.

5. Salaries and other incentives

Salary and pay package should be fixed considering the nature of each job and this package should provide for inflation in the cost of living condition of the employees.

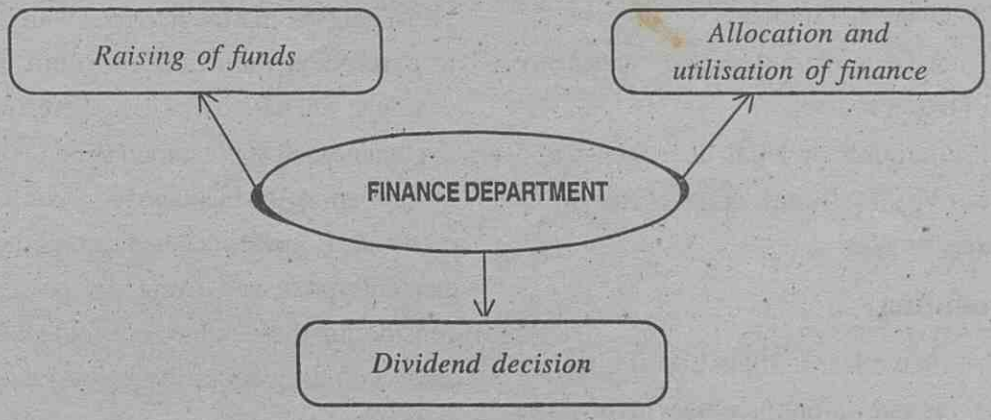


figure 12.2: *Functions of Finance Department*

Human Resources Management

Human Resources Management includes finding the right men for the various jobs to be performed, their appointment, training of men, salary and incentive administration and taking care of the welfare and development of human resources.

General Administration Department

This department is engaged in planning the various activities of the business and getting the plans implemented. The main function of this department is collection, analysis and dissemination of information that would help in planning and implementation of business activities. The functioning of this department helps the other departments of business. The responsibilities of this department includes office administrative activities like data entry, filing, documentation and legal matters. Let us examine the objectives of such a department.

- It acts as an information centre
- It coordinates the functions of all other departments.
- It facilitates external communication for all other departments
- Undertakes safe custody and maintenance of business assets.
- Preparation of legal documents and conveying legal matters to other departments.

Accounting

You have learnt about accounting, its objectives and various processes involved in it. The operating results of a business as well as its financial position can be ascertained only through systematic recording of transactions. There are certain general principles to be complied with for the systematic recording of transactions. These principles and the manner in which an account is prepared are discussed here.

Accounting Principles

There are certain general principles of accounting which have been universally accepted. Let us study more of such principles.

1. Separate entity principle

This principle state that business enterprises have a separate and distinct existence apart from that of the owner. ie, the enterprise is an artificial personality. Eg: Suppose Raju commences his business with Rs.50,000. Here the business, being a separate entity, is presumed to have borrowed Rs.50,000 from Raju. Just as borrowed money is to be repaid, the business must repay the borrowed sum to its owner and thus owner's investment is a lability for the business.

2. Going concern principle

Business transactions are recorded based on the principle that the enterprise will continue to exist for a long time in future. In our example, when Raju makes his investment in the business, it is presumed to be long term investment as the business has a continuous existence. Businessmen make investments in their enterprise with a long term perspective considering their unit to be a going concern and accounting activities are based on this principle.

3. Money measurement principle

Raju's friends helped him in setting up his business. Such help cannot be recorded in accounting as it cannot be measured in money terms. Monetary transactions alone can be recorded in an accounting system.

4. Dual Aspect principle

You have already learnt that every business transaction has two aspects, namely a debit aspect and a credit aspect. The accounting equation: 'Assets = Capital + Liabilities' is based on this principle.

Double Entry System of Accounting

Every business transaction has two aspects, a debit aspect and an equal and corresponding credit aspect. The debit amount will be equal to the credit amount. For example, Raju buys goods worth Rs 5,000. As goods come in to the business, it represents the debit aspect and cash represents the credit aspect as it goes out of the business. Such a system of accounting is called Double entry system of accounting. This system is followed in India as part of its accounting practice. An Italian named Luca Pacioli developed this system.

Let us see how an account is prepared under such a system.

Cash book

cash payments become necessary. Such items are sold and cash is received by the co-operative store. Here buying and selling takes place on cash basis alone, hence cash transactions ought to be recorded and maintained separately. A cash book is prepared for this purpose.

Cash Book

Cash book is a book which records cash receipts and cash payments. Cash receivable and payable are not recorded here.

Let us see how a cash book is prepared. A cash book has two sides, a debit side and a credit side. The left hand side or the debit side is used to record cash receipts and the right hand side or the credit side is used to record cash payments. Let us now examine how the monthly transactions of a co-operative store are recorded in a cash book.

2003
January

1	Commenced the store with Rs.10,000
5	Purchased books worth Rs.3,000
7	Purchased note books and paper worth Rs.2,000
10	Purchased furniture for Rs.2,000
15	Paid wages Rs.1,000
20	Sold books worth Rs.2,000
23	Sold note books and papers for Rs.1,000
25	Purchased pens for Rs.1,000
31	Sold pens for Rs.500

Debit CASH BOOK *Credit*

Date	Receipts	Amount	Date	Payments	Amount
2003			2003		
Jan1	Capital	10,000	Jan5	Purchase	
20	Sales			(Books)	3,000
	(Books)	2,000	7	Purchase	
23	Sales	1,000		(Note books	
	(Note books			and paper)	2,000
	and paper)		10	Furniture	2,000
31	Sales (Pen)	500	15	Wages	1,000
			25	Purchase (Pen)	1,000
			31	balance c/d	4,500
		13,500			13,500
Feb 1	balance b/f	4,500			

Note: Balance c/d represents balance carried down. Balance b/f represents balance brought forward.

The balance on 1st February as shown in the cash book, appears on the debit side indicating surplus cash with co-operative stores

SUMMARY

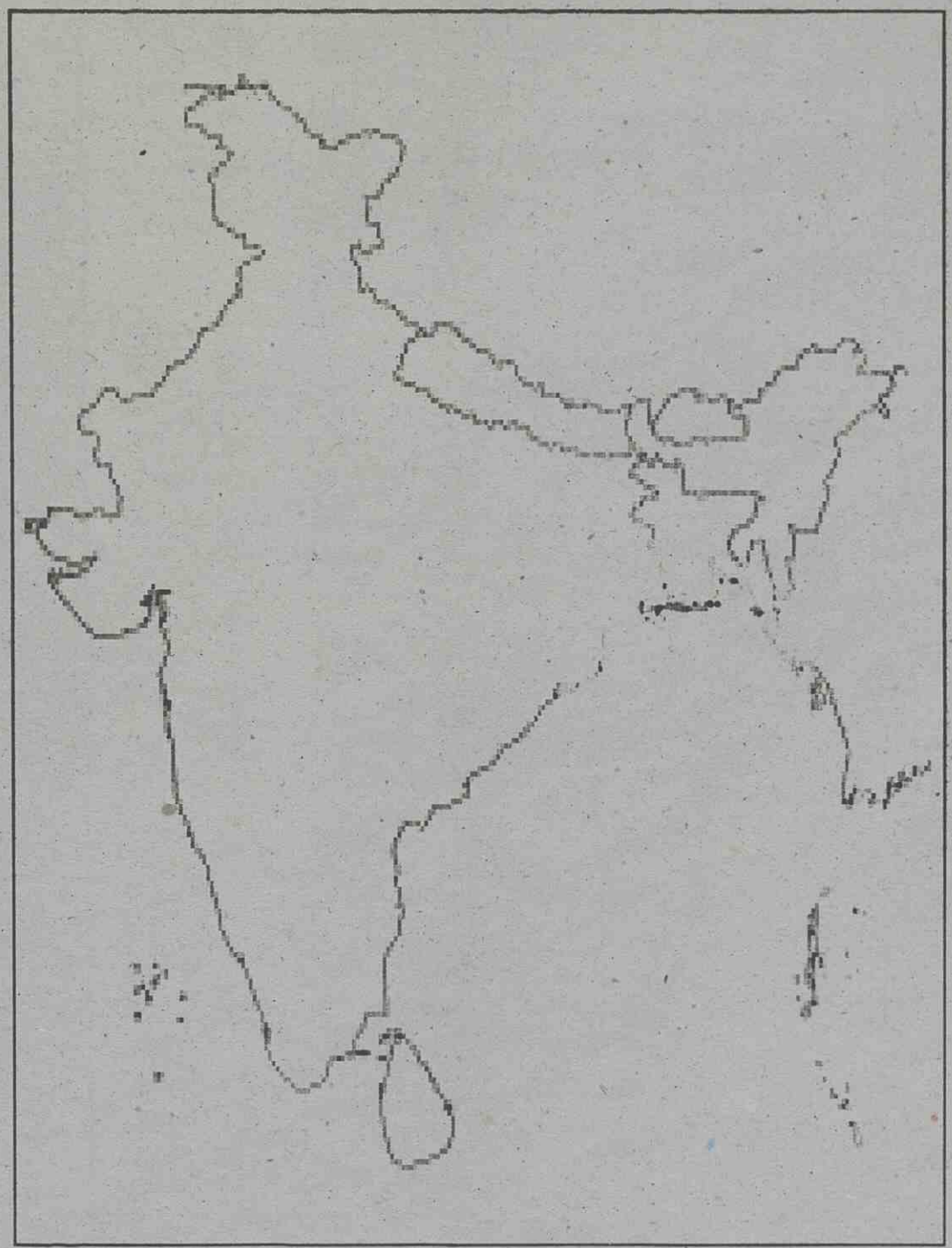
- Sole proprietorship, Partnership, Joint stock companies, Co-operative societies and Joint Family business are different forms of business organisations in the private sector.
- In the public sector, there are three forms of business enterprises- Departmental undertakings. Statutory corporations and Government companies
- Management includes planning of business activities, acquisition of inputs , recruitment and selection of employees, directing and leading different business activities and co-ordinating and controlling the activities of different departments.

- For efficiency in the working of a business organisation, departments are formed based on functions (buying, storage, production, marketing, finance, human resources and general administration) to be undertaken.
- There are certain universally accepted principles of Accounting. These include Separate entity principle, Going concern principle,Money measurement principle and Dual aspect principle.
- Every business transaction will have two aspects. Every debit has an equal and corresponding credit. This is the basic principle of the Double Entry System.
- Cash book is an account book used for recording cash receipts and cash payments.

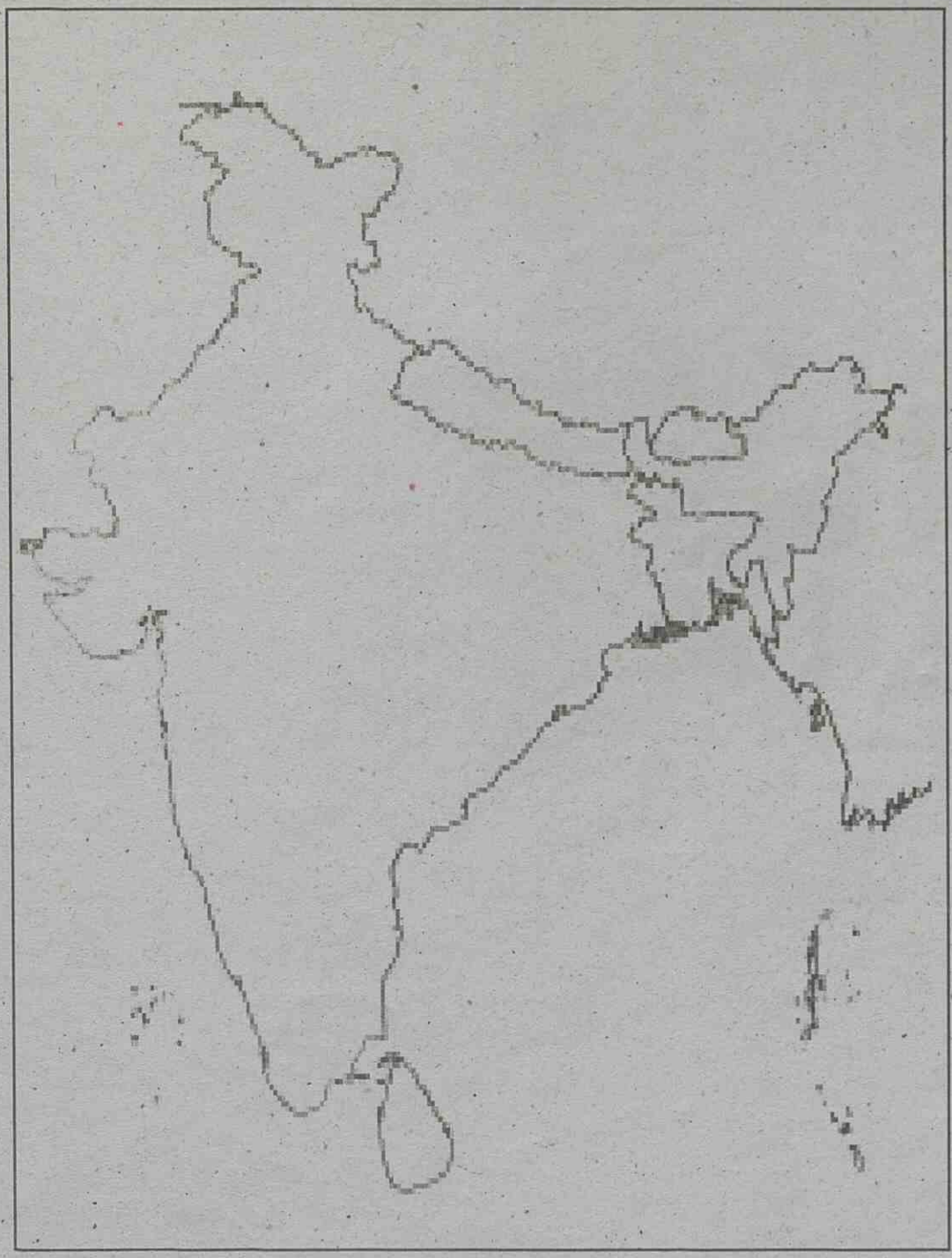
QUESTIONS

1. What is a Cash Book?
2. What are the functions of Financial Management?
3. What are the features of a statutory corporation?
4. Successful management helps in the attainment of business objectives. Explain?
5. What are the fundamental principles of Accounting?
6. Why is a cash book prepared?
7. List out the various departments of a business enterprise and state their functions?

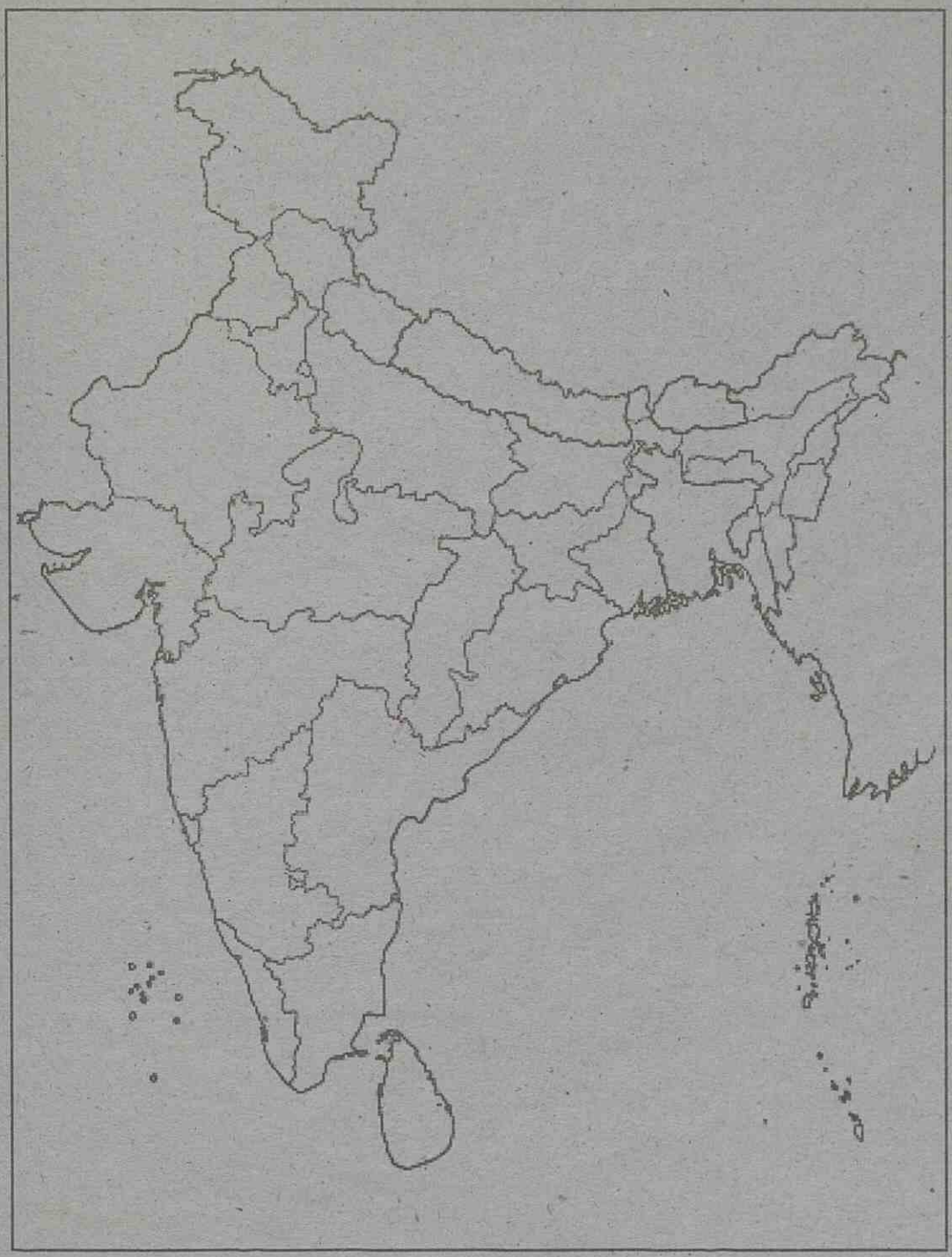
India - Physiography



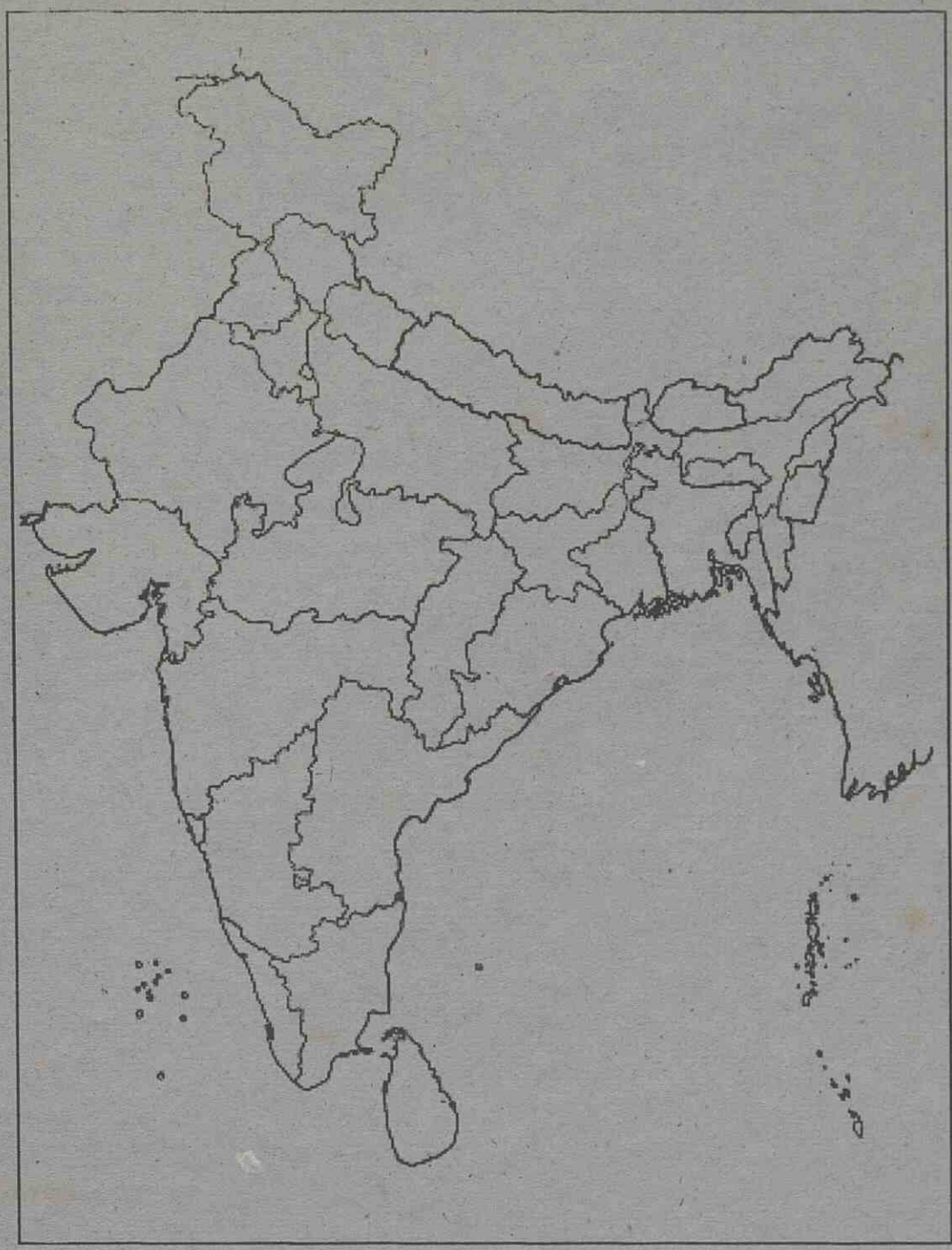
India - Rivers



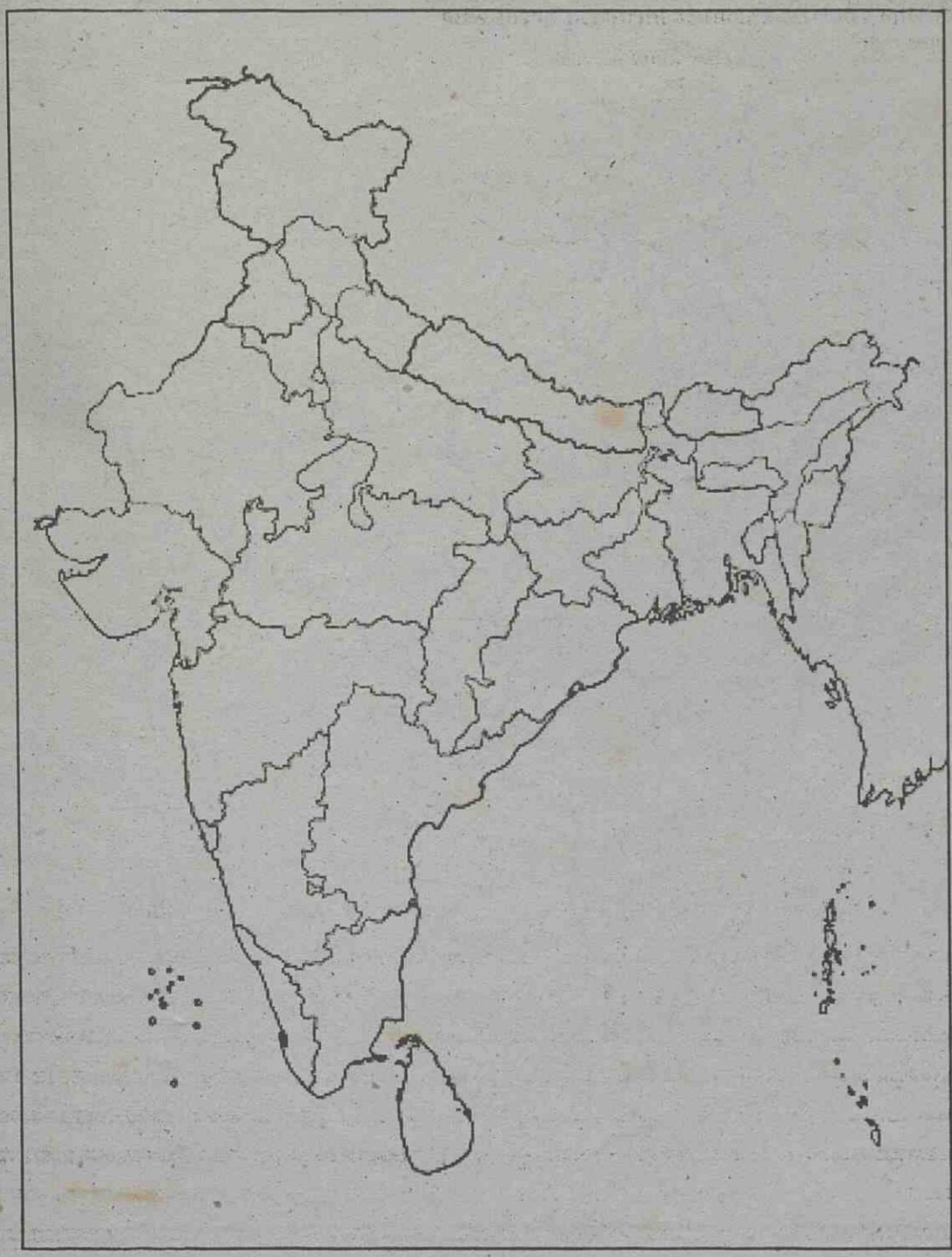
India - Foodcrops



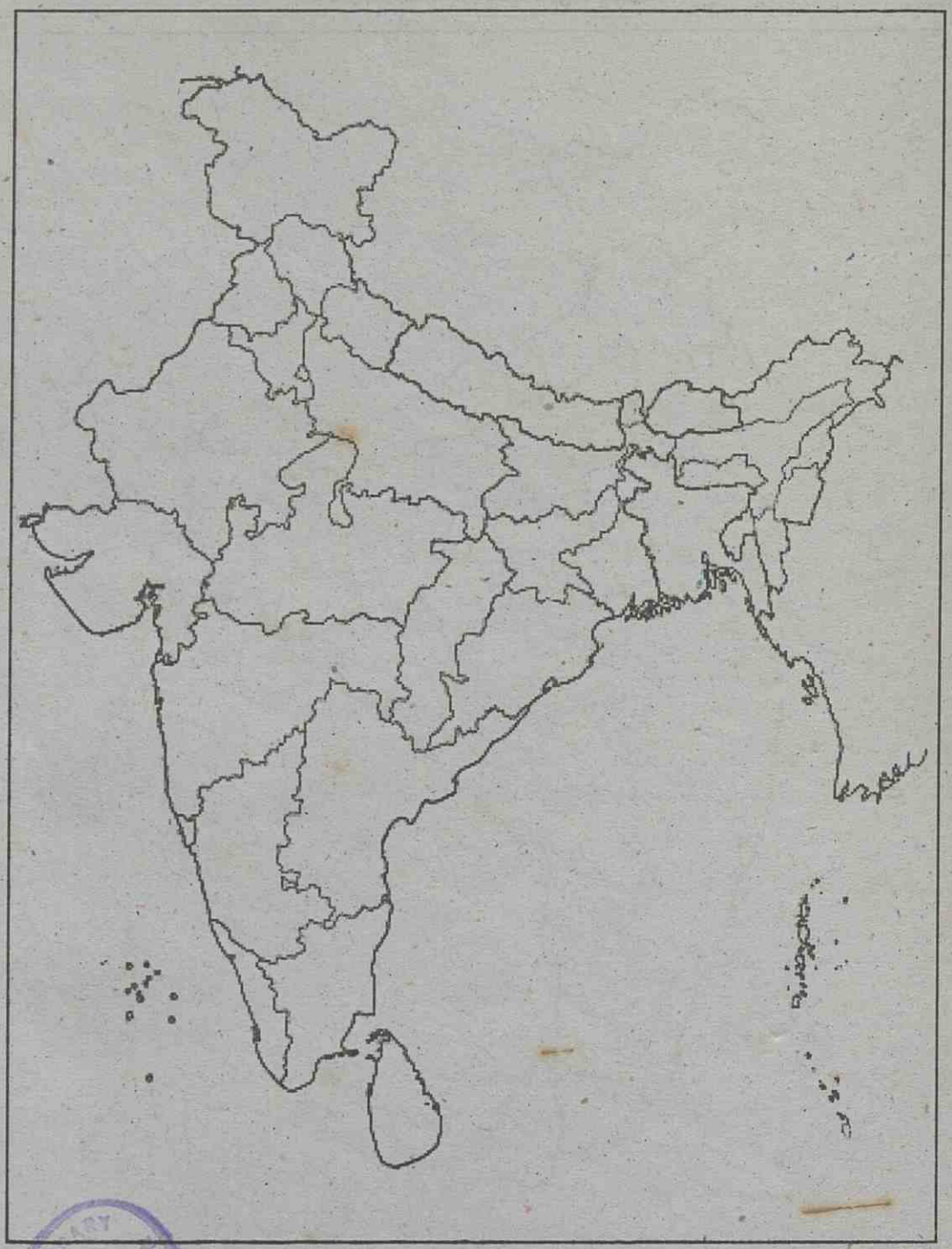
India - Cashcrops

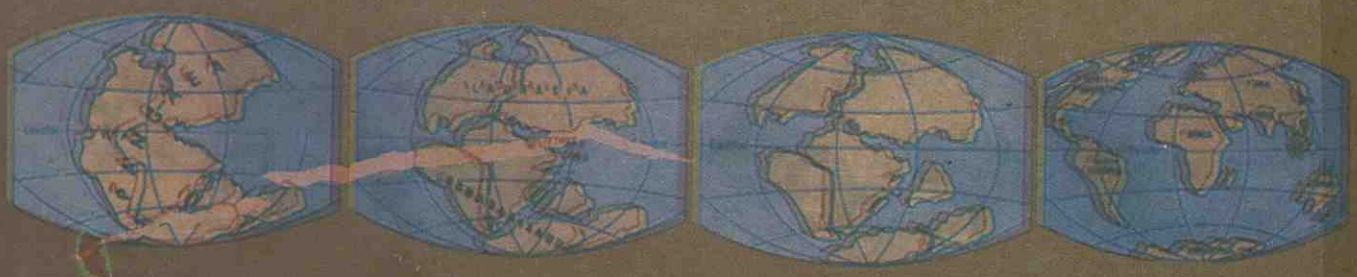


India - Agro based industries



India - Mineral based industries





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KERALA BOOKS AND PUBLICATIONS SOCIETY
KAKKANAD, KOCHI-682 030